Pleistocene and Holocene Palaeoenvironmental Reconstruction of the Carpathian Basin Based on Multiproxy Analysis of Cervid Teeth

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During the Pleistocene and Holocene, large scale climatic changes occurred, resulting in severe environmental changes. Such changes in the Carpathian Basin were examined using dental elements of cervids from localities of Slovakia and Hungary. Their dental wear and the stable carbon and oxygen isotope values of structural carbonate and phosphate in bio-apatite of enamel was measured. Dental wear reflects the long and short term changes of past vegetation, and stable isotope analyses can be used to uncover palaeotemperature and photosynthetic pathways of the consumed plants, thus indirectly providing information on the vegetation. The changes of mesowear scores, from the early Pleistocene onwards, indicate a gradual transition from a more or less closed to an open environment, as climate got cooler. The results of microwear analysis suggest that even though the environment became more open, some tree cover remained in the Carpathian Basin, even in the glacial periods. Based on the measured $\delta^{18}O$ values for glacial periods, estimated temperatures were approximately 5-6 °C cooler, whereas for interglacials, temperatures were similar to the recent climate of Hungary. The $\delta^{13}C$ values of the examined cervids suggest predominantly C_3 plant consumption, which agrees with the fact that C_4 plants are scarcer in colder environments.

Keywords: Dental mesowear; Dental microwear; Stable isotope analyses; Palaeovegetation; Ungulate diet

Introduction

The climatic variability of the Pleistocene and Holocene periods has been characterized by very large fluctuations in global ice volume. The largest changes in the volume of said glacial ice occurred in the Northern Hemisphere, where vast lands are present for ice to form on (e.g., Evans et al. 1977; Berger et al. 1993; Huybrechts 2002). These constant changes of the glacial/interglacial climatic cycles strongly modify terrestrial vegetation belts, extensively affecting terrestrial ecosystems (Faure et al. 2002; Zazula et al. 2003). As a response to these changes, some animals migrated, following their preferred vegetation or climate, while others remained more or less in place enduring actual climatic conditions.

One large herbivore group that remained in the Carpathian Basin during both the glacials and interglacials of the Quaternary are cervids. Some cervid species disappeared and reappeared as warmer and colder periods fluctuated (e.g., *Rangifer tarandus*), whereas others remained in the basin constantly (e.g., *Cervus elaphus*). The environmental tolerances of the cervids are quite wide (e.g., Renecker and Hudson 1990; Gebert and Verheyden-Tixier 2001; Jackson 1997; Kojola et al. 1998). Their constant presence throughout the Pleistocene and Holocene makes them an ideal group for paleoenvironmental purposes.

Meso- and microwear analyses are methods both based on the differing wear properties of the diet of animals. These methods are widely utilized in paleoenvironmental studies because of their fast and straightforward sample procession. Mesowear focuses on the long-term connection between the dentition and the diet, thus it could provide information about the typical forage consumed by the animal during longer periods of its life (e.g., Fortelius and Solounias 2000; Kaiser and Fortelius 2003; Kaiser and Solounias 2003). Based on this, we can gather rough information about the long-term vegetation, and consequently the climate of a region (e.g., Saarinen and Lister 2016; Yamada et al. 2016; Saarinen and Karme 2017). The other common dental wear method, microwear analysis, focuses on the short-term effects of diet on the dentition. The microscopic scars left by the foraged plants show specific traits depending on the diet, and are overwritten quickly, thus reflecting only the last few meals of an animal (Grine 1986). This could also help to make assumptions about the composition and the seasonality of the vegetation (e.g., Rivals et al. 2015; Semprebon et al. 2016; Sánchez-

Hernández et al. 2016; Henton et al. 2017) and behavioural plasticity of given taxa (Rivals and Semprebon 2017).

Investigating the stable isotopic compositions of biomineralized tissues, such as dental enamel, can improve our understanding of past climates and dietary behaviors of mammals (e.g., Tütken et al. 2006; Martin et al. 2008; Kohn 2010; Pushkina et al. 2014). Compared to bone and dentine, enamel has a low organic content, larger average crystal size and a lower porosity, making it much more resistant to diagenetic alterations (Kohn et al. 1999; Skinner 2005). The stable oxygen isotopic composition of phosphate ($\delta^{18}O_{PO4}$) and structural carbonate ($\delta^{18}O_{CO3}$) of the enamel can be linked to the bodily fluids of animals. The isotopic composition of the body water of obligate drinkers is partially related to the oxygen isotopic composition of environmental water, which is dependent on climate (e.g., Longinelli 1984; Luz and Kolodny 1985). Cervids obtain around 60-75% of their total water intake from voluntary drinking water intake, thus the isotopic composition of their body water roughly represents the chemical composition of precipitation (Alexander and Segiura 1990). Because of the strong P-O bonds, the phosphate oxygen (compared to the carbonate oxygen) is considered more resistant to inorganic alterations, making it more suitable for climatic reconstructions (e.g., Kohn et al. 1999; Vennemann et al. 2002). The stable carbon isotopic composition of the structural carbonate of enamel is partially dependent on the diet of mammals. Through extracting a $\delta^{13}C$ value, it becomes possible to reveal some properties (such as the C_4 plant, i.e. predominantly the grass content) of past vegetations (e.g., Cerling and Harris 1999; Passey et al. 2005).

Complex environmental reconstructions of the Pleistocene and Holocene in the Carpathian Basin based on large mammals are scarce. Most isotope data are from proboscideans and rhinoceroses (Kovács et al. 2012; Virág et al. 2014; Kovács et al.

2015), and dental wear methods were only used on some proboscideans (Virág 2013, Haiduc et al. 2018). Studies that use dental wear and stable isotope analyses simultaneously are rare which makes, evaluating and comparing the results of such methods difficult (e.g., Tütken et al. 2013; Rivals et al. 2015), even on a global scale. The aim of this study is to make up for this scarcity of Quaternary paleoenvironmental data in the Carpathian Basin, using a locally understudied large mammal group, the cervids. Furthermore, this study could also encourage other researchers to utilise multiproxy analyses to obtain better and more reliable palaeoenvironmental results from vertebrate assemblages.

Materials

The geographic distribution of Pleistocene and Holocene cervid bearing localities selected for the present study and their estimated age are shown in Figure 1, Figure 2, and in Table 1. The examined localities cover most of the middle to late Pleistocene and Holocene. However, there are some gaps in this time interval, as well. The two major gaps from this interval range from about 130 ka to 90 ka, and from about 650 ka to 500 ka. The former interval includes most of the Marine Isotope Stage (MIS) 5, and the latter includes MIS 14 and 15. The biggest gap in our database is from the early Pleistocene. No localities were included from the interval ranging from 1.25 Ma to 800 ka, due to the lack of localities with such age, and in the case of known localities the lack of cervid materials. All of the studied teeth were recovered from cave sediments, apart those from Zebegény, Zalaegerszeg, Mogyorósbánya, Pilismarót and Ságvár, which are open air archaeological sites.

Cervids, as a taxonomic group, are generalist herbivores (e.g. Jenkins and Wright 1988; Launchbaugh and Urness 1992, Rivals and Lister 2016). Individuals of the genera

Alces (elk), *Capreolus* (roe deer), *Cervus* (red deer), *Dama* (fallow deer), *Megaloceros* (irish elk) and *Rangifer* (reindeer) were present in Hungary throughout the Pleistocene and Holocene, and their teeth are one of the most common remains from these aforementioned periods. Their abundance and wide stratigraphic distribution throughout the Quaternary makes them an ideal group for palaeoenvironmental investigations. For the dental wear analyses, in total 727 molars and premolars were selected from adult specimens from one Slovakian and 27 Hungarian localities. From these, 74 molars were in adequate condition for the low-magnification microwear analysis. Samples of tooth enamel for stable isotope analyses were collected from 31 specimens from one Slovakian and eight Hungarian localities. The samples for this study were acquired from the collections of the Hungarian Natural History Museum, Department of Palaeontology and Geology (Budapest), the Mining and Geological Survey of Hungary, Department of Geological and Geophysical Collections (Budapest) and the Archaeozoological collection of the Hungarian National Museum (Budapest). The list of the selected specimens with all necessary identification information and the different examinations performed on are found in the Supplementary material (Table S1).

Methods

Dental mesowear analysis

The mesowear analysis, executed following the method proposed by Mihlbachler et al. (2011), focuses on the long-term, lifelong connection between the dentition of an animal and its forage. Depending on the composition of the consumed plants, the enamel facets of teeth could develop in different ways. The consumption of hard, abrasive plant materials increases food-to-tooth contact (abrasion), eradicating facets and eventually resulting in worn down, abraded teeth. On the other hand, the consumption of soft plant materials decreases food-to-tooth contact and increases tooth-to-tooth contact (attrition). This process constantly creates facets, resulting in teeth with sharp edges and pointed apices. The mesowear analysis focuses on the buccal shearing edges of the enamel surfaces of upper molars, and the lingual shearing edges of the lower molars. Applying the mesowear-ruler developed by Mihlbachler et al. (2011), the selected teeth were divided into seven mesowear categories, receiving scores ranging from 0 to 6 based on their facet development. Stage 0 is interpreted as an extreme browser, consuming almost exclusively soft plant materials, having teeth with high and sharp cusps. On the other hand, stage 6 is interpreted as an extreme grazer, consuming almost exclusively abrasive plant materials, having teeth with completely abraded, flat cusps. The scores in between indicate an increasing portion of abrasive plant materials in the diet of the animal (Mihlbachler et al. 2011). The main dietary categories were separated by Rivals and Semprebon (2017) as follows: browsers are specimens with mesowear scores between 0 and 2, mixed-feeders are specimens with a mesowear index between 0.5 and 3, whereas grazers are specimens, whose mesowear index is higher than 2. Based on this aforementioned article, we used the following dietary categories in this study: clear browsers were specimens with scores between 0 and 0.5; browse-dominated mixed feeders were those specimens, that fell into the overlapping part of the browser and mixed feeder interval, falling between 0.5 and 2; graze-dominated mixed feeders were those specimens falling into the overlapping part of the mixed feeder and grazer categories, with index values between 2 and 3; grazers were specimens with mesowear scores higher than 3. Unworn and fully-abraded molars were excluded from the analysis, for their inclusion could provide misleading dietary interpretation (Kaiser and Fortelius 2003; Rivals and Solounias 2007). Scoring was done based on high definition photographs of the molars of the selected specimens.

Dental microwear analysis

The other dental wear method, microwear analysis focuses on short term dietary preferences of an animal. The microwear observed on the enamel surface is constantly rewritten every few days, representing the abrasive properties of the most recently consumed forage items (Grine 1986). Microwear analysis was conducted on high resolution epoxy replicas of the selected specimens following the methodology of Solounias and Semprebon (2002) and Semprebon et al. (2004). Before casting, the surface of the teeth were thoroughly cleaned with acetone and ethanol, to remove debris, glue, or other contamination from the enamel surfaces. After cleaning the specimens a polyvinylsiloxane mold was made using Coltene Affinis Precious light body fast dental impression material. These molds were then cast using Epo-Tek 301 resin. The high resolution of both these materials enables the observation and quantification of micron scale scars on the enamel surface.

The enamel of teeth might be a sturdy material, but it is still susceptible to damage caused by the consumed forage items. On a microscopic scale, two kinds of such enamel scars are the most common: scratches and pits, which can be identified based on their shapes and refraction properties. Pits are scars that have approximately similar width and length; whereas scratches are elongated features with straight, parallel sides. By carefully adjusting the angle, in which the light strikes the casts, pits and scratches become separable based on their refractive properties. Small pits, fine and coarse scratches have high refractivity, they can become relatively bright under certain lightning properties. Large pits and hypercoarse scratches are less refractive, they always remain darker. Fine, coarse and hypercoarse scratches, as well as small and large pits were not differentiated from each other (see Solounias and Semprebon (2002) and Semprebon et al. (2004) for details). Scratches and pits were quantified under 35× magnification on five 0.16 mm^2 areas (measured with an ocular micrometre) on each specimen if possible, and averaged to best represent the microwear signal of a given specimen (Szabó and Virág in press). If possible, upper and lower second molars were selected, for they are the most widely utilized teeth for such analyses. However, if other molars or premolars were in adequately fine condition, they were also included, for their microwear signal is similar to that of the second molars (Xafis et al. 2017; Szabó and Virág in press).

Stable isotope analysis

Samples of tooth enamel for stable isotope analyses were collected from 31 specimens from one Slovakian and eight Hungarian localities. Each selected tooth was thoroughly cleaned with ethanol and distilled water. After the cleaning, the teeth were dried. Bulk powdered enamel samples were collected from each tooth. The samples were taken from the metaconules and hypoconids of the teeth. For the sampling tungsten-carbide coated drill bits were used, to avoid any contamination with extraneous materials, the drill bits were thoroughly cleaned between each sampling. The enamel was ground from the bottom, to the top of the tooth crown, thus representing the whole dental development period of a given animal's life. Due to the destructive sampling method, to ensure minimal degradation of the collections material, only a small amount of enamel samples could be collected. A subset of all samples were selected for both $\delta^{18}O_{PO4}$ and $\delta^{18}O_{CO3}$ analyses, to check for diagenetic alteration (see Table S1. for details). Based on the results of the subset samples, specimens from the same localities were deemed altered or unaltered, and analysed furthermore accordingly.

All isotope analyses were performed in the Isotope Climatology and Environmental Research Centre, Institute for Nuclear Research, Debrecen, Hungary.

For the ^{18}O measurement of the phosphate, 3 mg of ground enamel was used. Calcium-acetate/acetic acid buffer (1 mol/L, pH 5.0), hydrogen peroxide (10 $^{w}/_{w}$%) and sodium hypochlorite (12 $^{w}/_{w}$%) were used to get rid of organic components and secondary carbonates from the bioapatite. Afterwards, the phosphate content of the samples were dissolved in hydrogen fluoride (2 mol/L), then it was precipitated in silver phosphate form by adding silver nitrate (2 mol/L) to the solute (Garvie-Lok et al. 2004; Bassett et al. 2007; Szabó et al. 2017). The phosphate $\delta^{18}O$ was determined in a DeltaPLUS XP isotope ratio mass spectrometer equipped with a high temperature elemental analyzer. The measurement sequence was calibrated with known isotopic phosphate standards: the international B2207 ($\delta^{18}O_{VSMOW}$ = +21.7‰) and our in-house standard ($\delta^{18}O_{VSMOW}$ = +12.26‰ determined in University of Lausanne). The standard deviation of the $\delta^{18}O$ analysis was 0.3‰.

Since the carbonate content of the enamel samples were very low, a large amount (~1 mg) of bioapatite was used for the analysis of the ^{18}O and ^{13}C content of the carbonate. The sample materials were digested with phosphoric acid (over 104% cc.) in a Kiel IV automated carbonate extraction device. The liberated CO_2 was then admitted to a MAT 235 Plus high resolution isotope ratio mass spectrometer. The results were normalized against three types of international carbonate reference material (NBS-18, NBS-19 and IAEA-LSVEC) which were measured in the same carousel with the unknown samples. The standard deviation of the $\delta^{13}C$ and $\delta^{18}O$ analysis were 0.05‰ and 0.08‰, respectively.

$\delta^{18}O$ analysis

The measured $\delta^{18}O_{PO4}$ values are directly related to the oxygen isotopic composition of the body fluids of the cervids, which is directly related to the isotopic composition of their drinking water, and so the precipitation as well (Longinelli 1984;

Luz et al. 1984; Bryant and Froelich 1995). The isotopic composition of precipitation is influenced by many factors, such as temperature, latitude, altitude and continental effects (Zanazzi et al. 2015). Precipitation is enriched in heavy oxygen isotopes in warmer climates, and as the wind systems carry it from warmer to cooler areas, it gradually loses its heavy ^{18}O-enriched water component (Dansgaard 1964). This makes it possible to calculate a mean annual temperature (MAT) for past times from the $\delta^{18}O$ values of precipitation.

To evaluate this relationship between MAT and precipitation isotopic composition in the Carpathian Basin, a database was established from the data of seven GNIP (Global Network of Isotopes in Precipitation) laboratories. These seven locations are from Austria (Hohe Warte), Croatia (Zagreb-Grič), Hungary (Debrecen) and Slovakia (Bratislava, Milhostov, Mochove, Topoľníky). The inclusion of these four countries should represent the connection between the temperature and water isotopic composition in the Carpathian Basin well. The database includes 1762 registries, with the country, the laboratories, the latitude and longitude, the altitude, the $\delta^{18}O$ value of precipitation, the amount of precipitation and the measured air temperature for each one (Table S2). A standard major axis regression (MAR) was calculated for the air temperature and the $\delta^{18}O$ value of precipitation (Figure 3). The MAR was chosen over an ordinary least squares regression (OLS) because both examined variables were measured, thus both variables are burdened with measurement errors. MAR can deal with such a problem, whereas an OLS is not viable in a situation like this (Smith 2009; Ludbrook 2010). Based on the results of the MAR, a strong linear positive correlation can be made between the temperature and the precipitation isotopic composition (r^2=0.4758):

$$MAT = 1.95 \times \delta^{18}O_{H2O} + 27.67$$

To calculate an MAT from enamel phosphate, it is also necessary to evaluate the connection between the $\delta^{18}O_{PO4}$ and the $\delta^{18}O_{H2O}$. Another database was built from extant artiodactyls from literature: Bovidae (*Bos primigenius*, *Ovis aries*), Cervidae (*Cervus canadensis*, *C. elaphus*, *D. dama*, *R. tarandus*) and Suidae (*Sus scrofa*) (Longinelli 1984; D'Angela and Longinelli 1990; Fricke et al. 1998; Iacumin and Longinelli 2002). This database consists of phosphate isotopic measurements of tooth enamel and bone, the species, the locality, the measured $\delta^{18}O_{PO4}$ and the estimated $\delta^{18}O_{H2O}$ of the drinking water of these specimens (Table S3). The relationship between the two variables in question was also checked with an MAR for the aforementioned reasons (Figure 4). There was a strong, linear, positive correlation between the two variables (r^2=0.7158):

$$\delta^{18}O_{H2O} = (\delta^{18}O_{PO4} - 21.39) / 0.74$$

Using these equations, it is possible to calculate a precipitation isotopic composition from the enamel phosphate of a given specimen, and after, to calculate an MAT from the previously calculated $\delta^{18}O_{H2O}$ value. Thus, it is possible to evaluate the paleotemperature of the Carpathian Basin based on the bulk enamel samples taken from the Pleistocene and Holocene cervid specimens.

$\delta^{13}C$ analysis

Carbon fixation in plants can follow three different photosynthetic pathways: C_3 (Hatche-Slack cycle), C_4 (Calvine-Benson cycle) and CAM (Crassulacean Acid Metabolism) (Smith and Epstein, 1971; Dawson et al. 2002). In C_3 photosynthesis, the oxygen sensitive RUBISCO (ribulose-bis-phosphate carboxylase/oxygenase) fixes CO_2, resulting in phosphoglyceric-acid as its first stable C_3 product. The measurable $\delta^{13}C$ values in plants utilizing the C_3 pathway ranges from -22‰ to -35‰, and average around -27.8‰ (O'Leary, 1981). In the other two pathways (C_4 and CAM), the oxygen insensitive PEPC (phosphoenolpyruvate carboxylase) fixes CO_2, and malic acid is the first stable C_4 product (Lüttge 2002; Ehleringer et al. 1991). This process reduces photorespiration and increases photosynthetic rates, improving nitrogen and water use efficiency (Hibberd et al. 2008; Langdale 2011). The measurable ^{13}C isotopic composition of plants with a C_4 pathway - typical of monocotyledonean grasses and some trees and shrubs from warmer climates - ranges between -10‰ and -14‰, with an average around -13.5‰ (Cerling et al. 1997; Keeley and Rundel 2003). The CAM pathway - found in succulents, such as cacti, members of orchids and bromeliads - has $\delta^{13}C$ values between -10‰ and -35‰ (Gröcke 1997; Ehleringer and Monson 1993). However, their distribution is limited and they play a minor role in the diet of large mammals, thus their presence or absence does not affect the carbon isotopic analyses. The measurable $\delta^{13}C$ values of the bioapatite of extant large ruminant mammals are typically 14.1±0.5‰ higher than those of their forage plants (Cerling and Harris 1999), thus to infer information about the past diet of the animal, 14.1‰ was subtracted from the $\delta^{13}C$ values measured from the apatite. C_4 plants in Central Europe are rare compared to C_3 plants (Pyankov et al. 2010). Based on this, no specimen with a specific C_4 diet should be found, however the ratio between the C_3 and C_4 plants could have been different in past times, so some additional information can be extracted from these measurements.

Results

Dental mesowear analysis

Mesowear analysis was conducted on 726 dental remains from 28 Pleistocene and Holocene localities. The average mesowear score for the Pleistocene and Holocene periods is 3.26 (Table 2, Figure 5).

From the early Pleistocene Osztramos 8, the teeth of nine *Cervus* sp. specimens were analyzed, with an average mesowear score of 1.44. This score would classify the cervids from the early Pleistocene as browse-dominated mixed feeders (Table 2, Figure 5).

From the middle Pleistocene, 92 cervid dental elements were given a mesowear score, which had a mean of 2.33. Such a score would classify all middle Pleistocene cervids into the grass-dominated mixed feeder dietary category. The examined ten *Alces* specimens from Gombasek had an average score of 2.4, the nine *Capreolus* specimens from the same locality had a score of 3.67. The 64 *Cervus* specimens examined from Gombasek, Vértesszőlős II, Tarkő Rock-shelter, Vár Cave, Hórvölgy Rock-shelter and Uppony I had a mean score of 2.18. Furthermore six *Dama* specimens were examined from the locality of Üröm Hill with a mean mesowear score of 1. Two *Megaloceros* specimens were examined from Gombasek and Szuhogy-Csorbakő, with a mean value of 3. One *Rangifer tarandus* from Szuhogy-Csorbakő was also examined, its mesowear score was 6 (Table 2, Figure 5).

The mesowear scores of 601 cervids teeth were measured from 14 late Pleistocene localities. The average of the mesowear scores registered for this period was 3.43. Based on this score, the typical cervid of the late Pleistocene was a grazer. In total, ten *A. alces* specimens were examined from Lambrecht Cave, Kiskevély Cave, Istállóskő Cave and Szelim Cave, their average mesowear score was 3.1. From Lambrecht Cave and Istállóskő Cave 14 *C. capreolus* teeth were scored, with an average of 1.99. Apart from that 27 *C. elaphus* specimens were also examined from the localities Lambrecht Cave, Kiskevély Cave, Tapolca Cave, Tokod-Nagyberek, Szelim Cave and Zebegény. The average mesowear score for these specimens was 3.85. Additionally, ten specimens of *M. giganteus* were examined from Lambrecht Cave, Tapolca Cave, Tokod-Nagyberek and Zalaegerszeg, with a mean mesowear score of 3.7. Furthermore, a mesowear score was registered for 540 *R. tarandus* specimens, with a mean value of 3.46 (Table 2, Figure 5).

Two localities, Berva-völgy Cave and Remete Cave were from the Pleistocene-Holocene boundary. Eight cervid teeth were checked for their mesowear for this period, with a mean value of 2.5. Cervids based on this score would be classified into the grass-dominated mixed feeder dietary category. Six *C. elaphus* were examined from the aforementioned two localities, their mean mesowear score was 2.5. Furthermore, two *M. giganteus* specimens were examined from Berva-völgy Cave, their average mesowear score was also 2.5 (Table 2, Figure 5).

From the Holocene, 16 cervid teeth from three localities, Petényi Cave, Baradla Cave and Kiskőhát Cave were used for mesowear analysis. The mean of these 16 scores was 3.94, classifying these cervids into the grazer category. Eleven *C. elaphus* specimens were examined from Petényi Cave and Baradla Cave, their mean mesowear score was 3.55. Additionally, five *R. tarandus* mesowear scores were registered with an average score of 4.79 (Table 2, Figure 5).

Dental microwear analysis

In total, 73 teeth were examined for microwear scars from 22 localities. The counted scratches and pits, as well as their standard deviation can be seen in Table 3 and plotted against the dietary morphospaces suggested by Solounias and Semprebon (2002) and Semprebon et al. (2004) on Figure 6. The average scratch count for all specimens was 20.14, ranging from 6 to 49. The average pit count for all specimens was 19.67, ranging from 3 to 46.

From the early Pleistocene Osztramos 8 locality, one *Cervus* specimen was analysed, its scratch count was 23.6 and its pit count was 19.2 (Table 3, Figure 5-6).

From the middle Pleistocene, twelve *Cervus* specimens were analysed from six localities (Gombasek, Vár Cave, Vértesszőlős II, Tarkő Rock-shelter, Uppony I and Hórvölgy Rock-shelter). The average number of scratches on the selected areas was 19.9, and the average number of pits on the same areas was 25.5. Furthermore, two *Alces latifrons* specimens were included from Gombasek, the average number of scratches on their teeth was 16.5, and the average number of pits was 15. One *Capreolus* specimen was also examined from Gombasek, the average number of scratches on its teeth was 9.4, and the average number of pits was 30.6. From Üröm Hill, four *Dama* specimens were examined, with their dental microwear being an average of 16.4 scratches and 33.2 pits (Table 3, Figure 5-6).

From the late Pleistocene the microwear of in total 47 cervid specimens was quantified. Four *A. alces* specimens from Szelim Cave and Istállóskő Cave were examined with average scratch count being 17.2 and average pit count being 14.5. One *C. capreolus* specimen was also included from the Lambrecht Kálmán Cave, with 9 and 27 scratches and pits, respectively. Furthermore, eight *C. elaphus* specimens were analysed from Tapolca Cave, Kiskevély Cave, Lambrecht Kálmán Cave, Szelim Cave, Tokod-Nagyberek and Zebegény. The mean scratch and pit counts for said specimens were 26.9 and 15.1, respectively. Also eight *M. giganteus* specimens were examined from this period, from Tapolca Cave, Lambrecht Kálmán Cave, Tokod-Nagyberek and Zalaegerszeg. The average scratch count for these specimens was 24, and the average pit count was 36.2. In total, 26 *R. tarandus* specimens were examined from this period, from Szelim Cave, Szeleta Cave, Ságvár, Peskő Cave, Jankovich Cave and Istállóskő Cave. These specimens had an average scratch count of 18.3, and an average pit count of 10.9 (Table 3, Figure 5-6).

From the Pleistocene-Holocene transition, the microwear of one *M. giganteus* specimen was examined from Berva-völgy Cave. The average number of scratches was 24.2, and the average number of pits was 31 (Table 3, Figure 5-6).

Five *C. elaphus* specimens were analysed from the Holocene period. The five specimens were from two localities, namely Petényi Cave and Baradla Cave. The average number of scratches on the teeth of the selected specimens was 23, and the average number of pits was 21.5 (Table 3, Figure 5-6).

Stable isotope analysis

In total 28 phosphate, and 24 carbonate measurements were conducted. The results of the oxygen and carbon isotopic compositions of the examined samples, the calculated $\delta^{18}O$ values for environmental water and the estimated paleotemperatures are given in Table 4. The test of diagenetic effects was done on those samples that had both phosphate and carbonate measurements. The majority of the enamel samples seem to be diagenetically unaltered, as most data points plot inside the 95% confidence interval of the $\delta^{18}O_{CO3}$–$\delta^{18}O_{PO4}$ regression calculated for modern cervids (Pellegrini et al. 2011) (Figure 7). Only one of the Üröm Hill *Dama sp.* specimens fell outside the confidence interval, marking that the results of that locality should further be treated with caution (Figure 7). The calculated environmental water $\delta^{18}O$ values range from -13.9‰ to -5.4‰, with a mean value of 9.5‰. The estimated palaeotemperature values for the Pleistocene range from 0.6 °C to 17.2 °C, with a mean value of 9.2 °C. Excluding the only diagenetically altered specimen from Üröm Hill decreased the mean Pleistocene temperature to 9.0 °C. The measured $\delta^{13}C$ values of the enamel samples ranged from -0.37‰ and -11.75‰, which resulted in vegetation $\delta^{13}C$ values ranging from -14.47‰ to -25.85‰ (Figure 5).

From Gombasek, four diagenetically unaltered specimens of a *Cervus* species were analyzed. The $\delta^{18}O_{PO4}$ values of the four specimens ranged from 13‰ to 15.3‰, with a mean value of 14.3‰. The average of the calculated environmental water $\delta^{18}O$ value and the mean annual temperature was -9.58‰ and 8.99 °C, respectively. From this locality, carbon isotopic composition could be measured on three specimens, with values ranging from -9.7‰ to -10.79‰, with an average value of -10.09‰ (Table 4, Figure 5).

From the locality of Üröm Hill, two *Dama* specimens were included in this study. From the two specimens, one was unaltered, the other one fell outside but close to the border of the confidence interval of the $\delta^{18}O_{CO3}$–$\delta^{18}O_{PO4}$ regression. The measurements based on this second specimen should be treated with caution. The $\delta^{18}O_{PO4}$ values of the two specimens were 14.5‰ and 16.6‰. The average calculated environmental water $\delta^{18}O$ value and the mean annual temperature was -7.89‰ and 12.28 °C respectively. The measured carbon isotopic compositions were -3.4‰ and -6.06‰, with a mean value of -4,73‰ (Table 4, Figure 5).

Vár Cave is represented by one *Cervus cf. elaphus* specimen with a $\delta^{18}O_{PO4}$ value of 14.3‰. The calculated environmental water $\delta^{18}O$ value based on this value was -9.58‰, which resulted in a mean annual temperature of 8.99 °C (Table 4, Figure 5).

From the Tarkő Rock-shelter, four unaltered *Cervus acoronatus* specimens were analysed. The $\delta^{18}O_{PO4}$ values of the four specimens ranged from 13.2‰ to 15.9‰, with a mean value of 14.15‰. The average of the calculated environmental water $\delta^{18}O$ value and the mean annual temperature was -9.79‰ and 8.59 °C, respectively. The $\delta^{13}C$ value of the structural carbonate of the enamel of the examined specimens ranged from -8.43‰ to -10.85‰, with a mean value of -9.72‰ (Table 4, Figure 5).

Four *C. elaphus* specimens were studied from Uppony I, these specimens were diagenetically unaltered. The range of the $\delta^{18}O_{PO4}$ values were from 14.6‰ to 17.3‰, with a mean value of 15.9‰. The average of the calculated environmental water $\delta^{18}O$ value was -7.42‰ and the mean annual temperature was 13.21 °C. δ13C values were gained from three *C. elaphus* specimens from this locality, ranging from -5.3‰ to -11,03‰, with an average of -7.74‰ (Table 4, Figure 5).

From the Lambrecht Cave, four *C. elaphus* specimens were included in this study. The $\delta^{18}O_{PO4}$ values ranged from 13‰ to 17.4‰, with a mean value of 14.98‰. The mean $\delta^{18}O$ of the calculated environmental water was -8.67‰ and the mean annual temperature was 10.77 °C. The carbon isotopic composition of all four specimens could be measured as well, resulting in values ranging from -9.63‰ to -9.95‰, with a mean value of -9,84‰ (Table 4, Figure 5).

Based on the diagenetic alteration test, the *R. tarandus* specimens from Szeleta Cave were unaltered. The $\delta^{18}O_{PO4}$ values of the specimens were 12.1‰ and 14.8‰. The average calculated environmental water $\delta^{18}O$ value and the mean annual temperature was -10.73‰ and 6.75 °C, respectively. One of the $\delta^{13}C$ measurements had a notably higher value, and higher standard deviation compared to the others (-0.37‰). This value, which is shown on Figure 5, was treated here as an outlier, thus it was left out of further analyses. The other values were -4.2‰ and -11.75‰ (Table 4, Figure 5).

Two *M. giganteus* and two *C. elaphus* specimens were analyzed from Tokod-Nagyberek. Their $\delta^{18}O_{PO4}$ values ranged from 11.1‰ to 14.8‰, with a mean value of 13.13‰. The mean $\delta^{18}O$ of the calculated environmental water was -11.17‰ and the mean annual temperature was 5.89 °C. One *M. giganteus* and one *C. elaphus* tooth was checked for carbon isotopic composition, their values were -12.39‰ and -9.07‰ respectively (Table 4, Figure 5).

The youngest locality, Ságvár is represented by four supposedly unaltered *Rangifer tarandus* specimens. The $\delta^{18}O_{PO4}$ values of the specimens ranged from 12.3‰ to 14.6‰, with a mean of 13.53‰. The calculated mean $\delta^{18}O$ of the environmental water was -10.62‰, and the mean annual temperature was 6.97 °C. All four *R. tarandus* specimens were checked for ^{13}C composition, their values ranged from -7.93‰ to -10.46‰, their average $\delta^{13}C$ value was -9.38‰ (Table 4, Figure 5).

Discussion

Dietary preferences

Cervids are considered to be a generalist herbivore group, as they do not require strictly one or a few plant species, but rather forage on the available plants (e.g., Jenkins and Wright 1988; Launchbaugh and Urness 1992). However, this does not mean that different cervid species do not have preferred forage materials and are indistinguishable based on their diet. The mesowear and microwear analyses of the present study further support that different cervid species have different diets.

Elk, the largest extant cervid inhabits the northern parts of North America and Eurasia. As a rather cold-adapted species, its presence in southern regions is scarce. Elks are generally considered to be browsers, selecting foods with less fiber and high concentrations of nutrients (Renecker and Hudson 1990; Juntheikki 1996). The examined Pleistocene *Alces* specimens had mesowear scores characteristic of browse- and grass-dominated mixed feeders (Figure 5), and their microwear suggested a browsing or an intermediate feeding type (Figure 6), which agrees with the results of the aforementioned literatures.

Roe deers are small-bodied cervids, inhabiting most of Eurasia, except for the northernmost parts. They are considered to be browsers, feeding on buds and soft plant materials (Navarre 1993; Tixier and Duncan 1996). The microwear of the examined *Capreolus* specimens also showed this trait, as they occupied a small range in the browser dietary morphospace (Figure 6). The mesowear of most examined specimens also suggest a less abrasive diet, except for the Gombasek specimens (Figure 5).

Red deer is one of the most widespread cervids in Europe. The members of this taxon can survive in almost any kind of environment with sufficient forage materials. This could be due to the mixed feeder diet of the group (Renecker and Hudson 1990; Gebert and Verheyden-Tixier 2001). This mixed feeder trait was also marked in the present study, as *Cervus* specimens were found as grazers, browsers and intermediate feeders based on both their mesowear and microwear signals (Figure 5, Figure 6). In addition, whereas other examined cervids occupied only a smaller part of the dietary space, red deer not only spanned a much larger part of this morphospace, but changed its diet throughout the Pleistocene and Holocene based on the available forage plants, making this species extremely useful for paleoenvironmental reconstructions. Their mesowear score showed a gradual increase from the early to the late Pleistocene and Holocene. This gradual increase could have been associated with the opening of the vegetation as the climate got cooler, or with increased dust and grit intake of the more arid environments of the late Pleistocene. Based on their microwear, they mostly occupied the grazer and mixed feeder categories. When multiple deer species were present in the same locality, red deer had a microwear signal typical of grazers, possibly due to niche separation between different large herbivore species. As this species is considered to have a mixed diet, if other dietary niches are occupied, it can occupy any given dietary space. There is a slight difference between the diet of this species based on meso- and microwear analysis. This could be due to the possible bias of the microwear data towards specimens dying of during the seasons with higher mortality rates, during more stressful times of year (Young 1994; Gogarten et al. 2012; Taylor et al. 2016). On the other hand, mesowear represents the whole time period of an animal life, thus excludes this aforementioned bias (Mihlbachler 2018).

Fallow deer is a Eurasian deer species, with a present day native distribution restricted to the southern parts of Europe and the Middle East. Due to human activity, it was reintroduced to most of Europe. Fallow deer is considered to be a browser, with similar feeding habits as the roe deer (Jackson 1997; Nugent 1990). The examined *Dama* specimens from Üröm Hill also had a browsing diet based on both the mesowear and microwear analysis of the examined teeth (Figure 5, Figure 6).

Irish elk is one of the largest deer that ever lived. It roamed Eurasia throughout the Pleistocene. The diet of *M. giganteus* was diverse, based on its dental microwear, grazing, browsing and intermediate feeding also occurred as its feeding strategy (Rivals and Lister 2016). Based on plant macrofossil remains on the teeth of *M. giganteus*, it could have been a selective grazer, as most plant remains were from *Artemisia*, rich in calcium, necessary for the fast antler development of the species (Van Geel et al. 2018). The *M. giganteus* specimens of this paper based on their dental microwear also had a mixed feeder diet (Figure 6). Their mesowear however, spanned all dietary categories, from grazer to browser, suggesting that it could have had less strict dietary needs (Figure 5).

Reindeer, the cervid best adapted to cold environments, inhabit the northern regions of North America and Eurasia. They usually forage on less abrasive plant materials, ferns, mushrooms and lichens (Solounias et al. 1988; Kojola et al. 1998). The examined *R. tarandus* in this study had a dental mesowear characteristic of grazers, mostly with blunt teeth, with low apices (Figure 6). This could be either a result of a less optimal diet of the specimens, with more abrasive plants, or an increased amount of abrasive grit on the surface of the consumed plants (Kubo and Yamada 2014). This increased amount of grit could be due to a more open environment, where wind can easily pick up sand, loess, or other particles and contaminate the plants close to ground level, from where reindeer usually forage. These specimens occupy a smaller region in the microwear dietary morphospace, with low number of pits and intermediate to high number of scratches, also indicative of a relatively abrasive diet (Figure 5).

Environmental implications

Early Pleistocene

Osztramos 8 is the oldest of the examined localities, based on its recovered fauna, the material belongs to the Betfian stage (Jánossy and Kordos 1977; Jánossy 1972, 1986). The age of the locality is similar but slightly older than that of Osztramos 2 (Jánossy and Kordos 1977; Jánossy 1986). Based on the browse-dominated mixed feeder diet derived from the mesowear and the grazer diet derived from the microwear analysis of the examined *Cervus sp.* teeth, the surrounding vegetation of the locality was likely a mosaic forest-steppe, in which both soft and hard, abrasive plant material were available for the herbivores. Even though the sample sizes for the dental wear analyses are limited, the standard deviation of the results of the mesowear analysis is small. Thus, results based on these remains should be treated with caution, as it could be burdened with errors derived from the small sample size. This result corresponds well with the results of Pazonyi (2011), who developed ecological units for the Pleistocene of Hungary. According to her results, which were based on the synecological analysis of the fauna, this time period can be classified as a forest-steppe environment, with a low proportion of granivores, medium to low proportion of mixed feeders, carnivores, insectivores, and low proportion of grazers, as well as omnivores. A locality with similar age in Italy, the Pirro Nord complex supposedly had a moderately warm palaeoenvironment with mosaic woodlands as well (Pavia et al 2012).

Middle Pleistocene

The progression from the early to the middle Pleistocene was characterized by harsh cooling events. This interval is also called the Mid-Pleistocene Transition (MPT) (Berger and Jansen 1994; Mudelsee and Stattegger 1997). This was the period that saw the onset of the first important glaciations of the Pleistocene ranging from 1.2 Ma to 0.5 Ma (Head and Gibbard 2005). During this period, the presence of sub-tropical taxa was negligible in the Western Mediterranean region and based on palynological records the observed winter temperatures were about 5 °C colder than those of today (Joannin et al. 2011). Two of the examined localities were from this time interval, Gombasek and Üröm Hill, the former being slightly older than the latter.

At Gombasek several specimens from four genera (*Alces*, *Capreolus*, *Cervus*, *Megaloceros*) were present. Based on the environmental preferences of extant *C. capreolus*, the presence of roe deer in the site suggests that the vegetation had to be forested to some level. Furthermore the present day *A. alces* is found in colder environments, suggesting that the temperatures at this site had to be some degrees cooler. The mesowear signal of the examined specimens fell into the browse-dominated mixed feeder, the grass-dominated mixed feeder and the grazer dietary categories, suggesting that the environment of the period consisted of both open and closed vegetation. The lack of the clearly browsing specimens suggests that there were no extensive woodlands during this period. Interestingly, the examined *Capreolus* specimens fell into the grazer and the grass-dominated mixed feeder categories, which is unusual for recent *Capreolus* species are considered to be browsers, inhabiting woodlands (e.g., Solounias and Semprebon 2002; Merceron et al. 2004; Navarre 1993; Tixier and Duncan 1996). The microwear results of the specimens from this locality also suggest a mosaic environment, for all three main dietary categories (browser, grazer and mixed feeder) were present. There are two possibilities for this dental wear pattern: **a)** the examined specimens were of old age, so their mesowear pattern does not correlate with the diet, but rather is a result of their strongly eroded teeth, and their microwear reflects their actual diet. **b)** the mesowear of the specimens reflects the long-term effect of their diet on the teeth, indicating a suboptimal environment for *Capreolus*. The microwear on the other hand indicates a more optimal diet, which was available for shorter periods of time. Based on the dental wear stages, all animals belonged to the adult and late adult categories (Anders et al. 2011), so the second explanation seems to explain the observed phenomenon well. The reconstructed paleotemperature from this period was around 9 °C, which is 2-3 °C lower than that of present day average temperatures of Hungary. This colder temperature correlates well with that of Joannin et al. (2011), who found 5°C difference between the past and present winter temperatures in the Mediterranean region. The average $\delta^{13}C$ value for the examined specimens was -10.09‰, which translates to a -24.19‰ $\delta^{13}C$ value for their diet, which value is characteristic for the C_3 plants.

Six *Dama* specimens were studied from the Üröm Hill locality. The mesowear of these specimens classified them as browse-dominated mixed feeders, which suggests that a forest steppe environment with extensive woodlands was a possible vegetation type. The microwear of the studied specimens also classify them as browsers, further supporting the aforementioned vegetation. Again, due to the limited sample size, the derived conclusions should be treated with caution, even though their standard deviation is small, suggesting good results. Based on the fauna, the Üröm Hill locality could have been characterized by warm, humid climate and closed, forested vegetation with the dominance of dormice (*Glis*, *Muscardinus*) and forest voles (*Myodes*) (Virág and Pazonyi 2014). Similarly, a mosaic of open grassland and forest habitats and warm temperate conditions were reconstructed for the approximately coeval Voigtstedt locality (Central Germany) (Maul and Parfitt 2010). The calculated MAT of 12 °C seems extremely high compared to the value of 6 °C calculated by Virág (2013) based on stable isotopic measurements from a *Mammuthus trogontherii* molar from this locality. However, as mentioned in the results section, one of the two examined cervids could have been diagenetically altered (Figure 7). Excluding this specimen from the analysis alters the reconstructed MAT to 9 °C. This decreases the difference between the two measurements, but a notable difference is still present. The two measurements were conducted in two independent laboratories (the cervids were examined in the Isotope Climatology and Environmental Research Centre, Institute for Nuclear Research, Debrecen, Hungary, meanwhile the *M. trogontherii* was examined in the University of Lausanne), which could cause slight differences between the measured values (see also Tütken et al. 2006). Furthermore, material from this locality could be from a large temporal range, so the examined specimens could have originated from cooler and warmer intervals of this period. The two taxa – one cervid and one proboscidean – are rather distant relatives, so there could be slight differences between the metabolisms of them. Their water and dietary necessities, and the operation of their digestive system could also differ, which could also explain such differences. Comparing the carbon isotopic composition of the aforementioned *M. trogontherii* (Virág 2013), and the examined cervids of this study, a significant difference can be seen between the two values, the former with a $\delta^{13}C$ value of -9.5‰ and the latter with an average $\delta^{13}C$ value of -4.73‰. (Virág and Pazonyi 2014). Excluding the possibly diagenetically altered specimen, the cervid $\delta^{13}C$ value changes to -6.06‰, which falls much closer to the data of Virág (2013). However, the data from the *M. trogontherii* should also be treated with caution, for that measurement could have been done on a diagenetically altered specimen (Virág 2013). The calculated $\delta^{13}C$ value of the diet of the examined cervids suggests vegetation, which consists mainly of C_3 and a few C_4 plants. The latter can also be the result of a higher temperature, advantageous for the C_4 metabolism (Pyankov et al. 2010).

During the relatively warm last interglacial of the Cromerian complex and the Holsteinian interglacial, the climate in general was similar to that of the present day (Pereira et al. 2018). The locality of Vértesszőlős II – on the basis of *Arvicola mosbachensis*, *Stephanorhinus hundsheimensis* and *Cervus elaphus priscus* –could be either from the MIS 13, or the MIS 11 interglacials (Van der Made 2010, 2012; Ruszkiczay-Rüdiger et al. 2018). During this period, the typical vegetation of the locality could have been a forest-steppe, or a warm steppe, with mild and humid winters and hot summers and autumns (Pazonyi 2011; Fitzsimmons et al. 2012). Our results based on *C. elaphus* specimens seem to support these aforementioned data, as based on their mesowear, the specimens had a grass-dominated mixed feeder diet, and the microwear of one specimen suggested that it had a grazer diet.

The MIS 11 climatic optimum was characterized by a relatively high sea surface temperature at the Mediterranean, at around 10-18 °C (Girone et al. 2013). The vegetation of the surrounding areas was more or less forested, as high arboreal pollen concentrations were recorded in the sediments of Lake Ohrid (Sadori et al. 2016). The Fortuna street sites from the Vár Cave locality fell into this timeframe based on the *Arvicola cantiana-Lagurus transiens* fauna of the site (Kordos 1994, 2004). The reconstructed MAT of 9 °C is based on only one specimen, however this temperature is relatively close to present day Central European temperatures. Based on the micro- and mesowear analyses, the three *Cervus acoronatus* specimens of the locality had a grass-dominated mixed feeder diet. This agrees well with the presumed vegetation of the Carpathian Basin during this period, an open, mixed forest-steppe vegetation based on the vertebrate faunal composition of sites of this period (Pazonyi 2011).

From Marine Isotope Stage 9, the Saalian complex, the locality Tarkő Rock-shelter (layers V-VII) was examined. The mesowear of three *C. elaphus* specimens was recorded, classifying the specimens into the grass-dominated mixed feeder category, suggesting an open parkland environment with forested patches. This higher mesowear index could either be the result of exogenous grit coating the surface of forage plant materials, or a more or less open environment of this period. The microwear of two specimens supports this open environment, as it classifies both specimens into the grazer dietary category. These results are also based on a limited sample, thus should be treated with caution and not taken for granted. Based on the fauna of the locality – the lack of steppe elements, and the dominance of open parkland elements – forest-steppe vegetation type was reconstructed by Pazonyi (2011). Similarly a relatively warm, but drier environment with open vegetation was suggested by Fűköh et al. (1995) based on the gastropod fauna of the site. The reconstructed paleotemperature for this period was around 8.5 °C, around 3-4 °C cooler than that of the present day Carpathian Basin. At such temperature, the presence of continuous forested vegetation could be limited and the dominance of grasses could have been more important. The average carbon isotopic composition of -9.72‰ of the examined *C. elaphus* suggests a C_3 plant dominated diet, further supporting the cooler temperatures and the open environment.

The supposedly cool Marine Isotope Stage 8 is represented by the Hungarian locality, Szuhogy-Csorbakő from the end of this cold stage. Both the *R. tarandus* and the *M. giganteus* specimens from the locality had a high mesowear score, with an average of 5.5. This mesowear score suggests a grazer diet, or an increased intake of exogenous grit, both of which can be characteristic of open grassland and steppe vegetations, however, due to the limited sample size, this result should be treated with caution. Furthermore, the presence of *R. tarandus* also supports a colder, open environment. Pazonyi (2011) also reconstructed a cold steppe environment for this period for the Carpathian Basin. Similar results were reported by Bates et al. (2014) from the hominin bearing site Harnham, Wiltshire (Southern England) of the same age, with a wet grassland environment. Even though this locality is far from the Carpathian Basin, large scale processes seem to have had similar effects on both sites, which have a similar age and their reconstructed environment seems to support the aforementioned results.

Following up this colder period is the MIS 7 interglacial complex. The period could have been characterized mostly with typical forest environments throughout the South and Central European areas (López-García et al. 2014; Columbu et al. 2019). The subsequent MIS 6, on the other hand, was a glacial period with much cooler environments. Hórvölgy Rock-shelter and Uppony I are two localities with similar ages, also they are spatially close to each other. From the two, Hórvölgy Rock-shelter can be associated with the lowermost temporary range of Uppony I. However, the environment of the two sites seems to differ based on the results of both the mesowear and the microwear analysis. The *C. elaphus* specimens from Hórvölgy Rock-shelter had a browse-dominated mixed feeder diet based on their dental mesowear and a browser diet based on their microwear signal, both of which refer to a relatively forested vegetation.

On the other hand, *C. elaphus* specimens from Uppony I were classified into the grazer dietary category based on their mesowear and to the mixed feeder category based on their microwear. This difference would suggest a shift in the environment around these localities, possibly due to the climate getting colder in the beginning of the MIS 6 stage. The remains from Hórvölgy Rock-shelter are from the end of the MIS 7 interglacial. This would explain that both the mesowear and microwear show a diet of mostly soft plant materials, typical of a forested environment. The results based on the remains from Uppony I, from MIS 6 would suggest a more open, arid environment, agreeing well with the results of Pazonyi (2011), who also found a mosaic forest-steppe environment for this period for the Carpathian Basin. The inferred environments for both sites are based on small samples, thus their reliability is debatable. The reconstructed MAT of Uppony I, of 13 °C is about 1 to 2 °C higher than that of the average temperature of this area today. This higher temperature seems to contradict with the previous results, or the examined remains could be from the beginning of the cooling event, explaining the warmer reconstructed MAT. The carbon isotopic composition of the examined teeth suggest a C_3 or a mixed C_3-C_4 plant based diet, supporting the reconstructed high temperatures.

Late Pleistocene and Holocene

The oldest examined late Pleistocene locality was Lambrecht Kálmán Cave, which is from the transitional period between MIS 5 and MIS 4 stages. Mesowear analysis was conducted on the following species: *A. alces*, *C. capreolus*, *C. elaphus* and *M. giganteus*. The presence of the remains of several roe deer in the site suggests that the vegetation should have been forested to some extent, and the presence of *A. alces* suggests that the typical environment could have been somewhat cooler. The four cervid species covered most of the mesowear score range, *C. capreolus* and *M. giganteus* specimens had lower, whereas *A. alces* and *C. elaphus* specimens had higher mesowear scores. This wide range of observed mesowear scores suggests an environment, where multiple types of vegetation could be found, enabling a wide range of forage plants for the cervids to pick from. The microwear analysis of *C. capreolus*, *C. elaphus* and *M. giganteus* specimens seems to further support this diverse environment, for all three dietary categories were present based on this analysis. The examined *C. capreolus* showed a browser signal, *C. elaphus* a mostly grazer signal and *M. giganteus* showed traits of a mixed feeder. Based on the gastropod fauna of the site, Fűköh et al. (1995) suggested that the sediment in the cave was formed during a slightly warmer period of Marine Isotope Stage 5a interglacial. The composition of the vertebrate fauna of the site suggests either an open mosaic woodland vegetation, or a transitional phase into the mammoth steppe vegetation (Pazonyi 2011). Based on our aforementioned results, the mosaic woodland vegetation seems more plausible. The stable isotopic analyses based on *C. elaphus* specimens suggest a reconstructed paleotemperature of about 10-11 °C. This temperature is similar to, or slightly lower than that of the MAT of present day Hungary. Similar to that of modern MAT reconstructions were made based on the herpetofauna of the MIS 5/4 transitional site Cueva del Camino (Central Spain) (Blain et al. 2014). The carbon isotopic composition of the examined *C. elaphus* specimens suggests a diet composed of mainly C_3 plants.

During the Würm glaciation, climate throughout Europe gradually got cooler, and harsher, until it reached its peak at the Last Glacial Maximum (LGM). From temperatures and environment similar to that of present day, it slowly shifted to more open, dry environments, with vegetations such as the mammoth steppe vegetation (Wachecka-Kotkowska et al. 2018). The remains from Kiskevély Cave are from the beginning of this cooling period, the locality spans mostly the MIS 4 stage. Based on the vertebrate faunal composition of the localities from the Carpathian Basin from this interval, consisting of a high density of grazers, and large and medium carnivores, and a low density of browser taxa, the typical vegetation of this period was most likely mammoth steppe (Pazonyi 2011). This seems to agree well with our results, as the examined *A. alces* and *C. elaphus* specimens had mesowear scores in the grazer and the grass-dominated mixed feeder category, characteristic of open vegetation and possibly increased amount of exogenous dirt and grit coating the surface of the available plant materials. The microwear of the examined specimens fell into the mixed feeder dietary category, close to the grazer category, which would also suggest that the vegetation could have been open, with some forest-patches.

Afterwards, apart from some minor warming events, mainly in MIS 3, the gradual cooling continues throughout MIS 4, MIS 3 and MIS 2 (Wachecka-Kotkowska et al. 2018). Tapolca Cave is a locality that represents this period, because it spans almost 25 thousand years. Remains from this locality could fall into the end of MIS 4, MIS 3, or the beginning of MIS 2. Overall, the typical vegetation of this period was most likely mammoth steppe (Pazonyi 2011). The examined *C. elaphus* and *M. giganteus* specimens seem to support this hypothesis, for the mesowear of these specimens fell into the grazer dietary category, which would be characteristic of a locality with cooler, arid environment and open vegetation.

Following up the previous group of localities, we enter the LGM. This was presumably the coldest period of the Pleistocene. From the Carpathian Basin, palynological and malacological data are widely available from this period. Malacological data suggest a mosaic tundra, and mesofil steppe vegetation in the eastern parts of the basin for the LGM (Sümegi 2005; Sümegi et al. 2012). In the late glacial, the lower parts of the basin were covered by a birch-pine forest-steppe vegetation (Sümegi et al. 2011). Based on pollen and plant macrofossil studies, this same area around 18 cal kyr BP was thought to be covered with a mosaic tundra vegetation, where trees and shrubs were represented by pine and birch, and on higher altitudes a steppe-tundra vegetation was present (Magyari et al. 2019). Around 16 cal kyr BP, this tundra vegetation was replaced by a cold conifer forest-steppe, and around 14 cal kyr BP a cold mixed forest-steppe vegetation appeared, which prevailed until the early Holocene (Magyari et al. 2019). The western parts of the basin had richer forest cover compared to the eastern parts (Juhász 2007; Molnár et al. 2013). The vegetation of these parts could have been similar to that of modern day boreal forest and tundra (Sümegi et al. 2008). In short, during the late pleniglacial (24-14.6 cal kyr BP) and the late glacial, the Carpathian Basin was covered by a partly forested vegetation, with birch and pine species being the dominant woody plants. On the lower parts of the basin an open, cold steppe vegetation was predominant (Magyari et al. 2014, 2019).

Four examined localities were from the beginning of this period, from the second half of MIS 2 and the beginning of MIS 1: Szeleta Cave, Tokod-Nagyberek I, Istállóskő Cave and Szelim Cave were examined. These localities could represent a transition from a cool environment into the LGM. The dominance of *R. tarandus* of all examined cervids suggests a cold, open environment. However, the presence of *C. capreolus* suggests that some sort of forest coverage was still present in the Basin. From these four localities, the mesowear of seven *A. alces*, one *C. capreolus*, five *C. elaphus*, two *M. giganteus* and 42 *R. tarandus* specimens were registered. Overall, the average mesowear score of three species, *C. elaphus*, *M. giganteus* and *R. tarandus* classified them as grazers, and *A. alces* was classified as a grass-dominated mixed feeder. Only *C. capreolus* was classified as a browser, which agrees well with the dietary preference of extant roe deer. This predominance of grazers is characteristic for the supposed open mammoth steppe environment of this period, where wind easily carried dust and dirt and deposited them on the vegetation, increasing its abrasivity (Pazonyi 2011). The microwear of the examined specimens also suggests a mixed open environment, similar to the mesowear, where *A. alces* and *M. giganteus* foraged on a mixed diet, whereas *C. elaphus* and the dominant *R. tarandus* fed on more abrasive diet, as grazers or grass-dominated mixed feeders. The reconstructed paleotemperatures from this period were around 6 and 7 °C, around 4 to 6 °C cooler than that of present day Hungary. The ^{13}C composition of the examined cervid teeth suggest a C_3 plant based diet, characteristic of such a cool environment.

Seven of the examined localities fell entirely into the aforementioned coldest period of the LGM: Zebegény, Zalaegerszeg, Mogyorósbánya, Pilismarót, Ságvár, Jankovich Cave and Peskő Cave. For this period, the dominance of *R. tarandus* is even more conspicuous. The mesowear of every examined species fell into the grazer dietary category, and the microwear of the examined *C. elaphus* and *R. tarandus* specimens also fell into, or close to the grazer dietary morphospace. The results of both wear analyses strongly support an extremely open environment for this period. Two *M. giganteus* specimens fell into the mixed feeder category, suggesting that some tree or shrub cover should have still been present, creating an extremely open mixed vegetation. The MAT calculated for this period from *R. tarandus* specimens from Ságvár is around 7 °C, still much cooler than that of present day Hungary. Furthermore, the low $\delta^{13}C$ value, characteristic of a C_3 plant diet, also supports this cool environment.

The transition from the Pleistocene to the Holocene could be characterized by an ever growing tree cover, with forest-steppe vegetation and in some places a warm-steppe vegetation (Magyari et al. 2010). At higher altitudes, temperate woodlands, and gallery forests were present with spruce (Nafrádi et al. 2013). These temperate woodlands prevailed until the Middle Holocene (Willis et al. 1997; Gardner 2002). Two of our localities were from this transitional period: Berva-völgy Cave and Remete Cave. The aforementioned warming, and the reforestation associated with it can also be observed on the wear of the cervid teeth as well. The previously dominant grazer mesowear signal is replaced by a grass-dominated mixed feeder signal in the *C. elaphus* and *M. giganteus* species as well. The microwear of the aforementioned *M. giganteus* also shows a mixed feeder diet.

During the Holocene, the gradual warming continued, with some minor cooling events. From 10.25 cal kyr BP, a temperate woodland forest steppe vegetation was reconstructed for the area, however the presence of spruce pollen suggests that cold mosaic-steppe vegetation was present as well (Magyari et al. 2010). Between 9.9 and 5.4 cal kyr BP, the climate was getting warmer and drier, resulting in an ever-growing presence of open temperate forest-steppe and steppe vegetations. In the northern parts of the basin, cold forest-steppe vegetation prevailed until around 6 cal kyr BP (Magyari et al. 2010; Nafrádi et al. 2013). Between 4.1 and 3.1 cal kyr BP, temperate forest-steppe vegetation was dominant, however, after 3.1 cal kyr BP, a gradual deforestation could be observed due to the ever-growing presence of grazing livestock and agriculture (Magyari et al. 2010). Three examined localities from this period were Petényi Cave, Baradla Cave and Kiskőhát Cave. Despite this supposedly warmer period, the mesowear signal of the examined specimens showed a grazer diet. This, and the presence of *R. tarandus* in two of the three localities could suggest that the material examined could also include dental elements either from the short cooling events during the Holocene, or from the cold forest-steppe habitats prevailing until the Middle Holocene. The other explanation for this high mesowear score could be the increased dirt intake with the forage plants, which could be the result of an open vegetation, due to eolic transportation. The microwear of the examined *C. elaphus* however, shows that a wide variety of plant material was available during the examined period, as grazer, mixed feeder and browser signals can also be observed on their teeth.

Conclusions

In this study, we aimed to build a large-scale Pleistocene and Holocene paleoenvironmental reconstruction of the Carpathian Basin based on one of the most widespread herbivorous large mammal groups of said periods, the cervids. Dental elements of cervids are abundant in Pleistocene and Holocene localities, making them ideal for such analysis. To infer information about the past habitats in which the animals lived, three different taxon-free analyses were performed: dental mesowear analysis, dental microwear analysis and the analysis of the ^{13}C and ^{18}O isotope composition of structural carbonate and ^{18}O isotope composition of the phosphate of fossil bio-apatite from dental enamel. Well preserved cervid teeth were selected for these analyses from 27 Hungarian and one Slovakian sites.

Using the dental mesowear and microwear analyses, we attempted to reconstruct the past vegetation of the selected localities. The resolution of these methods is low, some information can be gained regarding the openness of the vegetation and regarding the presence or absence of multiple dietary categories, indicating the complexity of the biome. Both the mesowear and microwear analysis seems to give a good representation about the past environments. Colder periods were represented by higher mesowear scores, indicating grass-dominated mixed feeders and grazers, and a microwear signal representing mostly grazers. This pattern suggests a more open vegetation type for the cooler periods in the Carpathian Basin. Furthermore, during these cool periods grazers and grass-dominated mixed feeders were dominant and the other dietary categories seemed to be scarce. On the other hand, during the presumably warmer periods, the dietary pattern shifted from grass-dominated, to mixed feeders and browsers, indicating increased tree cover. The complexity of vegetation could also have increased, for during these periods almost every dietary category was present. This agrees well with earlier results of this area based on other vertebrate groups, plant macrofossils, pollens and gastropods.

After checking for diagenetic alteration, the isotopic composition of samples suitable for paleoenvironmental interpretations were further analysed. An MAT was estimated using tooth enamel $\delta^{18}O_{PO4}$ for nine Pleistocene localities. These estimated temperatures seem to follow the global temperature changes well. For glacial periods, the estimated temperatures are about 5-6 °C cooler than that of present day Hungary, and for the interglacial warm periods, temperatures similar to modern Hungary were inferred. The $\delta^{13}C$ values of the examined cervids suggest a mainly C_3 plant based vegetation (woodland, mesic C_3 grassland), which agrees with the fact that C_4 plants are scarcer in colder environments.

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Declaration of interest statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Table 1. GPS coordinates and temporal ranges of the examined Pleistocene and Holocene localities, with the relevant literature cited.

Table 2. The results of the mesowear analyses of every locality, divided by the cervid species. Mesowear scores of the same species/genera were averaged.

Table 3. Results of the microwear analysis of the examined specimens, grouped by localities. If it was possible, five sampling areas were quantified, and the minimum, maximum, average and standard deviation values were given based on these iterations.

Table 4. Results of the ^{13}C and ^{18}O stable isotope analyses conducted on the enamel of selected cervid specimens. The calculated environmental water $\delta^{18}O$ value and the calculated mean annual temperature is indicated as well.

Figure 1. Location of paleontological sites (1. Osztramos 8; 2. Gombasek; 3. Üröm Hill; 4. Vértesszőlős II; 5. Tarkő Rock-shelter; 6. Vár Cave; 7. Szuhogy-Csorbakő; 8. Hórvölgy Rock-shelter; 9. Uppony I; 10. Lambrecht Cave; 11. Kiskevély Cave; 12. Tapolca Cave; 13. Tokod-Nagyberek I; 14. Szeleta Cave; 15. Istállóskő Cave; 16. Szelim Cave; 17. Zebegény; 18. Zalaegerszeg; 19. Ságvár; 20. Mogyorósbánya; 21. Pilismarót; 22. Jankovich Cave; 23. Peskő Cave; 24. Berva-völgy Cave; 25. Remete Cave; 26. Petényi Cave; 27. Baradla Cave; 28. Kiskőhát Cave).

Figure 2. Temporal ranges of the Pleistocene and Holocene localities.

Figure 3. Major axis regression showing the relation between measured air temperature (°C) and measured δ18O of precipitation. The equation shows how to calculate air temperature from known precipitation δ18O values.

Figure 4. Major axis regression showing the relation between $\delta^{18}O$ of enamel PO_4 of extant cervids, suids and bovids and $\delta^{18}O$ of ingested meteoric water. The grey background distribution and the dashed line shows the relation between measured air temperature (°C) and measured $\delta^{18}O$ of precipitation. The equations show how to calculate a hypothetical water $\delta^{18}O$ value based on measured enamel PO_4 $\delta^{18}O$ value, and how to calculate air temperature from the previously calculated precipitation $\delta^{18}O$ values.

Figure 5. The results of the stable isotope analyses and the dental wear analyses: A) The change of calculated mean annual temperatures based on the $\delta^{18}O$ values of cervid enamel samples in relation to the age. Horizontal and vertical lines next to each data point indicate the uncertainty of age and the standard deviation of the temperature measurements. The $\delta^{18}O$ curve for comparison in the background is based on the work of Lisiecki and Raymo (2005). B) The change of the carbon isotopic composition of foraged plants based on the $\delta^{13}C$ values of cervid enamel samples in relation to the age. Horizontal and vertical lines next to each data point indicate the uncertainty of age and the standard deviation of the temperature measurements. The $\delta^{18}O$ curve for comparison in the background is based on the work of Lisiecki and Raymo (2005). C) The change of average mesowear score for the examined cervid genera in relation to age. Horizontal lines show the standard deviation of the average scores. The dashed lines in the background are to help indicate the sequence of localities, they do not hold any other meaning. D) The changes of microwear pattern of the examined cervid genera in relation to age. Cervids were appointed into one of three main dietary categories based on their signature microwear, following the propsitions of Solounias and Semprebon (2002) and Semprebon et al. (2004). The $\delta^{18}O$ curve for comparison in the background is based on the work of Lisiecki and Raymo (2005). Indices on the right follow the numbers explained in the legend of Figure 1.

Figure 6. Microwear pattern of the examined cervid groups plotted against the dietary morphospaces proposed by Solounias and Semprebon (2002) and Semprebon et al. (2004). The morphospace on the left represents the microwear of present day browsing herbivores, whereas the morphospace on the right represents present day grazers. Areas in between indicate an intermediate feeder diet.

Figure 7. Measured oxygen isotopic compositions of enamel carbonate and phosphate. The isotopic equilibrium line between carbonate and phosphate $\delta^{18}O$ values is plotted for reference along with the 95% confidence interval calculated by Pellegrini et al. (2011) on modern cervids.

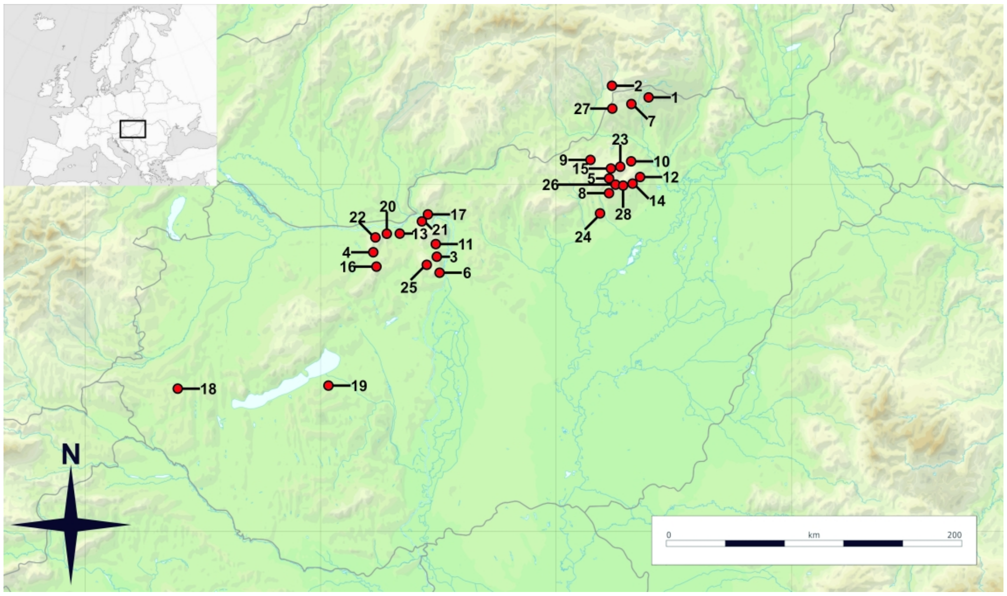

Figure 1. Location of paleontological sites (1. Osztramos 8; 2. Gombasek; 3. Üröm Hill; 4. Vértesszőlős II; 5. Tarkő Rock-shelter; 6. Vár Cave; 7. Szuhogy-Csorbakő; 8. Hórvölgy Rock-shelter; 9. Uppony I; 10. Lambrecht Cave; 11. Kiskevély Cave; 12. Tapolca Cave; 13. Tokod-Nagyberek I; 14. Szeleta Cave; 15. Istállóskő Cave; 16. Szelim Cave; 17. Zebegény; 18. Zalaegerszeg; 19. Ságvár; 20. Mogyorósbánya; 21. Pilismarót; 22. Jankovich Cave; 23. Peskő Cave; 24. Berva-völgy Cave; 25. Remete Cave; 26. Petényi Cave; 27. Baradla Cave; 28. Kiskőhát Cave).

296x175mm (500 x 500 DPI)

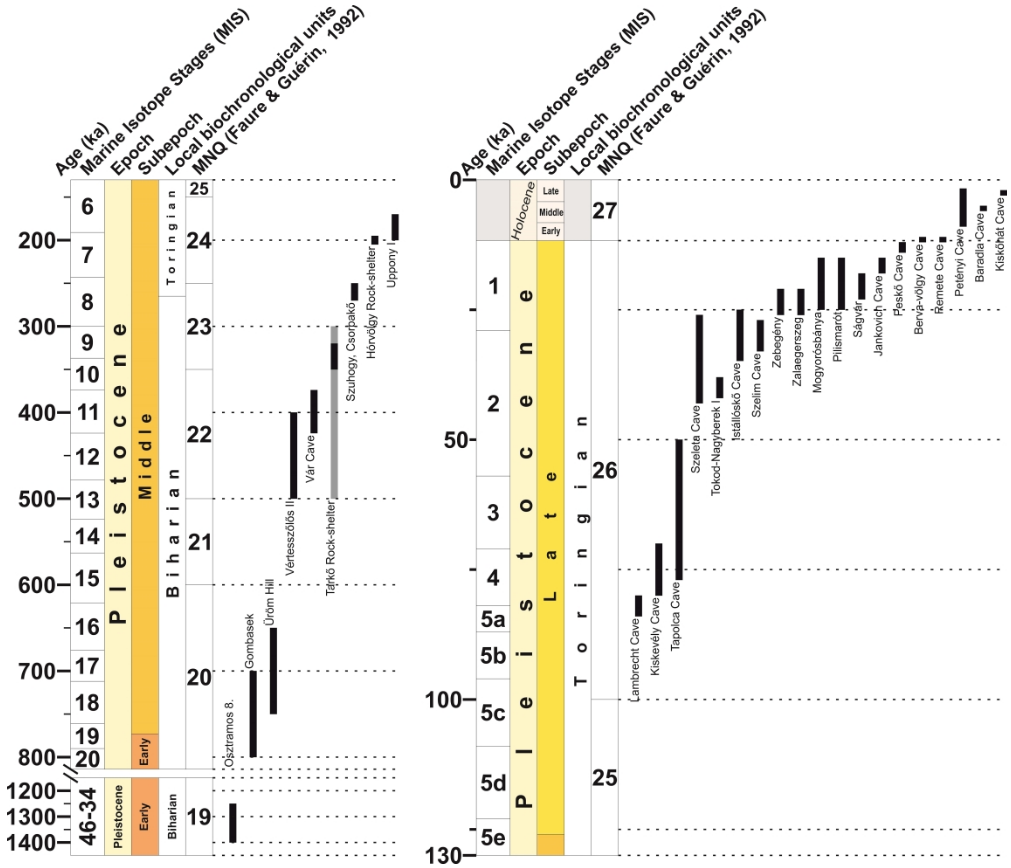

Figure 2. Temporal ranges of the Pleistocene and Holocene localities.

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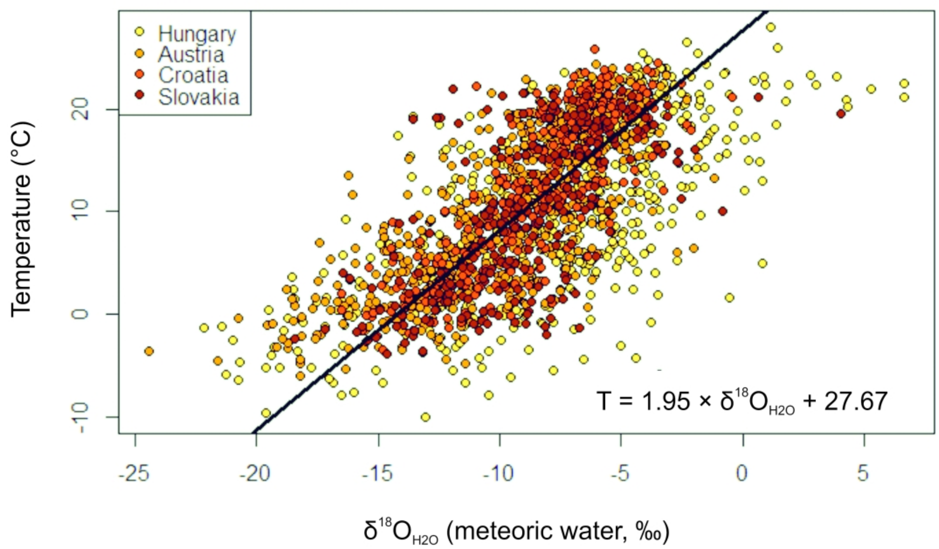

Figure 3. Major axis regression showing the relation between measured air temperature (°C) and measured $\delta^{18}O$ of precipitation. The equation shows how to calculate air temperature from known precipitation $\delta^{18}O$ values.

192x128mm (500 x 500 DPI)

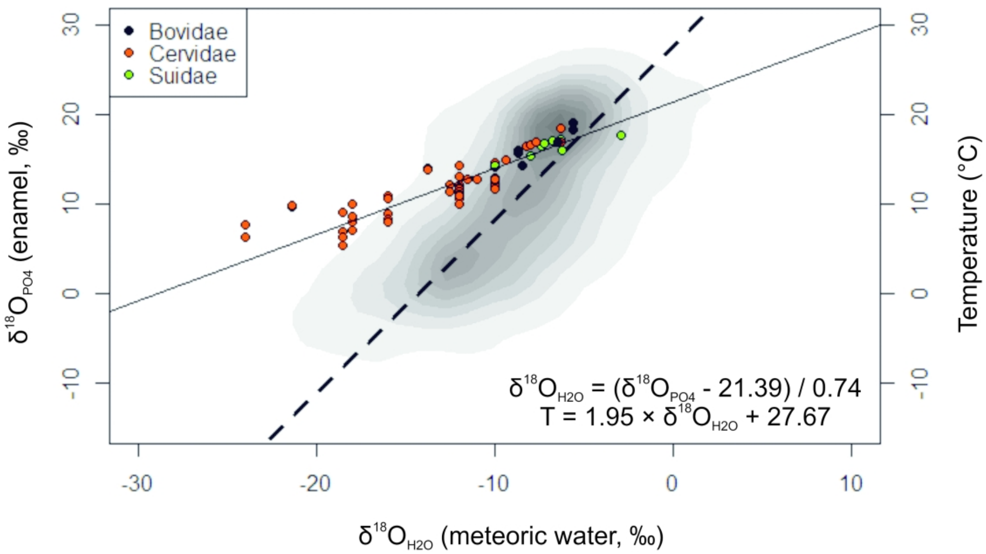

Figure 4. Major axis regression showing the relation between $\delta^{18}O$ of enamel PO_4 of extant cervids, suids and bovids and $\delta^{18}O$ of ingested meteoric water. The grey background distribution and the dashed line shows the relation between measured air temperature (°C) and measured $\delta^{18}O$ of precipitation. The equations show how to calculate a hypothetical water $\delta^{18}O$ value based on measured enamel PO_4 $\delta^{18}O$ value, and how to calculate air temperature from the previously calculated precipitation $\delta^{18}O$ values.

192x132mm (500 x 500 DPI)

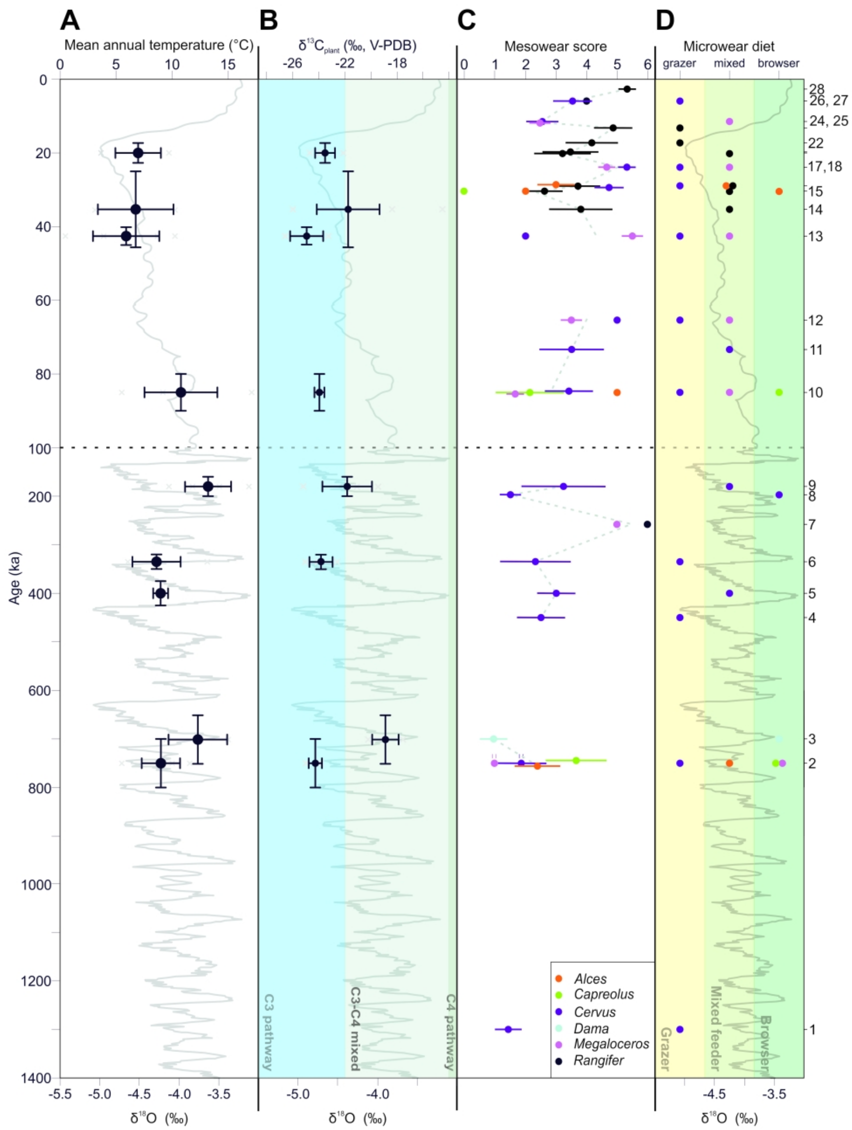

Figure 5. The results of the stable isotope analyses and the dental wear analyses: A) The change of calculated mean annual temperatures based on the δ^{18}O values of cervid enamel samples in relation to the age. Horizontal and vertical lines next to each data point indicate the uncertainty of age and the standard deviation of the temperature measurements. The δ^{18}O curve for comparison in the background is based on the work of Lisiecki and Raymo (2005). B) The change of the carbon isotopic composition of foraged plants based on the δ^{13}C values of cervid enamel samples in relation to the age. Horizontal and vertical lines next to each data point indicate the uncertainty of age and the standard deviation of the temperature measurements. The δ^{18}O curve for comparison in the background is based on the work of Lisiecki and Raymo (2005). C) The change of average mesowear score for the examined cervid genera in relation to age. Horizontal lines show the standard deviation of the average scores. The dashed lines in the background are to help indicate the sequence of localities, they do not hold any other meaning. D) The changes of microwear pattern of the examined cervid genera in relation to age. Cervids were appointed into one of three dietary categories based on their signature microwear following the propsitions of Solounias and

Semprebon (2002) and Semprebon et al. (2004). The $\delta^{18}O$ curve for comparison in the background is based on the work of Lisiecki and Raymo (2005). Indices on the right follow the numbers explained in the legend of Figure 1.

274x362mm (500 x 500 DPI)

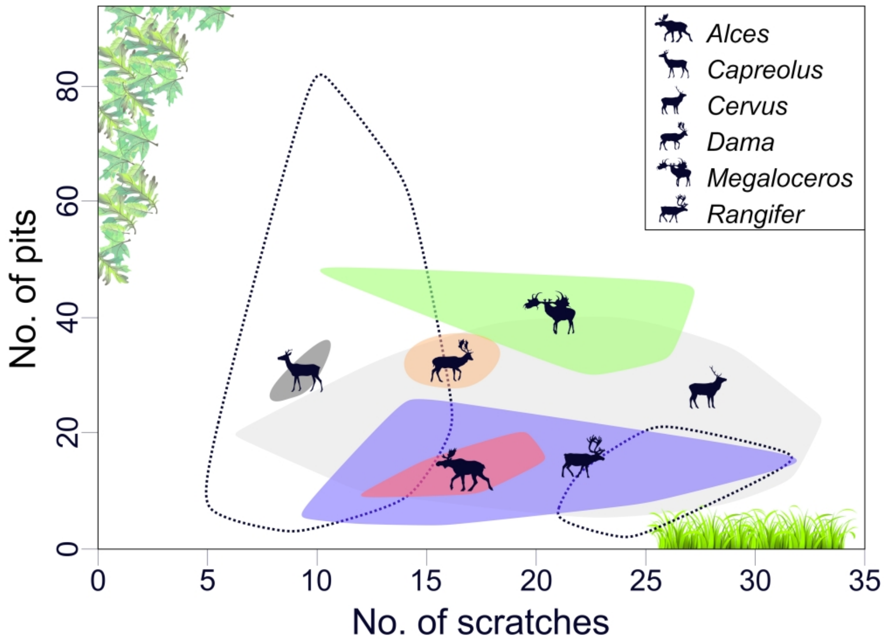

Figure 6. Microwear pattern of the examined cervid groups plotted against the dietary morphospaces proposed by Solounias and Semprebon (2002) and Semprebon et al. (2004). The morphospace on the left represents the microwear of present day browsing herbivores, whereas the morphospace on the right represents present day grazers. Areas in between indicate an intermediate feeder diet.

199x146mm (500 x 500 DPI)

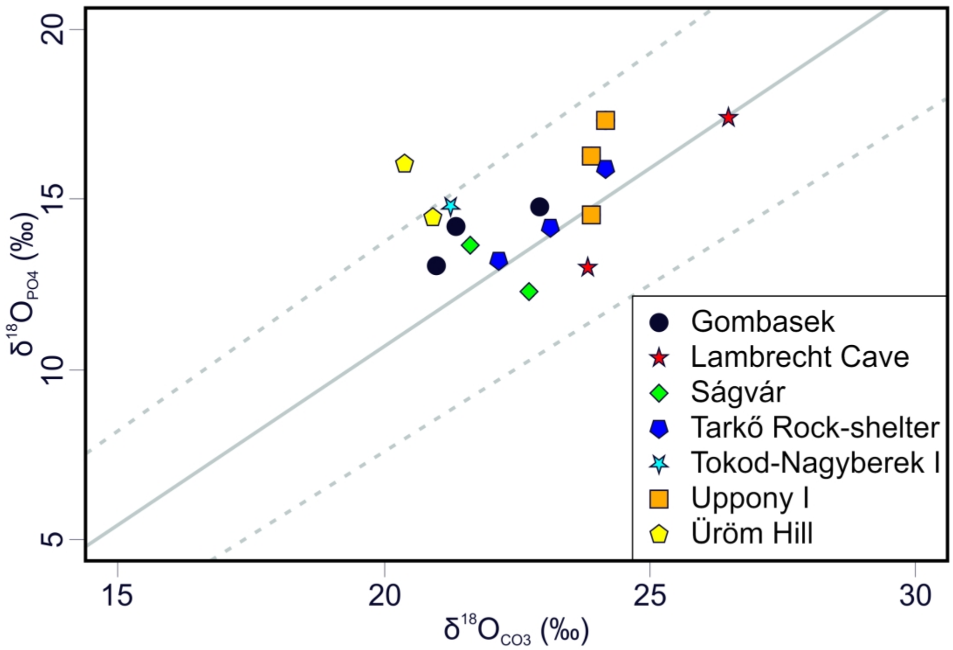

Figure 7. Measured oxygen isotopic compositions of enamel carbonate and phosphate. The isotopic equilibrium line between carbonate and phosphate $\delta^{18}O$ values is plotted for reference along with the 95% confidence interval calculated by Pellegrini et al. (2011) on modern cervids.

141x99mm (500 x 500 DPI)

Locality	Latitude (DD)	Longitude (DD)	Age (ka)
Osztramos 8	48.5183	20.7509	1300 ± 500
Gombasek	48.5628	20.4665	750 ± 50
Üröm Hill	47.5958	19.0213	700 ± 50
Vértesszőlős II	47.6262	18.3844	450 ± 50
Vár Cave (Fortuna street)	47.5042	19.0311	400 ± 25
Tarkő Rock-shelter (layers 5-7)	48.0571	20.4644	330 ± 20
Szuhogy-Csorbakő	48.3972	20.6539	260 ± 10
Hórvölgy Rock-shelter	47.9611	20.5305	200 ± 5
Uppony I	48.2123	20.4447	185 ± 15
Lambrecht Cave	48.1347	20.6106	83 ± 3
Kiskevély Cave	47.6328	18.9695	75 ± 5
Tapolca Cave	48.0968	20.6885	64 ± 14
Tokod-Nagyberek I	47.7142	18.6477	40 ± 2
Szeleta Cave	48.1081	20.6312	35 ± 9
Istállóskő Cave	48.0716	20.4173	30 ± 4
Zebegény	47.7994	18.9133	23 ± 3
Zalaegerszeg	48.864	16.864	23 ± 3
Szelim Cave	47.5905	18.4071	22 ± 2
Mogyorósbánya	47.7313	18.5982	20 ± 5
Pilismarót	47.7949	18.8508	20 ± 5
Ságvár	46.8242	18.0928	20 ± 3
Jankovich Cave	47.7239	18.5752	16 ± 2
Peskő Cave	48.0481	20.4236	13 ± 1
Berva-völgy Cave	47.9611	20.3715	11.5 ± 1
Remete Cave	47.5611	18.9276	11.5 ± 1
Petényi Cave	48.0476	20.4239	5 ± 4
Baradla Cave	48.4717	20.4953	5 ± 1
Kiskőhát Cave	48.0683	20.4903	2.5 ± 1

Reference
Jánossy 1972; 1986
Gasparik and Wagner 2014
Virág and Pazonyi 2014
Ruszkiczay-Rüdiger et al. 2018
Kordos 2004
Jánossy 1986; Luzi et al. 2019
Jánossy and Vörös 1985
Jánossy 1986; Kordos 1994
Jánossy et al. 1968
Kordos 1991; Gasparik 1993; Luzi et al. 2019
Dobosi and Vörös 1994; Markó 2009
Hellebrandt et al. 1976; Kordos 1991; Ringer and Moncel 2002
Jánossy 1986; Luzi et al. 2019
Ringer 2002; Adams 2002; Davies and Hedges 2008
Vértes 1965; Ringer 2002
Kovács 2012
Kovács 2012
Bradák and Markó 2006; Mészáros 2004
Dobosi 2016
Dobosi 2016
Sümegi and Krolopp 2002; Bösken et al. 2018; Vogel and Waterbolk 1964
Markó 2013; Pazonyi 2004
Vértes 1965
Gábori 1976
Gábori 1976
Vértes 1965
Fűkőh 1995; Kordos 1981
Kordos 1981; Pazonyi 2004

Locality	Taxa	N	Mesowear score				
			0	1	2	3	4
Osztramos 8	Cervus sp.	9	2	1	6	-	-
Gombasek	Alces sp.	10	-	3	4	1	-
	Capreolus sp.	9	-	3	-	-	-
	Cervus sp.	41	9	9	14	2	3
	Megaloceros sp.	1	-	1	-	-	-
Üröm Hill	Dama sp.	6	2	2	2	-	-
Vértesszőllős II	Cervus sp.	7	-	2	2	1	1
Tarkő Rock-shelter	Cervus acoronatus	3	-	2	-	-	-
Vár Cave	Cervus cf. elaphus	3	-	1	-	1	-
Szuhogy - Csorbakő	Megaloceros sp.	1	-	-	-	-	-
	Rangifer tarandus	1	-	-	-	-	-
Hórvölgy Rock-shelter	Cervus sp.	2	-	1	1	-	-
Uppony I.	Cervus sp.	8	2	1	1	-	-
Lambrecht Cave	Alces alces	1	-	-	-	-	-
	Capreolus capreolus	13	5	1	2	1	1
	Cervus elaphus	16	-	3	1	4	3
	Megaloceros giganteus	3	-	1	2	-	-
Kiskevély Cave	Alces alces	2	-	-	1	-	-
	Cervus elaphus	2	-	-	1	-	-
Tapolca Cave	Cervus elaphus	1	-	-	-	-	-
	Megaloceros giganteus	2	-	-	-	1	1
Tokod - Nagyberek I	Cervus elaphus	1	-	-	1	-	-
	Megaloceros giganteus	2	-	-	-	-	-
Szeleta Cave	Rangifer tarandus	15	1	1	3	2	1
Istállóskő Cave	Alces alces	2	-	-	2	-	-
	Capreolus capreolus	1	1	-	-	-	-
	Rangifer tarandus	8	-	1	3	3	-
Szelim Cave	Alces alces	5	-	-	2	2	-
	Cervus elaphus	4	-	-	-	-	2
	Rangifer tarandus	19	-	2	5	2	2
Zebegény	Cervus elaphus	3	-	-	-	-	-
Zalaegerszeg	Megaloceros giganteus	3	-	-	-	-	1
Ságvár	Rangifer tarandus	385	9	54	52	54	35
Mogyorósbánya	Rangifer tarandus	7	-	1	2	1	1
Pilismarót	Rangifer tarandus	92	8	10	21	9	18
Jankovich Cave	Rangifer tarandus	6	-	-	1	2	-
Peskő Cave	Rangifer tarandus	8	-	-	2	-	-
Berva-völgy Cave	Cervus elaphus	3	-	1	-	1	1
	Megaloceros giganteus	2	-	-	1	1	-
Remete Cave	Cervus elaphus	3	-	-	2	1	-
Petényi Cave	Cervus elaphus	6	-	-	1	2	1
	Rangifer tarandus	2	-	-	-	-	2
Baradla Cave	Cervus elaphus	5	-	1	-	1	1
Kiskőháti Cave	Rangifer tarandus	3	-	-	-	-	-

e

5	6	Average
-	-	1.44
2	-	2.4
6	-	3.67
2	2	1.87
-	-	1
-	-	1
1	-	2.57
1	-	2.33
1	-	3
1	-	5
-	1	6
-	-	1.5
1	3	3.25
1	-	5
2	1	2.15
4	1	3.44
-	-	1.67
1	-	3.5
1	-	3.5
1	-	5
-	-	3.5
-	-	2
1	1	5.5
2	5	3.8
-	-	2
-	-	0
1	-	2.63
1	-	3
1	1	4.75
3	5	3.74
2	1	5.33
2	-	4.67
70	56	3.47
-	6	3.43
14	12	3.19
1	2	4.17
3	3	5
-	-	2.67
-	-	2.5
-	-	2.33
2	-	3.67
-	-	4
2	-	3.4
2	1	5.33

Locality	Taxon	ID	Scratches		
			Minimum	Average	Maximum
Baradla Cave	*Cervus elaphus*	V. 27070.	12	16.7	21
	Cervus elaphus	V. 27070.	20	25.3	31
Berva-völgy Cave	*Megaloceros giganteus*	V. 63. 1514.	21	24.2	26
Tapolca Cave	*Cervus elaphus*	V. 63. 1496.	38	45.7	49
	Megaloceros giganteus	V. 63. 1442.	20	27.3	31
	Megaloceros giganteus	V. 63. 1445.	21	25	28
	Megaloceros giganteus	V. 63. 1482.	24	28.6	32
Gombasek	*Alces sp.*	V. 59. 957.	-	16	-
	Alces sp.	V. 59. 988.	-	17	-
	Capreolus sp.	V. 60. 1770.	8	9.4	11
	Cervus sp.	V. 59. 944.	25	27.3	31
	Cervus sp.	V. 59. 944.	-	26	-
	Cervus sp.	V. 59. 970.	-	26	-
	Megaloceros sp.	V. 59. 927.	-	9	-
Hórvölgy Rock-shelter	*Cervus sp.*	M. S. 01.	6	8.8	12
	Cervus sp.	M. S. 02.	11	16	19
Istállóskő Cave	*Alces alces*	V. 59. 379.	12	14	17
	Rangifer tarandus	V. 59. 389.	12	17.6	21
	Rangifer tarandus	V. 59. 424.	-	14	-
Jankovich Cave	*Rangifer tarandus*	V. 14659.	26	29.2	34
Kiskevély Cave	*Cervus elaphus*	V. 60. 955.	21	23.6	26
Lambrecht Kálmán Cave	*Capreolus capreolus*	V. 58. 1619.	-	9	-
	Cervus elaphus	V. 58. 1078.	20	24	31
	Cervus elaphus	V. 58. 1078.	23	25.4	27
	Cervus elaphus	V. 58. 1548.	22	23.8	27
	Megaloceros giganteus	V. 58. 1063.	18	19.6	21
Osztramos 8.	*Cervus sp.*	V. 73. 70.	18	23.6	27
Peskő Cave	*Rangifer tarandus*	V. 14274.	21	27.2	30
	Rangifer tarandus	V. 14277.	19	23.8	26
Petényi Cave	*Cervus elaphus*	V. 61. 2021.	14	19	22
	Cervus elaphus	V. 61. 1292.	22	27.2	31
	Cervus elaphus	V. 61. 1292.	25	26.8	31
Ságvár	*Rangifer tarandus*	V. 60. 1503.	12	15.2	20
	Rangifer tarandus	V. 60. 1532.	-	18	-
	Rangifer tarandus	V. 60. 1559.	-	17	-
	Rangifer tarandus	V. 60. 1559.	-	15	-
	Rangifer tarandus	V. 60. 1561.	12	13.2	16
	Rangifer tarandus	V. 60. 1561.	12	15	20
	Rangifer tarandus	V. 60. 1561.	13	16.6	19
	Rangifer tarandus	V. 60. 1561.	14	16.4	19
	Rangifer tarandus	V. 60. 1561.	-	18	-
	Rangifer tarandus	V. 60. 1561.	-	13	-
Szeleta Cave	*Rangifer tarandus*	V. 63. 1661.	14	14.8	16
	Rangifer tarandus	V. 63. 1705.	22	23	24
	Rangifer tarandus	V. 63. 1705.	-	25	-
	Alces alces	G. 57. 517.	14	17.2	20
	Alces alces	G. 57. 675.	18	19.4	21
	Alces alces	G. 57. 675.	17	18	19

	Cervus elaphus	G. 57. 451.	22	24.8	27
	Rangifer tarandus	G. 57. 101.	19	20.8	22
	Rangifer tarandus	G. 57. 507.	16	17.8	21
Szelim Cave	*Rangifer tarandus*	G. 57. 594.	19	20.4	22
	Rangifer tarandus	G. 57. 594.	17	20.2	23
	Rangifer tarandus	G. 57. 617.	18	20.4	23
	Rangifer tarandus	G. 57. 659.	9	11.2	14
	Rangifer tarandus	G. 57. 659.	11	13.6	16
	Rangifer tarandus	G. 57. 659.	15	18	21
Tarkő Rock-shelter	*Cervus acoronatus*	V. 69. 10.	-	21	-
	Cervus acoronatus	V. 69. 12.	25	26	18
	Cervus elaphus	V. 64. 867.	25	26.8	31
Tokod - Nagyberek	*Megaloceros giganteus*	V. 64. 859.	23	24.2	26
	Megaloceros giganteus	V. 64. 859.	23	25.2	28
Uppony I	*Cervus sp.*	V. 60. 1134.	21	21.3	22
	Dama sp.	V. 62. 233.	15	18	22
Üröm Hill	*Dama sp.*	V. 62. 233.	15	16.6	20
	Dama sp.	V. 62. 233.	12	15.6	20
	Dama sp.	V. 62. 233.	14	15.5	17
Vár Cave	*Cervus cf. elaphus*	V. 60. 866.	12	14.8	18
	Cervus cf. elaphus	V. 77. 54.	12	14.6	18
Vértesszőllős II	*Cervus sp.*	V. 2010. 37. 1.	25	29	34
Zalaegerszeg	*Megaloceros giganteus*	V. 62. 103.	19	21.4	24
	Megaloceros giganteus	V. 62. 103.	18	21	24
Zebegény	*Cervus elaphus*	V. 61. 2364.	20	21.3	23

	Pits			
SD	Minimum	Average	Maximum	SD
4.5	17	20.2	24	3.51
3.34	26	29.6	33	2.18
1.92	29	31	33	1.58
5.65	8	12	16	3.84
5.6	27	31.2	36	4.5
3.51	21	26.3	29	4.07
4.02	14	20.1	24	5.04
-	-	16	-	-
-	-	14	-	-
1.34	24	30.6	35	4,82
2.63	20	23.5	26	2.65
-	-	27	-	-
-	-	39	-	-
-	-	49	-	-
3	18	24.2	29	5.52
4.04	25	30.1	37	6.02
2.45	8	12.6	18	3.85
3.36	6	13.6	18	4.83
-	-	26	-	-
4.03	12	14	16	1.84
2.07	24	31	38	5.57
-	-	27	-	-
4.36	10	19.2	23	5.26
1.52	15	17.6	22	2.88
1.92	7	8.2	9	0.84
1.34	41	43.6	46	2.07
3.44	16	19.2	26	4.15
4.61	8	12	17	4.51
3.56	9	12.8	15	3.04
4.04	25	31.4	37	6.01
3.7	11	12.4	14	1.14
2.49	9	14	18	3.87
3.27	6	8.8	16	4.21
-	-	8	-	-
-	-	7	-	-
-	-	9	-	-
1.64	6	7.4	9	1.14
3.16	4	6.6	9	1.82
2.88	7	9.2	12	1.92
2.07	6	8.2	9	1.3
-	-	8	-	-
-	-	16	-	-
1.1	22	23.8	26	1.64
1.41	9	9.5	10	0.71
-	-	8	-	-
2.28	15	18	22	2.65
1.14	13	14.2	16	1.3
0.71	9	13.2	19	3.89

1.92	10	12.4	17	2.7
1.3	8	11.4	15	2.61
1.92	6	7.4	10	1.67
1.34	8	11.2	13	1.92
2.17	9	11.2	13	2.05
2.41	11	13.2	16	1.92
2.28	5	6	7	0.71
1.82	7	8	9	1
2.24	3	7.4	12	3.21
-	-	14	-	-
1.22	14	15.4	17	1.14
2.49	6	7.4	9	1.14
1.3	41	43.2	47	2.49
2.28	37	42.6	46	3.65
0.58	22	24.3	26	2.08
2.74	31	34.2	38	2.86
2.07	29	33.8	40	4.76
3.05	25	31.4	36	4.04
2.12	33	33.5	34	0.71
2.39	24	27.6	31	2.7
2.41	10	13.4	20	3.85
4.51	13	18.2	21	4.06
2.3	39	42.2	45	2.78
2.83	35	40.4	45	4.36
1.53	12	13	15	1.73

Species	ID	Locality	δ13C (V-PDB)	δ18OPO4 (V-SMOW)	δ18OCO3 (V-SMOW)
Rangifer tarandus	V.60.1561./m3	Ságvár	-7.93	14.6	NA
Rangifer tarandus	V.60.1561./m2	Ságvár	-9.67	12.3	22.7
Rangifer tarandus	V.60.1486.	Ságvár	-9.45	13.7	21.6
Rangifer tarandus	V.60.1532.	Ságvár	-10.46	NA	20.9
Megaloceros giganteus	V.64.859./1	Tokod - Nagyberek	-12.39	11.1	NA
Megaloceros giganteus	V.64.859./2	Tokod - Nagyberek	NA	12.4	NA
Cervus elaphus	V.91.65.	Tokod - Nagyberek	NA	14.2	NA
Cervus elaphus	V.92.17.	Tokod - Nagyberek	-9.07	14.8	21.3
Rangifer tarandus	V.63.1705.	Szeleta Cave	NA	12.1	NA
Rangifer tarandus	V.63.1661.	Szeleta Cave	-4.20	NA	20.2
Alces alces	G.57.517.	Szeleta Cave	-11.75	14.8	NA
Rangifer tarandus	G.57.519.	Szeleta Cave	-0.37	NA	26
Cervus elaphus	V.58.1548.	Lambrecht Cave	-9.83	15.1	NA
Cervus elaphus	V.58.1078.	Lambrecht Cave	-9.95	14.4	NA
Cervus elaphus	V.58.1547./1	Lambrecht Cave	-9.95	13	23.8
Cervus elaphus	V.58.1547./2	Lambrecht Cave	-9.63	17.4	26.5
Cervus acoronatus	V.69.10./1	Tarkő Rock-shelter	-9.88	14.1	23.1
Cervus acoronatus	V.69.12./1	Tarkő Rock-shelter	NA	13.4	NA
Cervus acoronatus	V.69.10./2	Tarkő Rock-shelter	-10.85	15.9	24.2
Cervus acoronatus	V.69.12./2	Tarkő Rock-shelter	-8.43	13.2	22.2
Cervus elaphus	V.60.1134.	Uppony I	NA	15.4	NA
Cervus elaphus	V.60.1135.	Uppony I	-5.30	14.6	23.9
Cervus elaphus	V.60.1139.	Uppony I	-6.90	17.3	24.2
Cervus elaphus	V.60.1177.	Uppony I	-11.03	16.3	23.9
Cervus cf. elaphus	V.60.866.	Vár Cave	NA	14.3	NA
Dama sp.	V.62.247.	Üröm Hill	-3.40	16.6	20.1
Dama sp.	V.62.233.	Üröm Hill	-6.06	14.5	20.9
Cervus sp.	V.59.994.	Gombasek	-9.70	13	21
Cervus sp.	V.59.946.	Gombasek	-10.79	14.2	21.3
Cervus sp.	V.59.1001./1	Gombasek	-9.77	14.7	22.9
Cervus sp.	V.59.1001./2	Gombasek	NA	15.3	NA

Calculated environmental water δ18O	Calculated mean annual temperature
-9.18	9.78
-12.28	3.72
-10.39	7.41
NA	NA
-13.91	0.55
-12.15	3.98
-9.72	8.72
-8.91	10.30
-12.55	3.19
NA	NA
-8.91	10.30
NA	NA
-8.50	11.10
-9.45	9.25
-11.34	5.56
-5.39	17.16
-9.85	8.46
-10.80	6.62
-7.42	13.20
-11.07	6.09
-8.09	11.89
-9.18	9.78
-5.53	16.89
-6.88	14.26
-9.58	8.99
-6.47	15.05
-9.31	9.51
-11.34	5.56
-9.72	8.72
-9.04	10.04
-8.23	11.62

Locality	Species	ID	Facility
Baradla Cave	*Cervus elaphus*	V.27070.	Natural History Museum
Baradla Cave	*Cervus elaphus*	V.27070.	Natural History Museum
Baradla Cave	*Cervus elaphus*	V.27070.	Natural History Museum
Baradla Cave	*Cervus elaphus*	V.27070.	Natural History Museum
Baradla Cave	*Cervus elaphus*	V.27070.	Natural History Museum
Berva-völgy Cave	*Cervus elaphus*	V.63.1510.	Natural History Museum
Berva-völgy Cave	*Cervus elaphus*	V.63.1510.	Natural History Museum
Berva-völgy Cave	*Cervus elaphus*	V.63.1510.	Natural History Museum
Berva-völgy Cave	*Megaloceros giganteus*	V.63.1514.	Natural History Museum
Berva-völgy Cave	*Megaloceros giganteus*	V.63.1514.	Natural History Museum
Gombasek	*Alces sp.*	V.59.877.	Natural History Museum
Gombasek	*Alces sp.*	V.59.877.	Natural History Museum
Gombasek	*Alces sp.*	V.59.877.	Natural History Museum
Gombasek	*Alces sp.*	V.59.943.	Natural History Museum
Gombasek	*Alces sp.*	V.59.943.	Natural History Museum
Gombasek	*Alces sp.*	V.59.943.	Natural History Museum
Gombasek	*Alces sp.*	V.59.957.	Natural History Museum
Gombasek	*Alces sp.*	V.59.957.	Natural History Museum
Gombasek	*Alces sp.*	V.59.958.	Natural History Museum
Gombasek	*Alces sp.*	V.59.988.	Natural History Museum
Gombasek	*Capreolus sp.*	V.59.1096.	Natural History Museum
Gombasek	*Capreolus sp.*	V.59.1096.	Natural History Museum
Gombasek	*Capreolus sp.*	V.59.1096.	Natural History Museum
Gombasek	*Capreolus sp.*	V.60.1770.	Natural History Museum
Gombasek	*Capreolus sp.*	V.60.1770.	Natural History Museum
Gombasek	*Capreolus sp.*	V.60.1770.	Natural History Museum
Gombasek	*Capreolus sp.*	V.60.1770.	Natural History Museum
Gombasek	*Capreolus sp.*	V.60.1770.	Natural History Museum
Gombasek	*Capreolus sp.*	V.60.1770.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.1001.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.1001.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.1001.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.1002.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.1002.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.1002.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.1002.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.875.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.875.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.875.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.875.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.936.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.936.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.937.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.944.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.944.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.944.	Natural History Museum

Gombasek	*Cervus sp.*	V.59.946.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.946.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.946.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.946.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.956.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.956.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.956.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.956.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.970.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.980.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.983.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.989.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.989.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.989.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.989.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.989.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.989.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.989.	Natural History Museum
Gombasek	*Cervus sp.*	V.59.994.	Natural History Museum
Gombasek	*Cervus sp.*	V.60.1783.	Natural History Museum
Gombasek	*Cervus sp.*	V.60.1783.	Natural History Museum
Gombasek	*Cervus sp.*	V.60.1783.	Natural History Museum
Gombasek	*Cervus sp.*	V.60.1783.	Natural History Museum
Gombasek	*Cervus sp.*	V.60.1783.	Natural History Museum
Gombasek	*Cervus sp.*	V.60.1783.	Natural History Museum
Gombasek	*Megaloceros sp.*	V.59.927.	Natural History Museum
Hórvölgy Rock-shelter	*Cervus sp.*	M.S.01.	Natural History Museum
Hórvölgy Rock-shelter	*Cervus sp.*	M.S.02.	Natural History Museum
Hórvölgy Rock-shelter	*Cervus sp.*	V.75.181.	Natural History Museum
Hórvölgy Rock-shelter	*Cervus sp.*	V.75.181.	Natural History Museum
Istállóskő Cave	*Alces alces*	V.59.379.	Natural History Museum
Istállóskő Cave	*Alces alces*	V.59.379.	Natural History Museum
Istállóskő Cave	*Capreolus capreolus*	V.59.30.	Natural History Museum
Istállóskő Cave	*Rangifer tarandus*	V.59.389.	Natural History Museum
Istállóskő Cave	*Rangifer tarandus*	V.59.394.	Natural History Museum
Istállóskő Cave	*Rangifer tarandus*	V.59.408.	Natural History Museum
Istállóskő Cave	*Rangifer tarandus*	V.59.408.	Natural History Museum
Istállóskő Cave	*Rangifer tarandus*	V.59.421.	Natural History Museum
Istállóskő Cave	*Rangifer tarandus*	V.59.424.	Natural History Museum
Istállóskő Cave	*Rangifer tarandus*	V.59.424.	Natural History Museum
Istállóskő Cave	*Rangifer tarandus*	V.59.428.	Natural History Museum
Jankovich Cave	*Rangifer tarandus*	V.14659.	Natural History Museum
Jankovich Cave	*Rangifer tarandus*	V.14659.	Natural History Museum
Jankovich Cave	*Rangifer tarandus*	V.14659.	Natural History Museum
Jankovich Cave	*Rangifer tarandus*	V.14659.	Natural History Museum
Jankovich Cave	*Rangifer tarandus*	V.14660.	Natural History Museum
Jankovich Cave	*Rangifer tarandus*	V.14660.	Natural History Museum
Kiskevély Cave	*Alces alces*	V.60.956.	Natural History Museum

Kiskevély Cave	*Alces alces*	V.60.956.	Natural History Museum
Kiskevély Cave	*Cervus elaphus*	V.60.955.	Natural History Museum
Kiskevély Cave	*Cervus elaphus*	V.60.955.	Natural History Museum
Kiskőhát Cave	*Rangifer tarandus*	V.64.85.	Natural History Museum
Kiskőhát Cave	*Rangifer tarandus*	V.64.85.	Natural History Museum
Kiskőhát Cave	*Rangifer tarandus*	V.64.85.	Natural History Museum
Lambrecht Cave	*Alces alces*	V.58.1030.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1595.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1596.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1596.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1596.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1596.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1611.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1611.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1611.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1619.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1619.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1619.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1619.	Natural History Museum
Lambrecht Cave	*Capreolus capreolus*	V.58.1619.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1058.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1078.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1078.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1078.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1136.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1136.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1142.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1142.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1142.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1547.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1547.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1548.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1548.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1548.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.1548.	Natural History Museum
Lambrecht Cave	*Cervus elaphus*	V.58.720.	Natural History Museum
Lambrecht Cave	*Megaloceros giganteus*	V.58.1030.	Natural History Museum
Lambrecht Cave	*Megaloceros giganteus*	V.58.1063.	Natural History Museum
Lambrecht Cave	*Megaloceros giganteus*	V.58.1063.	Natural History Museum
Mogyorósbánya	*Rangifer tarandus*	7476-7478	Hungarian National Museum
Mogyorósbánya	*Rangifer tarandus*	7479-7481	Hungarian National Museum
Mogyorósbánya	*Rangifer tarandus*	7482-7485	Hungarian National Museum
Mogyorósbánya	*Rangifer tarandus*	7486-7488	Hungarian National Museum
Mogyorósbánya	*Rangifer tarandus*	7489-7491	Hungarian National Museum
Mogyorósbánya	*Rangifer tarandus*	7492-7494	Hungarian National Museum
Mogyorósbánya	*Rangifer tarandus*	7495-7497	Hungarian National Museum
Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum
Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum

Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum
Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum
Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum
Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum
Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum
Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum
Osztramos 8.	*Cervus sp.*	V.73.70.	Natural History Museum
Peskő Cave	*Rangifer tarandus*	V.14274.	Natural History Museum
Peskő Cave	*Rangifer tarandus*	V.14274.	Natural History Museum
Peskő Cave	*Rangifer tarandus*	V.14274.	Natural History Museum
Peskő Cave	*Rangifer tarandus*	V.14277.	Natural History Museum
Peskő Cave	*Rangifer tarandus*	V.14277.	Natural History Museum
Peskő Cave	*Rangifer tarandus*	V.14277.	Natural History Museum
Peskő Cave	*Rangifer tarandus*	V.14277.	Natural History Museum
Peskő Cave	*Rangifer tarandus*	V.14277.	Natural History Museum
Petényi Cave	*Cervus elaphus*	V.61.2021.	Natural History Museum
Petényi Cave	*Cervus elaphus*	V.61.2021.	Natural History Museum
Petényi Cave	*Cervus elaphus*	V.61.2021.	Natural History Museum
Petényi Cave	*Cervus elaphus*	V.61.2021.	Natural History Museum
Petényi Cave	*Cervus elaphus*	V.61.2025.	Natural History Museum
Petényi Cave	*Cervus elaphus*	V.61.2025.	Natural History Museum
Petényi Cave	*Rangifer tarandus*	V.61.2110.	Natural History Museum
Petényi Cave	*Rangifer tarandus*	V.61.2110.	Natural History Museum
Pilismarót	*Rangifer tarandus*	7500-7502	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7503-7505	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7503-7505	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7506-7508	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7509-7511	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7512-7514	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7512-7514	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7515-7517	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7518-7520	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7521-7523	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7524-7526	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7527-7529	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7527-7529	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7530-7532	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7533-7535	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7536-7538	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7539-7541	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7542-7544	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7545-7547	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7548-7550	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7551-7553	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7554-7556	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7557-7559	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7560-7562	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7563-7565	Hungarian National Museum

Pilismarót	*Rangifer tarandus*	7566-7568	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7569-7571	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7572-7574	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7575-7577	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7578-7580	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7581-7583	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7584-7586	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7584-7586	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7587-7589	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7590-7592	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7593-7595	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7596-7598	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7596-7598	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7599-7601	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7602-7604	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7605-7607	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7608-7610	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7611-7613	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7614-7616	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7617-7619	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7617-7619	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7620-7622	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7623-7625	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7626-7628	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7629-7631	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7632-7634	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7635-7637	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7638-7641	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7642-7644	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7642-7644	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7645-7647	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7648-7650	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7651-7653	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7654-7656	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7657-7659	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7660-7662	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7663-7665	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7666-7668	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7669-7671	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7669-7671	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7672-7674	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7675-7677	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7678-7680	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7678-7680	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7681-7683	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7681-7683	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7684-7686	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7687-7689	Hungarian National Museum

Pilismarót	*Rangifer tarandus*	7690-7692	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7690-7692	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7693-7695	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7696-7698	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7699-7701	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7702-7704	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7705-7707	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7708-7710	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7711-7713	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7711-7713	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7714-7716	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7717-7719	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7720-7722	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7723-7725	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7726-7728	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7729-7731	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7732-7734	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7735-7738	Hungarian National Museum
Pilismarót	*Rangifer tarandus*	7739-7741	Hungarian National Museum
Remete Cave	*Cervus elaphus*	V.61.1292.	Natural History Museum
Remete Cave	*Cervus elaphus*	V.61.1292.	Natural History Museum
Remete Cave	*Cervus elaphus*	V.61.1292.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1486.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1532.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1559.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1559.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1661.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1661.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1661.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1661.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1661.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1661.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1661.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1705.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1705.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1705.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1705.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1705.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1705.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1705.	Natural History Museum
Szeleta Cave	*Rangifer tarandus*	V.63.1705.	Natural History Museum

Szelim Cave	*Alces alces*	G.57.227.	Natural History Museum
Szelim Cave	*Alces alces*	G.57.504.	Natural History Museum
Szelim Cave	*Alces alces*	G.57.517.	Natural History Museum
Szelim Cave	*Alces alces*	G.57.519.	Natural History Museum
Szelim Cave	*Alces alces*	G.57.675.	Natural History Museum
Szelim Cave	*Alces alces*	G.57.675.	Natural History Museum
Szelim Cave	*Cervus elaphus*	G.57.386.	Natural History Museum
Szelim Cave	*Cervus elaphus*	G.57.386.	Natural History Museum
Szelim Cave	*Cervus elaphus*	G.57.386.	Natural History Museum
Szelim Cave	*Cervus elaphus*	G.57.451.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.101.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.507.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.588.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.588.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.594.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.594.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.594.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.594.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.594.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.617.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.617.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.617.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.621.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.621.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.625.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.628.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.659.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.659.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.659.	Natural History Museum
Szelim Cave	*Rangifer tarandus*	G.57.660.	Natural History Museum
Szuhogy - Csorbakő	*Megaloceros giganteus*	V.63.1578.	Natural History Museum
Szuhogy - Csorbakő	*Rangifer tarandus*	V.60.1104.	Natural History Museum
Tapolca Cave	*Cervus elaphus*	V.63.1496.	Natural History Museum
Tapolca Cave	*Megaloceros giganteus*	V.63.1442.	Natural History Museum
Tapolca Cave	*Megaloceros giganteus*	V.63.1445.	Natural History Museum
Tapolca Cave	*Megaloceros giganteus*	V.63.1482.	Natural History Museum
Tarkő Rock-shelter	*Cervus acoronatus*	V.69.10.	Natural History Museum
Tarkő Rock-shelter	*Cervus acoronatus*	V.69.10.	Natural History Museum
Tarkő Rock-shelter	*Cervus acoronatus*	V.69.12.	Natural History Museum
Tarkő Rock-shelter	*Cervus acoronatus*	V.69.12.	Natural History Museum
Tokod - Nagyberek I	*Cervus elaphus*	V.64.867.	Natural History Museum
Tokod - Nagyberek I	*Cervus elaphus*	V.91.65.	Natural History Museum
Tokod - Nagyberek I	*Cervus elaphus*	V.92.17.	Natural History Museum
Tokod - Nagyberek I	*Megaloceros giganteus*	V.64.859.	Natural History Museum
Tokod - Nagyberek I	*Megaloceros giganteus*	V.64.859.	Natural History Museum
Uppony I	*Cervus sp.*	V.60.1131.	Natural History Museum
Uppony I	*Cervus sp.*	V.60.1133.	Natural History Museum
Uppony I	*Cervus sp.*	V.60.1133.	Natural History Museum

Uppony I	*Cervus sp.*	V.60.1135.	Natural History Museum
Uppony I	*Cervus sp.*	V.60.1139.	Natural History Museum
Uppony I	*Cervus sp.*	V.60.1177.	Natural History Museum
Uppony I	*Cervus sp.*	V.60.1278.	Natural History Museum
Uppony I	*Cervus sp.*	V.65.174.	Natural History Museum
Uppony I	*Cervus sp.*	V.60.1134.	Natural History Museum
Üröm Hill	*Dama sp.*	V.62.233.	Natural History Museum
Üröm Hill	*Dama sp.*	V.62.233.	Natural History Museum
Üröm Hill	*Dama sp.*	V.62.233.	Natural History Museum
Üröm Hill	*Dama sp.*	V.62.233.	Natural History Museum
Üröm Hill	*Dama sp.*	V.62.233.	Natural History Museum
Üröm Hill	*Dama sp.*	V.62.233.	Natural History Museum
Üröm Hill	*Dama sp.*	V.62.247.	Natural History Museum
Vár Cave	*Cervus cf. elaphus*	V.60.866.	Natural History Museum
Vár Cave	*Cervus cf. elaphus*	V.60.867.	Natural History Museum
Vár Cave	*Cervus cf. elaphus*	V.77.54.	Natural History Museum
Vértesszőllős II	*Cervus sp.*	V.2010.37.1.	Natural History Museum
Vértesszőllős II	*Cervus sp.*	V.69.791.	Natural History Museum
Vértesszőllős II	*Cervus sp.*	V.69.791.	Natural History Museum
Vértesszőllős II	*Cervus sp.*	V.69.791.	Natural History Museum
Vértesszőllős II	*Cervus sp.*	V.69.792.	Natural History Museum
Vértesszőllős II	*Cervus sp.*	V.69.793.	Natural History Museum
Vértesszőllős II	*Cervus sp.*	V.69.794.	Natural History Museum
Vértesszőllős II	*Cervus sp.*	V.69.794.	Natural History Museum
Zalaegerszeg	*Megaloceros giganteus*	V.62.103.	Natural History Museum
Zalaegerszeg	*Megaloceros giganteus*	V.62.103.	Natural History Museum
Zalaegerszeg	*Megaloceros giganteus*	V.62.103.	Natural History Museum
Zebegény	*Cervus elaphus*	V.61.2364.	Natural History Museum
Zebegény	*Cervus elaphus*	V.61.2364.	Natural History Museum
Zebegény	*Cervus elaphus*	V.61.2364.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1435./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1435./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1437.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1445./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1445./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1450./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1450./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1450./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1452./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1452./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1452./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1469./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1469./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1489./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1489./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1489./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1490./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1490./2	Natural History Museum

Ságvár	*Rangifer tarandus*	V.60.1490./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1493./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1493./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1496./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1496./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1496./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1498./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1498./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1498./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1501./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1501./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1501./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1501./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1503./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1504./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1504./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1505./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1505./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1507./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1507./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1508./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1508./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1508./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1509.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1510.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1511./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1511./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1523.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1524./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1524./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1526.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1527.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./11	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./12	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./6	Natural History Museum

Ságvár	*Rangifer tarandus*	V.60.1528./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1528./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1532.	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1534./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1534./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1534./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1534./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1534./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1534./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1534./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1536./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1536./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1536./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1536./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1536./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1536./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1536./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1537./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1537./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1537./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1537./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1537./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1538./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1538./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1538./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1538./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1538./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1540./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./11	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1542./8	Natural History Museum

Ságvár	*Rangifer tarandus*	V.60.1542./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./11	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./12	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./13	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./14	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1543./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1545./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1545./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1545./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1545./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1545./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./11	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1546./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1547./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1547./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1547./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1547./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1547./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./11	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./12	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./13	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./14	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./15	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./16	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./17	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./18	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./3	Natural History Museum

Ságvár	*Rangifer tarandus*	V.60.1548./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1548./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./11	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1550./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1551./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1551./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1551./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1552./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1552./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1552./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1552./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1552./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1552./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1552./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./11	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./12	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1553./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1554./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1554./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1554./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1554./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1554./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1554./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./11	Natural History Museum

Ságvár	*Rangifer tarandus*	V.60.1557./12	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./13	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./14	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./15	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./16	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1557./9	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1558./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1558./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1558./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1558./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1558./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1558./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1559./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1559./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1559./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./1	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./10	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./11	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./12	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./13	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./14	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./15	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./16	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./17	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./18	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./19	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./2	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./20	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./21	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./22	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./23	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./24	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./25	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./26	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./27	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./28	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./29	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./3	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./30	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./31	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./32	Natural History Museum

Ságvár	*Rangifer tarandus*	V.60.1561./33	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./34	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./35	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./36	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./37	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./38	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./39	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./4	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./40	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./41	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./42	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./43	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./44	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./5	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./6	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./7	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./8	Natural History Museum
Ságvár	*Rangifer tarandus*	V.60.1561./9	Natural History Museum
Ságvár	*Rangifer tarandus*	4/9/1/1	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/1/2	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/1/3	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/2/1	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/1	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/2	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/3	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/4	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/5	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/6	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/7	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/8	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/9	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/10	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/11	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/12	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/13	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/14	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/15	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/16	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/3/17	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/6/1	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/6/2	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/6/3	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/6/4	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/1	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/2	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/3	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/4	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/5	Hungarian National Museum

Ságvár	*Rangifer tarandus*	4/9/7/6	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/7	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/8	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/9	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/10	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/11	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/12	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/13	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/14	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/15	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/16	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/17	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/18	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/7/19	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/1	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/2	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/3	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/4	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/5	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/6	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/7	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/8	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/9	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/10	Hungarian National Museum
Ságvár	*Rangifer tarandus*	4/9/9/11	Hungarian National Museum

Mesowear score	Microwear		Stable isotopic	
	Scratch (mean)	Pit (mean)	δ18OPO4 [‰] VSMOW	δ18OCO3 [‰] VPDB
1	16.7	20.2	-	-
4	25.3	29.6	-	-
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4	-	-	-	-
3	-	-	-	-
1	-	-	-	-
4	-	-	-	-
3	-	-	-	-
3	24.2	31	-	-
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5	-	-	-	-
1	-	-	-	-
3	16	16	-	-
1	-	-	-	-
2	-	-	-	-
5	17	14	-	-
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1	-	-	-	-
5	9.4	30.6	-	-
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2	-	-	15.3	NA
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2	27.3	23.5	-	-
4	26	27	-	-
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Site	Country	Latitude	Longitude	Altitude	O18	Precipitatio	Air Temperature
VIENNA (H(	AT	48.24861	16.35639	198	-18.2	40	-6
VIENNA (H(	AT	48.24861	16.35639	198	-16.31	40	-5.3
VIENNA (H(	AT	48.24861	16.35639	198	-11.4	7	-4.7
VIENNA (H(	AT	48.24861	16.35639	198	-18.19	44	-4.7
VIENNA (H(	AT	48.24861	16.35639	198	-21.6	22	-4.5
VIENNA (H(	AT	48.24861	16.35639	198	-18.18	82	-4.4
VIENNA (H(	AT	48.24861	16.35639	198	-12.2	13	-4.3
VIENNA (H(	AT	48.24861	16.35639	198	-24.41	64	-3.5
VIENNA (H(	AT	48.24861	16.35639	198	-14.04	21	-3.4
VIENNA (H(	AT	48.24861	16.35639	198	-18.7	34	-3.3
VIENNA (H(	AT	48.24861	16.35639	198	-16.23	48	-3.3
VIENNA (H(	AT	48.24861	16.35639	198	-15.6	42	-3.2
VIENNA (H(	AT	48.24861	16.35639	198	-19.18	40	-3.2
VIENNA (H(	AT	48.24861	16.35639	198	-14.02	25	-3.1
VIENNA (H(	AT	48.24861	16.35639	198	-15	57	-3.1
VIENNA (H(	AT	48.24861	16.35639	198	-18.7	48	-2.7
VIENNA (H(	AT	48.24861	16.35639	198	-12.54	38	-2.6
VIENNA (H(	AT	48.24861	16.35639	198	-11.47	25	-2.4
VIENNA (H(	AT	48.24861	16.35639	198	-12.46	14	-2.4
VIENNA (H(	AT	48.24861	16.35639	198	-17.6	24	-2.3
VIENNA (H(	AT	48.24861	16.35639	198	-18.9099	42	-2.3
VIENNA (H(	AT	48.24861	16.35639	198	-18.14	12	-2.1
VIENNA (H(	AT	48.24861	16.35639	198	-11.8	27	-2.1
VIENNA (H(	AT	48.24861	16.35639	198	-15.1	47	-2
VIENNA (H(	AT	48.24861	16.35639	198	-17.35	31	-2
VIENNA (H(	AT	48.24861	16.35639	198	-17.53	17	-2
VIENNA (H(	AT	48.24861	16.35639	198	-12.8073	56	-1.9
VIENNA (H(	AT	48.24861	16.35639	198	-13.56	17	-1.8
VIENNA (H(	AT	48.24861	16.35639	198	-13.24	54	-1.6
VIENNA (H(	AT	48.24861	16.35639	198	-15.56	50	-1.5
VIENNA (H(	AT	48.24861	16.35639	198	-13.99	35	-1.5
VIENNA (H(	AT	48.24861	16.35639	198	-14.68	71	-1.4
VIENNA (H(	AT	48.24861	16.35639	198	-11.6	52	-1.1
VIENNA (H(	AT	48.24861	16.35639	198	-15.36	14	-1.1
VIENNA (H(	AT	48.24861	16.35639	198	-13.11	64	-1
VIENNA (H(	AT	48.24861	16.35639	198	-19.54	39	-1
VIENNA (H(	AT	48.24861	16.35639	198	-16.44	48	-0.9
VIENNA (H(	AT	48.24861	16.35639	198	-19.34	77	-0.9
VIENNA (H(	AT	48.24861	16.35639	198	-12.69	23	-0.8
VIENNA (H(	AT	48.24861	16.35639	198	-11.19	34	-0.7
VIENNA (H(	AT	48.24861	16.35639	198	-14.78	26	-0.7
VIENNA (H(	AT	48.24861	16.35639	198	-18.51	30	-0.6
VIENNA (H(	AT	48.24861	16.35639	198	-13.37	49	-0.6
VIENNA (H(	AT	48.24861	16.35639	198	-12.85	46	-0.6
VIENNA (H(	AT	48.24861	16.35639	198	-14.65	35	-0.6
VIENNA (H(	AT	48.24861	16.35639	198	-14.26	55	-0.5
VIENNA (H(	AT	48.24861	16.35639	198	-14.4	49	-0.4
VIENNA (H(	AT	48.24861	16.35639	198	-12.75	66	-0.4
VIENNA (H(	AT	48.24861	16.35639	198	-10.65	64	-0.4

VIENNA (H(	AT	48.24861	16.35639	198	-20.74	79	-0.3
VIENNA (H(	AT	48.24861	16.35639	198	-13.65	36	-0.2
VIENNA (H(	AT	48.24861	16.35639	198	-18.16	70	-0.2
VIENNA (H(	AT	48.24861	16.35639	198	-16.23	47	-0.1
VIENNA (H(	AT	48.24861	16.35639	198	-10.23	25	0.2
VIENNA (H(	AT	48.24861	16.35639	198	-13.99	27	0.2
VIENNA (H(	AT	48.24861	16.35639	198	-12.98	109	0.4
VIENNA (H(	AT	48.24861	16.35639	198	-12.6	59	0.4
VIENNA (H(	AT	48.24861	16.35639	198	-15.46	39	0.4
VIENNA (H(	AT	48.24861	16.35639	198	-12.99	19	0.5
VIENNA (H(	AT	48.24861	16.35639	198	-16.93	86	0.5
VIENNA (H(	AT	48.24861	16.35639	198	-9.7	29	0.6
VIENNA (H(	AT	48.24861	16.35639	198	-13.67	21	0.6
VIENNA (H(	AT	48.24861	16.35639	198	-13.88	57	0.6
VIENNA (H(	AT	48.24861	16.35639	198	-17.68	35	0.6
VIENNA (H(	AT	48.24861	16.35639	198	-11.11	74	0.6
VIENNA (H(	AT	48.24861	16.35639	198	-14.92	52	0.6
VIENNA (H(	AT	48.24861	16.35639	198	-11.95	105	0.6
VIENNA (H(	AT	48.24861	16.35639	198	-14.75	57	0.7
VIENNA (H(	AT	48.24861	16.35639	198	-13.875	17	0.7
VIENNA (H(	AT	48.24861	16.35639	198	-13.29	60	0.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.35687	10	0.7
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VIENNA (H(	AT	48.24861	16.35639	198	-13.93	43	0.8
VIENNA (H(	AT	48.24861	16.35639	198	-15.9245	20	0.8
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VIENNA (H(	AT	48.24861	16.35639	198	-9.67	43	0.8
VIENNA (H(	AT	48.24861	16.35639	198	-16.4	39	0.9
VIENNA (H(	AT	48.24861	16.35639	198	-14.45	26	0.9
VIENNA (H(	AT	48.24861	16.35639	198	-8.945	8	1
VIENNA (H(	AT	48.24861	16.35639	198	-15.39	29	1.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.16	20	1.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.98	5	1.1
VIENNA (H(	AT	48.24861	16.35639	198	-12.935	113	1.1
VIENNA (H(	AT	48.24861	16.35639	198	-11.97	36	1.1
VIENNA (H(	AT	48.24861	16.35639	198	-12.42	55	1.2
VIENNA (H(	AT	48.24861	16.35639	198	-12.74	72	1.2
VIENNA (H(	AT	48.24861	16.35639	198	-12.0195	31.5	1.2
VIENNA (H(	AT	48.24861	16.35639	198	-17.2	72	1.3
VIENNA (H(	AT	48.24861	16.35639	198	-15.07	25	1.3
VIENNA (H(	AT	48.24861	16.35639	198	-11.84	15	1.3
VIENNA (H(	AT	48.24861	16.35639	198	-16.66	56	1.3
VIENNA (H(	AT	48.24861	16.35639	198	-16.18	37	1.4
VIENNA (H(	AT	48.24861	16.35639	198	-13.27	19	1.4
VIENNA (H(	AT	48.24861	16.35639	198	-13.91	16	1.4
VIENNA (H(	AT	48.24861	16.35639	198	-9.52	52	1.4
VIENNA (H(	AT	48.24861	16.35639	198	-7.74	29	1.4
VIENNA (H(	AT	48.24861	16.35639	198	-13.52	61	1.5
VIENNA (H(	AT	48.24861	16.35639	198	-13.32	37	1.5

VIENNA (H(	AT	48.24861	16.35639	198	-9.31	4	1.5
VIENNA (H(	AT	48.24861	16.35639	198	-18.55	45	1.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.81	13	1.5
VIENNA (H(	AT	48.24861	16.35639	198	-12.39	29	1.6
VIENNA (H(	AT	48.24861	16.35639	198	-17.565	64	1.6
VIENNA (H(	AT	48.24861	16.35639	198	-13.15	50	1.7
VIENNA (H(	AT	48.24861	16.35639	198	-15.3	54	1.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.6	19	1.8
VIENNA (H(	AT	48.24861	16.35639	198	-12.56	59	1.8
VIENNA (H(	AT	48.24861	16.35639	198	-11.62	42	2
VIENNA (H(	AT	48.24861	16.35639	198	-13.87	33	2
VIENNA (H(	AT	48.24861	16.35639	198	-11.29	78	2.1
VIENNA (H(	AT	48.24861	16.35639	198	-9.11	5	2.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.64	38	2.2
VIENNA (H(	AT	48.24861	16.35639	198	-13.48	30	2.2
VIENNA (H(	AT	48.24861	16.35639	198	-9.63	7	2.3
VIENNA (H(	AT	48.24861	16.35639	198	-7.52	99	2.3
VIENNA (H(	AT	48.24861	16.35639	198	-14.45	107	2.3
VIENNA (H(	AT	48.24861	16.35639	198	-12.82	37	2.3
VIENNA (H(	AT	48.24861	16.35639	198	-10.4	29	2.4
VIENNA (H(	AT	48.24861	16.35639	198	-12.9	67	2.4
VIENNA (H(	AT	48.24861	16.35639	198	-12.02	74	2.4
VIENNA (H(	AT	48.24861	16.35639	198	-18.75	32	2.5
VIENNA (H(	AT	48.24861	16.35639	198	-12.98	42	2.5
VIENNA (H(	AT	48.24861	16.35639	198	-12.76	57	2.6
VIENNA (H(	AT	48.24861	16.35639	198	-11.13	72	2.6
VIENNA (H(	AT	48.24861	16.35639	198	-12.26	38	2.6
VIENNA (H(	AT	48.24861	16.35639	198	-12.17	30	2.6
VIENNA (H(	AT	48.24861	16.35639	198	-12.93	49	2.6
VIENNA (H(	AT	48.24861	16.35639	198	-14.67	39	2.6
VIENNA (H(	AT	48.24861	16.35639	198	-10.94	91	2.6
VIENNA (H(	AT	48.24861	16.35639	198	-15.61	34	2.8
VIENNA (H(	AT	48.24861	16.35639	198	-12.83	52	2.8
VIENNA (H(	AT	48.24861	16.35639	198	-8.82	34	2.8
VIENNA (H(	AT	48.24861	16.35639	198	-12.82	52	2.9
VIENNA (H(	AT	48.24861	16.35639	198	-16.69	40	2.9
VIENNA (H(	AT	48.24861	16.35639	198	-11.5	68	3
VIENNA (H(	AT	48.24861	16.35639	198	-8.75	18	3
VIENNA (H(	AT	48.24861	16.35639	198	-11.87	64	3
VIENNA (H(	AT	48.24861	16.35639	198	-13.49	20	3
VIENNA (H(	AT	48.24861	16.35639	198	-10.88	71	3
VIENNA (H(	AT	48.24861	16.35639	198	-14.05	43	3
VIENNA (H(	AT	48.24861	16.35639	198	-12.1	112	3
VIENNA (H(	AT	48.24861	16.35639	198	-13.6	47	3.1
VIENNA (H(	AT	48.24861	16.35639	198	-9.05	31	3.1
VIENNA (H(	AT	48.24861	16.35639	198	-12.62	20	3.1
VIENNA (H(	AT	48.24861	16.35639	198	-10.71	29	3.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.44	15	3.2
VIENNA (H(	AT	48.24861	16.35639	198	-8.27	18	3.2
VIENNA (H(	AT	48.24861	16.35639	198	-17.46	62	3.3

VIENNA (H(AT	48.24861	16.35639	198	-10.05	89	3.3
VIENNA (H(AT	48.24861	16.35639	198	-9.31	9	3.4
VIENNA (H(AT	48.24861	16.35639	198	-16.19	75	3.4
VIENNA (H(AT	48.24861	16.35639	198	-13.57	79	3.4
VIENNA (H(AT	48.24861	16.35639	198	-6.22	8	3.4
VIENNA (H(AT	48.24861	16.35639	198	-13.07	30	3.5
VIENNA (H(AT	48.24861	16.35639	198	-14.655	52	3.5
VIENNA (H(AT	48.24861	16.35639	198	-9	17	3.5
VIENNA (H(AT	48.24861	16.35639	198	-12.11	50	3.5
VIENNA (H(AT	48.24861	16.35639	198	-14.65	45	3.7
VIENNA (H(AT	48.24861	16.35639	198	-12.11	66	3.7
VIENNA (H(AT	48.24861	16.35639	198	-11.69	68	3.7
VIENNA (H(AT	48.24861	16.35639	198	-9.75	24	3.7
VIENNA (H(AT	48.24861	16.35639	198	-13.3	84	3.8
VIENNA (H(AT	48.24861	16.35639	198	-12.05	33	3.8
VIENNA (H(AT	48.24861	16.35639	198	-6.9	22	3.8
VIENNA (H(AT	48.24861	16.35639	198	-10.04	55	3.8
VIENNA (H(AT	48.24861	16.35639	198	-10.6185	18	3.8
VIENNA (H(AT	48.24861	16.35639	198	-9.9	68	3.9
VIENNA (H(AT	48.24861	16.35639	198	-14.5	101	3.9
VIENNA (H(AT	48.24861	16.35639	198	-15.1	49	3.9
VIENNA (H(AT	48.24861	16.35639	198	-11.01	43	3.9
VIENNA (H(AT	48.24861	16.35639	198	-12	43	4
VIENNA (H(AT	48.24861	16.35639	198	-14.18	60	4
VIENNA (H(AT	48.24861	16.35639	198	-11.64	19	4
VIENNA (H(AT	48.24861	16.35639	198	-11.29	56	4.1
VIENNA (H(AT	48.24861	16.35639	198	-14.55	21	4.1
VIENNA (H(AT	48.24861	16.35639	198	-8.75	25	4.1
VIENNA (H(AT	48.24861	16.35639	198	-11.45	39	4.2
VIENNA (H(AT	48.24861	16.35639	198	-13.84	45	4.2
VIENNA (H(AT	48.24861	16.35639	198	-13.16	64	4.2
VIENNA (H(AT	48.24861	16.35639	198	-14	25	4.2
VIENNA (H(AT	48.24861	16.35639	198	-10.55	46	4.2
VIENNA (H(AT	48.24861	16.35639	198	-12.81	44	4.3
VIENNA (H(AT	48.24861	16.35639	198	-7.3	61	4.4
VIENNA (H(AT	48.24861	16.35639	198	-11.44	31	4.4
VIENNA (H(AT	48.24861	16.35639	198	-7.34	10	4.4
VIENNA (H(AT	48.24861	16.35639	198	-11.6	44	4.5
VIENNA (H(AT	48.24861	16.35639	198	-13.01	92	4.5
VIENNA (H(AT	48.24861	16.35639	198	-12.43	22	4.7
VIENNA (H(AT	48.24861	16.35639	198	-9.11	17	4.7
VIENNA (H(AT	48.24861	16.35639	198	-13.75	47	4.7
VIENNA (H(AT	48.24861	16.35639	198	-10.01	45	4.8
VIENNA (H(AT	48.24861	16.35639	198	-12.37	66	4.8
VIENNA (H(AT	48.24861	16.35639	198	-12.08	58	4.9
VIENNA (H(AT	48.24861	16.35639	198	-15.93	64	5
VIENNA (H(AT	48.24861	16.35639	198	-11.9	107	5
VIENNA (H(AT	48.24861	16.35639	198	-8.91	27	5
VIENNA (H(AT	48.24861	16.35639	198	-13.97	75	5
VIENNA (H(AT	48.24861	16.35639	198	-10.59	36	5

VIENNA (H(	AT	48.24861	16.35639	198	-11.51	94	5.1
VIENNA (H(	AT	48.24861	16.35639	198	-11.23	58	5.2
VIENNA (H(	AT	48.24861	16.35639	198	-13.8	72	5.2
VIENNA (H(	AT	48.24861	16.35639	198	-10.1	22	5.3
VIENNA (H(	AT	48.24861	16.35639	198	-9.41	47	5.3
VIENNA (H(	AT	48.24861	16.35639	198	-9.99	63	5.3
VIENNA (H(	AT	48.24861	16.35639	198	-16.96	72	5.4
VIENNA (H(	AT	48.24861	16.35639	198	-11.86	57	5.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.14	31	5.5
VIENNA (H(	AT	48.24861	16.35639	198	-12.45	32	5.6
VIENNA (H(	AT	48.24861	16.35639	198	-14.1	36	5.6
VIENNA (H(	AT	48.24861	16.35639	198	-12.25	34	5.7
VIENNA (H(	AT	48.24861	16.35639	198	-12.81	145	5.7
VIENNA (H(	AT	48.24861	16.35639	198	-13.17	69	5.8
VIENNA (H(	AT	48.24861	16.35639	198	-7.84	91	5.8
VIENNA (H(	AT	48.24861	16.35639	198	-14.4	112	5.9
VIENNA (H(	AT	48.24861	16.35639	198	-5.98	54	5.9
VIENNA (H(	AT	48.24861	16.35639	198	-13.2755	18	6
VIENNA (H(	AT	48.24861	16.35639	198	-11.91	96	6.1
VIENNA (H(	AT	48.24861	16.35639	198	-2.69	4	6.1
VIENNA (H(	AT	48.24861	16.35639	198	-6.78	37	6.2
VIENNA (H(	AT	48.24861	16.35639	198	-14.77	48	6.2
VIENNA (H(	AT	48.24861	16.35639	198	-14.66	41	6.2
VIENNA (H(	AT	48.24861	16.35639	198	-10.68	22	6.3
VIENNA (H(	AT	48.24861	16.35639	198	-8.94	81	6.3
VIENNA (H(	AT	48.24861	16.35639	198	-11.11	48	6.4
VIENNA (H(	AT	48.24861	16.35639	198	-9.32	21	6.4
VIENNA (H(	AT	48.24861	16.35639	198	-15.96	112	6.4
VIENNA (H(	AT	48.24861	16.35639	198	-9.46	52	6.4
VIENNA (H(	AT	48.24861	16.35639	198	-8.26	57	6.4
VIENNA (H(	AT	48.24861	16.35639	198	-12.12	42	6.4
VIENNA (H(	AT	48.24861	16.35639	198	-11.88	71	6.4
VIENNA (H(	AT	48.24861	16.35639	198	-6.2	26	6.5
VIENNA (H(	AT	48.24861	16.35639	198	-2.05	15	6.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.89	25	6.6
VIENNA (H(	AT	48.24861	16.35639	198	-12.01	50	6.6
VIENNA (H(	AT	48.24861	16.35639	198	-13.37	69	6.7
VIENNA (H(	AT	48.24861	16.35639	198	-12.09	25	6.7
VIENNA (H(	AT	48.24861	16.35639	198	-10.5457	35.1	6.7
VIENNA (H(	AT	48.24861	16.35639	198	-11.3	53	6.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.22	8	6.8
VIENNA (H(	AT	48.24861	16.35639	198	-14.12	77	6.8
VIENNA (H(	AT	48.24861	16.35639	198	-12.43	39	6.9
VIENNA (H(	AT	48.24861	16.35639	198	-12.44	21	6.9
VIENNA (H(	AT	48.24861	16.35639	198	-13.75	21	6.9
VIENNA (H(	AT	48.24861	16.35639	198	-17.43	111	7
VIENNA (H(	AT	48.24861	16.35639	198	-13.42	32	7
VIENNA (H(	AT	48.24861	16.35639	198	-10.9	67	7.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.35	67	7.1
VIENNA (H(	AT	48.24861	16.35639	198	-9.29	11	7.1

VIENNA (H(	AT	48.24861	16.35639	198	-11.41	28	7.2
VIENNA (H(	AT	48.24861	16.35639	198	-10.18	65	7.2
VIENNA (H(	AT	48.24861	16.35639	198	-10.13	60	7.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.98	44	7.3
VIENNA (H(	AT	48.24861	16.35639	198	-12.21	125	7.3
VIENNA (H(	AT	48.24861	16.35639	198	-11.25	105	7.4
VIENNA (H(	AT	48.24861	16.35639	198	-11.21	67	7.5
VIENNA (H(	AT	48.24861	16.35639	198	-14.7711	36	7.5
VIENNA (H(	AT	48.24861	16.35639	198	-11.43	31	7.6
VIENNA (H(	AT	48.24861	16.35639	198	-13.78	90	7.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.15	63	7.7
VIENNA (H(	AT	48.24861	16.35639	198	-8.6	30	7.8
VIENNA (H(	AT	48.24861	16.35639	198	-7.55	32	7.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.14945	23	7.8
VIENNA (H(	AT	48.24861	16.35639	198	-14.82	36	8
VIENNA (H(	AT	48.24861	16.35639	198	-5.41	27	8.1
VIENNA (H(	AT	48.24861	16.35639	198	-9.67	34	8.1
VIENNA (H(	AT	48.24861	16.35639	198	-13.23	34	8.2
VIENNA (H(	AT	48.24861	16.35639	198	-7.25	10	8.2
VIENNA (H(	AT	48.24861	16.35639	198	-14.17	40	8.2
VIENNA (H(	AT	48.24861	16.35639	198	-8.61	15	8.3
VIENNA (H(	AT	48.24861	16.35639	198	-7.15	18	8.3
VIENNA (H(	AT	48.24861	16.35639	198	-8	48	8.4
VIENNA (H(	AT	48.24861	16.35639	198	-15.48	129	8.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.98	30	8.5
VIENNA (H(	AT	48.24861	16.35639	198	-8.88	37	8.5
VIENNA (H(	AT	48.24861	16.35639	198	-14.76	72	8.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.41	21	8.7
VIENNA (H(	AT	48.24861	16.35639	198	-5.74	23	8.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.2	36	8.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.5	30	8.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.495	71	8.8
VIENNA (H(	AT	48.24861	16.35639	198	-11.3	34	8.9
VIENNA (H(	AT	48.24861	16.35639	198	-12.9	132	9
VIENNA (H(	AT	48.24861	16.35639	198	-9.46	52	9
VIENNA (H(	AT	48.24861	16.35639	198	-10.95	92	9.1
VIENNA (H(	AT	48.24861	16.35639	198	-12.84	69	9.1
VIENNA (H(	AT	48.24861	16.35639	198	-10.7	131	9.2
VIENNA (H(	AT	48.24861	16.35639	198	-10.2	28	9.2
VIENNA (H(	AT	48.24861	16.35639	198	-12.81	12	9.2
VIENNA (H(	AT	48.24861	16.35639	198	-9.53	86	9.3
VIENNA (H(	AT	48.24861	16.35639	198	-11.56	88	9.3
VIENNA (H(	AT	48.24861	16.35639	198	-7.36	30	9.3
VIENNA (H(	AT	48.24861	16.35639	198	-7.1	33	9.4
VIENNA (H(	AT	48.24861	16.35639	198	-11.41	40	9.4
VIENNA (H(	AT	48.24861	16.35639	198	-7.13	48	9.5
VIENNA (H(	AT	48.24861	16.35639	198	-10.14	50	9.5
VIENNA (H(	AT	48.24861	16.35639	198	-9.05	51	9.6
VIENNA (H(	AT	48.24861	16.35639	198	-11.25	60	9.6
VIENNA (H(	AT	48.24861	16.35639	198	-13.33	31	9.6

VIENNA (H(	AT	48.24861	16.35639	198	-9.43	86	9.7
VIENNA (H(	AT	48.24861	16.35639	198	-5.36	16	9.7
VIENNA (H(	AT	48.24861	16.35639	198	-9.78	43	9.8
VIENNA (H(	AT	48.24861	16.35639	198	-10.64	88	9.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.12	46	9.9
VIENNA (H(	AT	48.24861	16.35639	198	-9.49	21	9.9
VIENNA (H(	AT	48.24861	16.35639	198	-12.28	111	9.9
VIENNA (H(	AT	48.24861	16.35639	198	-11.59	80	9.9
VIENNA (H(	AT	48.24861	16.35639	198	-11.8	49	10
VIENNA (H(	AT	48.24861	16.35639	198	-7.6	24	10
VIENNA (H(	AT	48.24861	16.35639	198	-10.52	19	10
VIENNA (H(	AT	48.24861	16.35639	198	-8.25	27	10
VIENNA (H(	AT	48.24861	16.35639	198	-9.61829	73	10
VIENNA (H(	AT	48.24861	16.35639	198	-7.26	32	10.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.7	27	10.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.93	57	10.1
VIENNA (H(	AT	48.24861	16.35639	198	-3.721	73	10.1
VIENNA (H(	AT	48.24861	16.35639	198	-5.83	11	10.2
VIENNA (H(	AT	48.24861	16.35639	198	-9.14	66	10.2
VIENNA (H(	AT	48.24861	16.35639	198	-11.94	45	10.2
VIENNA (H(	AT	48.24861	16.35639	198	-11.65	100	10.3
VIENNA (H(	AT	48.24861	16.35639	198	-9.17	33	10.4
VIENNA (H(	AT	48.24861	16.35639	198	-8.33	21	10.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.21	16	10.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.64	11	10.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.58	34	10.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.75	57	10.6
VIENNA (H(	AT	48.24861	16.35639	198	-9.81	37	10.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.01	93	10.6
VIENNA (H(	AT	48.24861	16.35639	198	-7.73	24	10.6
VIENNA (H(	AT	48.24861	16.35639	198	-6.23	18	10.7
VIENNA (H(	AT	48.24861	16.35639	198	-9.76	44	10.7
VIENNA (H(	AT	48.24861	16.35639	198	-7.53	27	10.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.975	15	10.7
VIENNA (H(	AT	48.24861	16.35639	198	-5.29	3	10.7
VIENNA (H(	AT	48.24861	16.35639	198	-8.56	15	10.8
VIENNA (H(	AT	48.24861	16.35639	198	-5.79	28	10.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.19	88	10.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.5	19	10.8
VIENNA (H(	AT	48.24861	16.35639	198	-11.33	79	10.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.10668	91	10.8
VIENNA (H(	AT	48.24861	16.35639	198	-8.5	36	10.9
VIENNA (H(	AT	48.24861	16.35639	198	-4.57	13	10.9
VIENNA (H(	AT	48.24861	16.35639	198	-9.8	61	10.9
VIENNA (H(	AT	48.24861	16.35639	198	-10.43	47	11
VIENNA (H(	AT	48.24861	16.35639	198	-7.44	25	11
VIENNA (H(	AT	48.24861	16.35639	198	-8.84	53	11
VIENNA (H(	AT	48.24861	16.35639	198	-10.88	26	11
VIENNA (H(	AT	48.24861	16.35639	198	-7.86	27	11
VIENNA (H(	AT	48.24861	16.35639	198	-5.4	28	11.2

VIENNA (H(	AT	48.24861	16.35639	198	-10.46	22	11.2
VIENNA (H(	AT	48.24861	16.35639	198	-10.29	49	11.2
VIENNA (H(	AT	48.24861	16.35639	198	-8.87	39	11.2
VIENNA (H(	AT	48.24861	16.35639	198	-10.47	29	11.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.71	22	11.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.54	44	11.2
VIENNA (H(	AT	48.24861	16.35639	198	-5.1	11	11.3
VIENNA (H(	AT	48.24861	16.35639	198	-12.2	64	11.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.71	8	11.5
VIENNA (H(	AT	48.24861	16.35639	198	-10.96	14	11.5
VIENNA (H(	AT	48.24861	16.35639	198	-8.9	22	11.5
VIENNA (H(	AT	48.24861	16.35639	198	-13.8	59	11.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.11	72	11.6
VIENNA (H(	AT	48.24861	16.35639	198	-10.84	48	11.7
VIENNA (H(	AT	48.24861	16.35639	198	-16.03	14	11.7
VIENNA (H(	AT	48.24861	16.35639	198	-12.39	30	11.8
VIENNA (H(	AT	48.24861	16.35639	198	-8	39	12
VIENNA (H(	AT	48.24861	16.35639	198	-7.51	67	12
VIENNA (H(	AT	48.24861	16.35639	198	-12.37	179	12
VIENNA (H(	AT	48.24861	16.35639	198	-8.5	15	12.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.04	20	12.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.05	64	12.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.53	37	12.2
VIENNA (H(	AT	48.24861	16.35639	198	-10.19	136	12.3
VIENNA (H(	AT	48.24861	16.35639	198	-8.93	18	12.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.3	48	12.6
VIENNA (H(	AT	48.24861	16.35639	198	-6.62	66	12.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.29	56	12.7
VIENNA (H(	AT	48.24861	16.35639	198	-5.94299	43	13
VIENNA (H(	AT	48.24861	16.35639	198	-5.59	29	13
VIENNA (H(	AT	48.24861	16.35639	198	-11.56	106	13.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.2	60	13.2
VIENNA (H(	AT	48.24861	16.35639	198	-1.2	84	13.2
VIENNA (H(	AT	48.24861	16.35639	198	-8.2	131	13.2
VIENNA (H(	AT	48.24861	16.35639	198	-9.69	98	13.2
VIENNA (H(	AT	48.24861	16.35639	198	-5.96	9	13.2
VIENNA (H(	AT	48.24861	16.35639	198	-8.21	1	13.2
VIENNA (H(	AT	48.24861	16.35639	198	-7.23	30	13.3
VIENNA (H(	AT	48.24861	16.35639	198	-7.61	20	13.4
VIENNA (H(	AT	48.24861	16.35639	198	-16.2	54	13.5
VIENNA (H(	AT	48.24861	16.35639	198	-8.23	12	13.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.22	44	13.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.46	99	13.6
VIENNA (H(	AT	48.24861	16.35639	198	-9.03	195	13.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.8	56	13.7
VIENNA (H(	AT	48.24861	16.35639	198	-7.95	69	13.8
VIENNA (H(	AT	48.24861	16.35639	198	-9.5	51	14.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.57	47	14.1
VIENNA (H(	AT	48.24861	16.35639	198	-9.32	128	14.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.08	131	14.2

VIENNA (H(AT	48.24861	16.35639	198	-9.14246	65	14.2
VIENNA (H(AT	48.24861	16.35639	198	-9.25	55	14.3
VIENNA (H(AT	48.24861	16.35639	198	-5.73	5	14.3
VIENNA (H(AT	48.24861	16.35639	198	-6.1	25	14.4
VIENNA (H(AT	48.24861	16.35639	198	-10.92	79	14.4
VIENNA (H(AT	48.24861	16.35639	198	-9.49	44	14.5
VIENNA (H(AT	48.24861	16.35639	198	-11.96	62	14.5
VIENNA (H(AT	48.24861	16.35639	198	-10.16	120	14.6
VIENNA (H(AT	48.24861	16.35639	198	-7.94224	169	14.6
VIENNA (H(AT	48.24861	16.35639	198	-7.98	40	14.7
VIENNA (H(AT	48.24861	16.35639	198	-8.02	69	14.7
VIENNA (H(AT	48.24861	16.35639	198	-5.95	38	14.7
VIENNA (H(AT	48.24861	16.35639	198	-7.2	70	14.8
VIENNA (H(AT	48.24861	16.35639	198	-7.1	68	14.9
VIENNA (H(AT	48.24861	16.35639	198	-6.94	44	14.9
VIENNA (H(AT	48.24861	16.35639	198	-7.22	35	14.9
VIENNA (H(AT	48.24861	16.35639	198	-7.69	58	14.9
VIENNA (H(AT	48.24861	16.35639	198	-7.58	76	14.9
VIENNA (H(AT	48.24861	16.35639	198	-6.83	189	14.9
VIENNA (H(AT	48.24861	16.35639	198	-10.5	93	14.9
VIENNA (H(AT	48.24861	16.35639	198	-7.6	69	15
VIENNA (H(AT	48.24861	16.35639	198	-8.86	93	15
VIENNA (H(AT	48.24861	16.35639	198	-4.92	21	15
VIENNA (H(AT	48.24861	16.35639	198	-6.22	89	15
VIENNA (H(AT	48.24861	16.35639	198	-8.62	130	15
VIENNA (H(AT	48.24861	16.35639	198	-8.12	39	15.1
VIENNA (H(AT	48.24861	16.35639	198	-9.53	33	15.1
VIENNA (H(AT	48.24861	16.35639	198	-7.98	59	15.1
VIENNA (H(AT	48.24861	16.35639	198	-13.74	92	15.1
VIENNA (H(AT	48.24861	16.35639	198	-12.3	43	15.2
VIENNA (H(AT	48.24861	16.35639	198	-7.96	46	15.2
VIENNA (H(AT	48.24861	16.35639	198	-9.7	91	15.3
VIENNA (H(AT	48.24861	16.35639	198	-1.84	45	15.3
VIENNA (H(AT	48.24861	16.35639	198	-6.27	24	15.3
VIENNA (H(AT	48.24861	16.35639	198	-7.1	19	15.4
VIENNA (H(AT	48.24861	16.35639	198	-8.67	62	15.4
VIENNA (H(AT	48.24861	16.35639	198	-11.08	120	15.4
VIENNA (H(AT	48.24861	16.35639	198	-3.93	21	15.4
VIENNA (H(AT	48.24861	16.35639	198	-6.92	40	15.4
VIENNA (H(AT	48.24861	16.35639	198	-4.29	48	15.4
VIENNA (H(AT	48.24861	16.35639	198	-7.3	48	15.6
VIENNA (H(AT	48.24861	16.35639	198	-6.83	14	15.6
VIENNA (H(AT	48.24861	16.35639	198	-8.81	99	15.6
VIENNA (H(AT	48.24861	16.35639	198	-8.37	56	15.6
VIENNA (H(AT	48.24861	16.35639	198	-6.48	84	15.6
VIENNA (H(AT	48.24861	16.35639	198	-6.32	17	15.7
VIENNA (H(AT	48.24861	16.35639	198	-8.45	43	15.7
VIENNA (H(AT	48.24861	16.35639	198	-7.96	132	15.7
VIENNA (H(AT	48.24861	16.35639	198	-7.49	44	15.8
VIENNA (H(AT	48.24861	16.35639	198	-6.75	49	15.8

VIENNA (H(	AT	48.24861	16.35639	198	-7.85	8	15.8
VIENNA (H(	AT	48.24861	16.35639	198	-6.6	20	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-4.77	17	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-7.73	69	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-7.34	52	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-6.01	29	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-9.59	46	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-7.95	71	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-5.735	91	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-10.15	109	15.9
VIENNA (H(	AT	48.24861	16.35639	198	-9.3	30	16
VIENNA (H(	AT	48.24861	16.35639	198	-8.22463		16
VIENNA (H(	AT	48.24861	16.35639	198	-5	25	16.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.82	73	16.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.21	42	16.1
VIENNA (H(	AT	48.24861	16.35639	198	-5.65	70	16.2
VIENNA (H(	AT	48.24861	16.35639	198	-7.58	67	16.2
VIENNA (H(	AT	48.24861	16.35639	198	-8.43	57	16.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.57	97	16.3
VIENNA (H(	AT	48.24861	16.35639	198	-7.02	85	16.3
VIENNA (H(	AT	48.24861	16.35639	198	-7.26	85	16.3
VIENNA (H(	AT	48.24861	16.35639	198	-8	49	16.4
VIENNA (H(	AT	48.24861	16.35639	198	-8.98	57	16.4
VIENNA (H(	AT	48.24861	16.35639	198	-4.83	43	16.4
VIENNA (H(	AT	48.24861	16.35639	198	-7.92	44	16.4
VIENNA (H(	AT	48.24861	16.35639	198	-3.23	34	16.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.83	109	16.7
VIENNA (H(	AT	48.24861	16.35639	198	-8.69	81	16.7
VIENNA (H(	AT	48.24861	16.35639	198	-11.93	45	16.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.52	44	16.7
VIENNA (H(	AT	48.24861	16.35639	198	-7.66	89	16.8
VIENNA (H(	AT	48.24861	16.35639	198	-6.18	35	16.9
VIENNA (H(	AT	48.24861	16.35639	198	-4.55	15	16.9
VIENNA (H(	AT	48.24861	16.35639	198	-4.04	38	17
VIENNA (H(	AT	48.24861	16.35639	198	-6.88	39	17.2
VIENNA (H(	AT	48.24861	16.35639	198	-8.31	52	17.2
VIENNA (H(	AT	48.24861	16.35639	198	-5.9	22	17.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.58	51	17.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.55	29	17.2
VIENNA (H(	AT	48.24861	16.35639	198	-5.42	20	17.2
VIENNA (H(	AT	48.24861	16.35639	198	-5.9	57	17.3
VIENNA (H(	AT	48.24861	16.35639	198	-8.36	154	17.3
VIENNA (H(	AT	48.24861	16.35639	198	-9.47	46	17.3
VIENNA (H(	AT	48.24861	16.35639	198	-8.67	156	17.4
VIENNA (H(	AT	48.24861	16.35639	198	-6.53	72	17.4
VIENNA (H(	AT	48.24861	16.35639	198	-4.83	22	17.4
VIENNA (H(	AT	48.24861	16.35639	198	-8	117	17.4
VIENNA (H(	AT	48.24861	16.35639	198	-8.4	47	17.4
VIENNA (H(	AT	48.24861	16.35639	198	-5.99	99	17.4
VIENNA (H(	AT	48.24861	16.35639	198	-6.3	59	17.5

VIENNA (H(	AT	48.24861	16.35639	198	-8.14	47	17.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.96	17	17.5
VIENNA (H(	AT	48.24861	16.35639	198	-4.5	22	17.7
VIENNA (H(	AT	48.24861	16.35639	198	-3.42	30	17.7
VIENNA (H(	AT	48.24861	16.35639	198	-8.98	44	17.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.56	53	17.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.24	49	17.7
VIENNA (H(	AT	48.24861	16.35639	198	-9.12	212	17.7
VIENNA (H(	AT	48.24861	16.35639	198	-7.77571	21	17.7
VIENNA (H(	AT	48.24861	16.35639	198	-7.3	193	17.8
VIENNA (H(	AT	48.24861	16.35639	198	-5	64	17.8
VIENNA (H(	AT	48.24861	16.35639	198	-7.52	37	17.8
VIENNA (H(	AT	48.24861	16.35639	198	-6.19	112	17.8
VIENNA (H(	AT	48.24861	16.35639	198	-10.84	118	17.9
VIENNA (H(	AT	48.24861	16.35639	198	-6.86	34	17.9
VIENNA (H(	AT	48.24861	16.35639	198	-6.18	68	18
VIENNA (H(	AT	48.24861	16.35639	198	-7.71	30	18
VIENNA (H(	AT	48.24861	16.35639	198	-5.82	44	18
VIENNA (H(	AT	48.24861	16.35639	198	-7.91	125	18
VIENNA (H(	AT	48.24861	16.35639	198	-7.7	133	18.1
VIENNA (H(	AT	48.24861	16.35639	198	-6.69	101	18.1
VIENNA (H(	AT	48.24861	16.35639	198	-6.06	13	18.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.69	36	18.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.09	28	18.1
VIENNA (H(	AT	48.24861	16.35639	198	-10.44	55	18.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.36	26	18.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.74	67	18.2
VIENNA (H(	AT	48.24861	16.35639	198	-7.81	98	18.2
VIENNA (H(	AT	48.24861	16.35639	198	-7.75	108	18.2
VIENNA (H(	AT	48.24861	16.35639	198	-7.895	62	18.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.41	142	18.2
VIENNA (H(	AT	48.24861	16.35639	198	-4.9	52	18.3
VIENNA (H(	AT	48.24861	16.35639	198	-5.7	84	18.3
VIENNA (H(	AT	48.24861	16.35639	198	-6.37	69	18.3
VIENNA (H(	AT	48.24861	16.35639	198	-4.9	52	18.4
VIENNA (H(	AT	48.24861	16.35639	198	-7.93	35	18.4
VIENNA (H(	AT	48.24861	16.35639	198	-9.13	23	18.4
VIENNA (H(	AT	48.24861	16.35639	198	-4.1	83	18.5
VIENNA (H(	AT	48.24861	16.35639	198	-3.7	84	18.5
VIENNA (H(	AT	48.24861	16.35639	198	-5.84	67	18.5
VIENNA (H(	AT	48.24861	16.35639	198	-9.08	73	18.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.49	26	18.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.77	145	18.6
VIENNA (H(	AT	48.24861	16.35639	198	-7.2	53	18.7
VIENNA (H(	AT	48.24861	16.35639	198	-5.7	123	18.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.85	22	18.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.87	61	18.7
VIENNA (H(	AT	48.24861	16.35639	198	-7.45	45	18.7
VIENNA (H(	AT	48.24861	16.35639	198	-8.37	105	18.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.63	73	18.7

VIENNA (H(	AT	48.24861	16.35639	198	-6.07	45	18.8
VIENNA (H(	AT	48.24861	16.35639	198	-7.72	67	18.8
VIENNA (H(	AT	48.24861	16.35639	198	-7.16	66	18.9
VIENNA (H(	AT	48.24861	16.35639	198	-9.3	55	19
VIENNA (H(	AT	48.24861	16.35639	198	-5.76	110	19
VIENNA (H(	AT	48.24861	16.35639	198	-7.1	48	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.53	35	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-6.3	56	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.9	41	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.13	48	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.13	60	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.97	41	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-6.39	71	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.24	245	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-6.325	73	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.11	44	19.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.19	55	19.2
VIENNA (H(	AT	48.24861	16.35639	198	-3.93	40	19.2
VIENNA (H(	AT	48.24861	16.35639	198	-7.81645	120	19.2
VIENNA (H(	AT	48.24861	16.35639	198	-7.92771	84	19.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.78	81	19.3
VIENNA (H(	AT	48.24861	16.35639	198	-4.45	44	19.4
VIENNA (H(	AT	48.24861	16.35639	198	-6.2	53	19.4
VIENNA (H(	AT	48.24861	16.35639	198	-8.03	66	19.4
VIENNA (H(	AT	48.24861	16.35639	198	-8.1714	123	19.4
VIENNA (H(	AT	48.24861	16.35639	198	-6.6	28	19.5
VIENNA (H(	AT	48.24861	16.35639	198	-5.55	60	19.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.55	83	19.5
VIENNA (H(	AT	48.24861	16.35639	198	-9.25	130	19.5
VIENNA (H(	AT	48.24861	16.35639	198	-7.83	144	19.5
VIENNA (H(	AT	48.24861	16.35639	198	-9.66	75	19.5
VIENNA (H(	AT	48.24861	16.35639	198	-9.2	85	19.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.63	121	19.6
VIENNA (H(	AT	48.24861	16.35639	198	-8.46	74	19.6
VIENNA (H(	AT	48.24861	16.35639	198	-10.75	33	19.6
VIENNA (H(	AT	48.24861	16.35639	198	-7.49	52	19.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.37	89	19.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.94	38	19.7
VIENNA (H(	AT	48.24861	16.35639	198	-4.06	53	19.7
VIENNA (H(	AT	48.24861	16.35639	198	-5.98	111	19.7
VIENNA (H(	AT	48.24861	16.35639	198	-8.66	58	19.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.98098	113	19.8
VIENNA (H(	AT	48.24861	16.35639	198	-6.07	142	20
VIENNA (H(	AT	48.24861	16.35639	198	-4.81	24	20
VIENNA (H(	AT	48.24861	16.35639	198	-7.12	31	20.1
VIENNA (H(	AT	48.24861	16.35639	198	-5.45	20	20.1
VIENNA (H(	AT	48.24861	16.35639	198	-8.33	33	20.1
VIENNA (H(	AT	48.24861	16.35639	198	-7.81	136	20.1
VIENNA (H(	AT	48.24861	16.35639	198	-4.26	47	20.1
VIENNA (H(	AT	48.24861	16.35639	198	-5.6	43	20.1

VIENNA (H(	AT	48.24861	16.35639	198	-6.6	42	20.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.03	114	20.3
VIENNA (H(	AT	48.24861	16.35639	198	-7.71	121	20.3
VIENNA (H(	AT	48.24861	16.35639	198	-5.49	64	20.3
VIENNA (H(	AT	48.24861	16.35639	198	-5.5	23	20.3
VIENNA (H(	AT	48.24861	16.35639	198	-6.21	59	20.3
VIENNA (H(	AT	48.24861	16.35639	198	-6.04	59	20.4
VIENNA (H(	AT	48.24861	16.35639	198	-5.81	39	20.4
VIENNA (H(	AT	48.24861	16.35639	198	-7.9	210	20.4
VIENNA (H(	AT	48.24861	16.35639	198	-4.21	115	20.4
VIENNA (H(	AT	48.24861	16.35639	198	-6.13	96	20.4
VIENNA (H(	AT	48.24861	16.35639	198	-7.96	79	20.4
VIENNA (H(	AT	48.24861	16.35639	198	-5.46	42	20.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.35	29	20.5
VIENNA (H(	AT	48.24861	16.35639	198	-4.5	69	20.5
VIENNA (H(	AT	48.24861	16.35639	198	-4.56	60	20.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.24	69	20.5
VIENNA (H(	AT	48.24861	16.35639	198	-5.4	43	20.6
VIENNA (H(	AT	48.24861	16.35639	198	-6.99	72	20.6
VIENNA (H(	AT	48.24861	16.35639	198	-6.17	25	20.6
VIENNA (H(	AT	48.24861	16.35639	198	-4.5	26	20.7
VIENNA (H(	AT	48.24861	16.35639	198	-6.11	39	20.7
VIENNA (H(	AT	48.24861	16.35639	198	-8.37	64	20.7
VIENNA (H(	AT	48.24861	16.35639	198	-7.61	80	20.8
VIENNA (H(	AT	48.24861	16.35639	198	-3.96	50	20.8
VIENNA (H(	AT	48.24861	16.35639	198	-2.3	37	20.9
VIENNA (H(	AT	48.24861	16.35639	198	-5.52	78	20.9
VIENNA (H(	AT	48.24861	16.35639	198	-6.86	81	21
VIENNA (H(	AT	48.24861	16.35639	198	-4.9	85	21
VIENNA (H(	AT	48.24861	16.35639	198	-5.2	66	21.1
VIENNA (H(	AT	48.24861	16.35639	198	-5.60554	28	21.1
VIENNA (H(	AT	48.24861	16.35639	198	-6.58	34	21.3
VIENNA (H(	AT	48.24861	16.35639	198	-6.39	56	21.3
VIENNA (H(	AT	48.24861	16.35639	198	-5.91	15	21.3
VIENNA (H(	AT	48.24861	16.35639	198	-5.02	60	21.3
VIENNA (H(	AT	48.24861	16.35639	198	-6.38	47	21.3
VIENNA (H(	AT	48.24861	16.35639	198	-6.6	11	21.4
VIENNA (H(	AT	48.24861	16.35639	198	-4.24	79	21.4
VIENNA (H(	AT	48.24861	16.35639	198	-4.45	53	21.4
VIENNA (H(	AT	48.24861	16.35639	198	-6.01	149	21.4
VIENNA (H(	AT	48.24861	16.35639	198	-10.36	48	21.5
VIENNA (H(	AT	48.24861	16.35639	198	-3.88	130	21.5
VIENNA (H(	AT	48.24861	16.35639	198	-4.67	44	21.6
VIENNA (H(	AT	48.24861	16.35639	198	-7.78	41	21.6
VIENNA (H(	AT	48.24861	16.35639	198	-6.02	52	21.7
VIENNA (H(	AT	48.24861	16.35639	198	-7.66	70	21.8
VIENNA (H(	AT	48.24861	16.35639	198	-7.69	80	21.9
VIENNA (H(	AT	48.24861	16.35639	198	-5.8	91	21.9
VIENNA (H(	AT	48.24861	16.35639	198	-7.92	55	22
VIENNA (H(	AT	48.24861	16.35639	198	-5.37	85	22.2

VIENNA (H(	AT	48.24861	16.35639	198	-3.4	32	22.2
VIENNA (H(	AT	48.24861	16.35639	198	-5.36	66	22.2
VIENNA (H(	AT	48.24861	16.35639	198	-6.72578	88	22.3
VIENNA (H(	AT	48.24861	16.35639	198	-4.23	30	22.5
VIENNA (H(	AT	48.24861	16.35639	198	-4.62	42	22.6
VIENNA (H(	AT	48.24861	16.35639	198	-5.37	128	22.7
VIENNA (H(	AT	48.24861	16.35639	198	-4.63	24	22.9
VIENNA (H(	AT	48.24861	16.35639	198	-8.9	11	22.9
VIENNA (H(	AT	48.24861	16.35639	198	-6.2	76	23.2
VIENNA (H(	AT	48.24861	16.35639	198	-3.13	6	23.3
VIENNA (H(	AT	48.24861	16.35639	198	-6.69	48	23.4
VIENNA (H(	AT	48.24861	16.35639	198	-3.59	20	23.5
VIENNA (H(	AT	48.24861	16.35639	198	-6.71	44	23.6
VIENNA (H(	AT	48.24861	16.35639	198	-5.38	38	23.9
VIENNA (H(	AT	48.24861	16.35639	198	-6.03	19	24.4
ZAGREB	HR	45.80667	15.97	165	-14.82	40	-3.4
ZAGREB	HR	45.80667	15.97	165	-15.05	90	-2.1
ZAGREB	HR	45.80667	15.97	165	-13.74	81	-1.8
ZAGREB	HR	45.80667	15.97	165	-13.56	42	-1.5
ZAGREB	HR	45.80667	15.97	165	-12.11	42	-1.3
ZAGREB	HR	45.80667	15.97	165	-12.71	32	-0.8
ZAGREB	HR	45.80667	15.97	165	-15.21	31	0.2
ZAGREB	HR	45.80667	15.97	165	-11.41	12	0.2
ZAGREB	HR	45.80667	15.97	165	-13.9	96	0.7
ZAGREB	HR	45.80667	15.97	165	-10.42	31	0.7
ZAGREB	HR	45.80667	15.97	165	-7.87	25	1.1
ZAGREB	HR	45.80667	15.97	165	-13.07	54	1.3
ZAGREB	HR	45.80667	15.97	165	-13.71	174	1.5
ZAGREB	HR	45.80667	15.97	165	-12.52	61	1.7
ZAGREB	HR	45.80667	15.97	165	-11.9	72	1.8
ZAGREB	HR	45.80667	15.97	165	-12.6	146	1.9
ZAGREB	HR	45.80667	15.97	165	-10.99	30	1.9
ZAGREB	HR	45.80667	15.97	165	-16.5	79	2
ZAGREB	HR	45.80667	15.97	165	-10.96	40	2.1
ZAGREB	HR	45.80667	15.97	165	-13.08	59	2.1
ZAGREB	HR	45.80667	15.97	165	-12.74	57	2.2
ZAGREB	HR	45.80667	15.97	165	-13.43	65	2.3
ZAGREB	HR	45.80667	15.97	165	-14.24	22	2.6
ZAGREB	HR	45.80667	15.97	165	-10.92	32	2.6
ZAGREB	HR	45.80667	15.97	165	-9.75	3	2.7
ZAGREB	HR	45.80667	15.97	165	-10.19	38	2.8
ZAGREB	HR	45.80667	15.97	165	-8.79	41	2.8
ZAGREB	HR	45.80667	15.97	165	-11.43	16	2.9
ZAGREB	HR	45.80667	15.97	165	-14	176	2.9
ZAGREB	HR	45.80667	15.97	165	-12.1	8	3.1
ZAGREB	HR	45.80667	15.97	165	-8.13	26	3.2
ZAGREB	HR	45.80667	15.97	165	-12.5	94	3.3
ZAGREB	HR	45.80667	15.97	165	-11.3	84	3.3
ZAGREB	HR	45.80667	15.97	165	-10.87	79	3.5
ZAGREB	HR	45.80667	15.97	165	-7.21	26	3.7

ZAGREB	HR	45.80667	15.97	165	-11.5	29	3.8
ZAGREB	HR	45.80667	15.97	165	-11.29	142	4.2
ZAGREB	HR	45.80667	15.97	165	-9.57	35	4.2
ZAGREB	HR	45.80667	15.97	165	-10.65	154	4.3
ZAGREB	HR	45.80667	15.97	165	-8.73	29	4.3
ZAGREB	HR	45.80667	15.97	165	-10.55	74	4.5
ZAGREB	HR	45.80667	15.97	165	-11.53	53	5
ZAGREB	HR	45.80667	15.97	165	-12.59	70	5
ZAGREB	HR	45.80667	15.97	165	-12.4	31	5
ZAGREB	HR	45.80667	15.97	165	-13.07	135	5.1
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ZAGREB	HR	45.80667	15.97	165	-10.02	26	5.4
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ZAGREB	HR	45.80667	15.97	165	-13.4	40	5.7
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ZAGREB	HR	45.80667	15.97	165	-11.47	147	6
ZAGREB	HR	45.80667	15.97	165	-11.39	82	6.1
ZAGREB	HR	45.80667	15.97	165	-11.81	44	6.2
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ZAGREB	HR	45.80667	15.97	165	-11.1	70	6.5
ZAGREB	HR	45.80667	15.97	165	-10.75	78	6.8
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ZAGREB	HR	45.80667	15.97	165	-12.18	59	7
ZAGREB	HR	45.80667	15.97	165	-9.65	11	7
ZAGREB	HR	45.80667	15.97	165	-13.29	39	7.1
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ZAGREB	HR	45.80667	15.97	165	-9.28	194	11.2
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ZAGREB	HR	45.80667	15.97	165	-8.33	99	11.5
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ZAGREB	HR	45.80667	15.97	165	-8.52	65	12.8
ZAGREB	HR	45.80667	15.97	165	-4.38	36	12.8
ZAGREB	HR	45.80667	15.97	165	-5.75	50	12.9
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ZAGREB	HR	45.80667	15.97	165	-9.1	31	13
ZAGREB	HR	45.80667	15.97	165	-9.89	122	13.3
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ZAGREB	HR	45.80667	15.97	165	-7.42	132	16
ZAGREB	HR	45.80667	15.97	165	-6.5	98	16.1
ZAGREB	HR	45.80667	15.97	165	-5.91	49	16.2
ZAGREB	HR	45.80667	15.97	165	-7.8	152	16.5
ZAGREB	HR	45.80667	15.97	165	-7.24	117	16.8
ZAGREB	HR	45.80667	15.97	165	-6.38	80	16.9
ZAGREB	HR	45.80667	15.97	165	-5.3	68	16.9
ZAGREB	HR	45.80667	15.97	165	-6.04	52	17
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ZAGREB	HR	45.80667	15.97	165	-7.26	130	17.3
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ZAGREB	HR	45.80667	15.97	165	-6.92	162	17.5
ZAGREB	HR	45.80667	15.97	165	-6.12	122	17.7
ZAGREB	HR	45.80667	15.97	165	-7.34	84	17.8
ZAGREB	HR	45.80667	15.97	165	-6.22	38	17.8
ZAGREB	HR	45.80667	15.97	165	-2.11	10	17.9
ZAGREB	HR	45.80667	15.97	165	-5.73	66	18
ZAGREB	HR	45.80667	15.97	165	-6.43	194	18.3
ZAGREB	HR	45.80667	15.97	165	-5.9	72	18.4

ZAGREB	HR	45.80667	15.97	165	-6.51	63	18.4
ZAGREB	HR	45.80667	15.97	165	-9.5	92	18.5
ZAGREB	HR	45.80667	15.97	165	-6.54	42	18.7
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ZAGREB	HR	45.80667	15.97	165	-8.8	131	19.7
ZAGREB	HR	45.80667	15.97	165	-8.23	83	19.8
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ZAGREB	HR	45.80667	15.97	165	-5.84	30	19.9
ZAGREB	HR	45.80667	15.97	165	-4.32	95	20
ZAGREB	HR	45.80667	15.97	165	-8.19	108	20.2
ZAGREB	HR	45.80667	15.97	165	-5.4	134	20.2
ZAGREB	HR	45.80667	15.97	165	-7.8	154	20.4
ZAGREB	HR	45.80667	15.97	165	-6.3	81	20.5
ZAGREB	HR	45.80667	15.97	165	-3.71	103	20.6
ZAGREB	HR	45.80667	15.97	165	-8.33	96	20.6
ZAGREB	HR	45.80667	15.97	165	-5.3	80	20.6
ZAGREB	HR	45.80667	15.97	165	-6.79	110	20.7
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ZAGREB	HR	45.80667	15.97	165	-6.54	260	20.8
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ZAGREB	HR	45.80667	15.97	165	-7.74	96	21.5
ZAGREB	HR	45.80667	15.97	165	-6.44	82	21.5
ZAGREB	HR	45.80667	15.97	165	-3.93	46	21.6
ZAGREB	HR	45.80667	15.97	165	-5	53	21.7
ZAGREB	HR	45.80667	15.97	165	-6.69	81	21.8
ZAGREB	HR	45.80667	15.97	165	-6.32	134	21.8
ZAGREB	HR	45.80667	15.97	165	-5.93	31	22
ZAGREB	HR	45.80667	15.97	165	-5.94	85	22
ZAGREB	HR	45.80667	15.97	165	-10.94	54	22.2
ZAGREB	HR	45.80667	15.97	165	-4.4	25	22.2
ZAGREB	HR	45.80667	15.97	165	-5.9	111	22.3
ZAGREB	HR	45.80667	15.97	165	-2.54	58	22.5
ZAGREB	HR	45.80667	15.97	165	-5.79	82	23
ZAGREB	HR	45.80667	15.97	165	-5.6	179	23.1
ZAGREB	HR	45.80667	15.97	165	-6.95	68	23.2
ZAGREB	HR	45.80667	15.97	165	-5.49	31	23.3
ZAGREB	HR	45.80667	15.97	165	-3.92	26	23.8
ZAGREB	HR	45.80667	15.97	165	-5.7	91	23.8
ZAGREB	HR	45.80667	15.97	165	-4.7	104	23.9
ZAGREB-GF	HR	45.81667	15.98333	157	-15.64	46	-1.6
ZAGREB-GF	HR	45.81667	15.98333	157	-11.6	26.2	-0.7
ZAGREB-GF	HR	45.81667	15.98333	157	-12.13	64	-0.4

ZAGREB-GF	HR	45.81667	15.98333	157	-15.25	18.8	-0.2
ZAGREB-GF	HR	45.81667	15.98333	157	-9.54	80	-0.1
ZAGREB-GF	HR	45.81667	15.98333	157	-15.5	30.5	-0.1
ZAGREB-GF	HR	45.81667	15.98333	157	-14.48	37	0.3
ZAGREB-GF	HR	45.81667	15.98333	157	-16.5	72.1	0.5
ZAGREB-GF	HR	45.81667	15.98333	157	-13.98	44	1.6
ZAGREB-GF	HR	45.81667	15.98333	157	-12.9	24.9	2.2
ZAGREB-GF	HR	45.81667	15.98333	157	-12.64	102	2.6
ZAGREB-GF	HR	45.81667	15.98333	157	-10.8	71	2.7
ZAGREB-GF	HR	45.81667	15.98333	157	-14.86	72	2.9
ZAGREB-GF	HR	45.81667	15.98333	157	-9.37	28.6	3
ZAGREB-GF	HR	45.81667	15.98333	157	-13.46	84	3.9
ZAGREB-GF	HR	45.81667	15.98333	157	-8.34	11	4.5
ZAGREB-GF	HR	45.81667	15.98333	157	-11.13	63	4.5
ZAGREB-GF	HR	45.81667	15.98333	157	-15.35	76	4.6
ZAGREB-GF	HR	45.81667	15.98333	157	-8.28	83.3	4.6
ZAGREB-GF	HR	45.81667	15.98333	157	-11.4	94.5	4.7
ZAGREB-GF	HR	45.81667	15.98333	157	-14.39	17	5.1
ZAGREB-GF	HR	45.81667	15.98333	157	-6.38	28	5.7
ZAGREB-GF	HR	45.81667	15.98333	157	-10.94	15.3	5.9
ZAGREB-GF	HR	45.81667	15.98333	157	-8.12	59	6.4
ZAGREB-GF	HR	45.81667	15.98333	157	-7.22	21.9	6.5
ZAGREB-GF	HR	45.81667	15.98333	157	-10.33	103	6.6
ZAGREB-GF	HR	45.81667	15.98333	157	-9.5	47.3	7.6
ZAGREB-GF	HR	45.81667	15.98333	157	-9.72	32	8.1
ZAGREB-GF	HR	45.81667	15.98333	157	-5.46	51.3	8.9
ZAGREB-GF	HR	45.81667	15.98333	157	-14.41	114	9
ZAGREB-GF	HR	45.81667	15.98333	157	-10.47	56	9.2
ZAGREB-GF	HR	45.81667	15.98333	157	-6.65	54.4	9.4
ZAGREB-GF	HR	45.81667	15.98333	157	-8.66	33	9.5
ZAGREB-GF	HR	45.81667	15.98333	157	-9.48	103.2	10.1
ZAGREB-GF	HR	45.81667	15.98333	157	-8.03	49	10.3
ZAGREB-GF	HR	45.81667	15.98333	157	-8.9	35.8	10.4
ZAGREB-GF	HR	45.81667	15.98333	157	-6.83	112.5	10.5
ZAGREB-GF	HR	45.81667	15.98333	157	-9.9	76	10.8
ZAGREB-GF	HR	45.81667	15.98333	157	-9.21	100.8	10.9
ZAGREB-GF	HR	45.81667	15.98333	157	-9.5	156.9	11.4
ZAGREB-GF	HR	45.81667	15.98333	157	-7.67	83.1	11.8
ZAGREB-GF	HR	45.81667	15.98333	157	-3.29	91	12
ZAGREB-GF	HR	45.81667	15.98333	157	-8.3	108	12.3
ZAGREB-GF	HR	45.81667	15.98333	157	-6.3	76	12.5
ZAGREB-GF	HR	45.81667	15.98333	157	-7.23	128	12.5
ZAGREB-GF	HR	45.81667	15.98333	157	-6.03	108	13
ZAGREB-GF	HR	45.81667	15.98333	157	-6.94	58	13.4
ZAGREB-GF	HR	45.81667	15.98333	157	-7.87	74	13.5
ZAGREB-GF	HR	45.81667	15.98333	157	-10.16	164	13.8
ZAGREB-GF	HR	45.81667	15.98333	157	-5.82	91.9	14.2
ZAGREB-GF	HR	45.81667	15.98333	157	-9.6	177.3	15
ZAGREB-GF	HR	45.81667	15.98333	157	-6.64	59.6	15.4
ZAGREB-GF	HR	45.81667	15.98333	157	-3.7	9.2	15.4

ZAGREB-GF	HR	45.81667	15.98333	157	-8.6	89	16.1
ZAGREB-GF	HR	45.81667	15.98333	157	-8.61	181	16.5
ZAGREB-GF	HR	45.81667	15.98333	157	-7.4	106.6	17
ZAGREB-GF	HR	45.81667	15.98333	157	-7.06	146	17.4
ZAGREB-GF	HR	45.81667	15.98333	157	-4.14	71	17.5
ZAGREB-GF	HR	45.81667	15.98333	157	-7.82	70	17.8
ZAGREB-GF	HR	45.81667	15.98333	157	-8.2	26	17.8
ZAGREB-GF	HR	45.81667	15.98333	157	-6.92	82.1	17.8
ZAGREB-GF	HR	45.81667	15.98333	157	-2.28	45.5	18.5
ZAGREB-GF	HR	45.81667	15.98333	157	-7.08	56.1	18.7
ZAGREB-GF	HR	45.81667	15.98333	157	-5.3	85.3	18.9
ZAGREB-GF	HR	45.81667	15.98333	157	-3.89	121.7	19.1
ZAGREB-GF	HR	45.81667	15.98333	157	-5.13	65	19.5
ZAGREB-GF	HR	45.81667	15.98333	157	-3.69	59	20.1
ZAGREB-GF	HR	45.81667	15.98333	157	-5.84	85	20.3
ZAGREB-GF	HR	45.81667	15.98333	157	-5.24	19.8	20.4
ZAGREB-GF	HR	45.81667	15.98333	157	-6.21	65	20.5
ZAGREB-GF	HR	45.81667	15.98333	157	-5.74	133	20.8
ZAGREB-GF	HR	45.81667	15.98333	157	-7.21	59	21
ZAGREB-GF	HR	45.81667	15.98333	157	-0.46	124	21.2
ZAGREB-GF	HR	45.81667	15.98333	157	-6.45	70	21.3
ZAGREB-GF	HR	45.81667	15.98333	157	-5.55	81	21.4
ZAGREB-GF	HR	45.81667	15.98333	157	-9	84.2	21.5
ZAGREB-GF	HR	45.81667	15.98333	157	-7.16	62	21.6
ZAGREB-GF	HR	45.81667	15.98333	157	-8.5	151	21.6
ZAGREB-GF	HR	45.81667	15.98333	157	-4.1	70.2	21.9
ZAGREB-GF	HR	45.81667	15.98333	157	-5.59	147	22.3
ZAGREB-GF	HR	45.81667	15.98333	157	-3.71	44.2	22.3
ZAGREB-GF	HR	45.81667	15.98333	157	-6.46	144	22.4
ZAGREB-GF	HR	45.81667	15.98333	157	-7.06	94	22.4
ZAGREB-GF	HR	45.81667	15.98333	157	-6.4	148.2	22.5
ZAGREB-GF	HR	45.81667	15.98333	157	-5.06	54.6	22.9
ZAGREB-GF	HR	45.81667	15.98333	157	-6.49	20.4	23.6
ZAGREB-GF	HR	45.81667	15.98333	157	-3.75	78.6	23.6
ZAGREB-GF	HR	45.81667	15.98333	157	-3.5	75.2	24.5
ZAGREB-GF	HR	45.81667	15.98333	157	-6.07	17.4	25.8
DEBRECEN	HU	47.47051	21.49042	110	-13.06	0.3	-10
DEBRECEN	HU	47.47051	21.49042	110	-19.62	4.6	-9.6
DEBRECEN	HU	47.47051	21.49042	110	-3.65	4.6	-8.4
DEBRECEN	HU	47.47051	21.49042	110	-3.72	0.4	-8.1
DEBRECEN	HU	47.47051	21.49042	110	-10.47	1.3	-7.9
DEBRECEN	HU	47.47051	21.49042	110	-16.52	0.5	-7.8
DEBRECEN	HU	47.47051	21.49042	110	-16	3.8	-7.6
DEBRECEN	HU	47.47051	21.49042	110	-11.4	2.8	-6.7
DEBRECEN	HU	47.47051	21.49042	110	-14.8	0.8	-6.6
DEBRECEN	HU	47.47051	21.49042	110	-16.86	1.4	-6.6
DEBRECEN	HU	47.47051	21.49042	110	-20.72	1.8	-6.4
DEBRECEN	HU	47.47051	21.49042	110	-17	14	-6.2
DEBRECEN	HU	47.47051	21.49042	110	-9.52	7.1	-6.1
DEBRECEN	HU	47.47051	21.49042	110	-21.25	1.1	-5.9

DEBRECEN HU	47.47051	21.49042	110	-3.44	6.3	-5.9
DEBRECEN HU	47.47051	21.49042	110	-15.1	12.5	-5.5
DEBRECEN HU	47.47051	21.49042	110	-7.78	3.3	-5.4
DEBRECEN HU	47.47051	21.49042	110	-11.95	1.4	-5.4
DEBRECEN HU	47.47051	21.49042	110	-19.04	0.3	-5.2
DEBRECEN HU	47.47051	21.49042	110	-10.74	0.7	-5.2
DEBRECEN HU	47.47051	21.49042	110	-17.76	1.1	-5.2
DEBRECEN HU	47.47051	21.49042	110	-19.63	5.4	-5.2
DEBRECEN HU	47.47051	21.49042	110	-20.71	9.5	-4.6
DEBRECEN HU	47.47051	21.49042	110	-6.57	0.7	-4.4
DEBRECEN HU	47.47051	21.49042	110	-4.42	3.2	-4.2
DEBRECEN HU	47.47051	21.49042	110	-10.86	13	-4.2
DEBRECEN HU	47.47051	21.49042	110	-19.4	6.8	-3.9
DEBRECEN HU	47.47051	21.49042	110	-16.8	3.1	-3.8
DEBRECEN HU	47.47051	21.49042	110	-18.3	5.2	-3.6
DEBRECEN HU	47.47051	21.49042	110	-10.47	1.1	-3.5
DEBRECEN HU	47.47051	21.49042	110	-12.19	0.1	-3.5
DEBRECEN HU	47.47051	21.49042	110	-8.8	2.7	-3.4
DEBRECEN HU	47.47051	21.49042	110	-12.41	0.6	-3.2
DEBRECEN HU	47.47051	21.49042	110	-19.28	14.6	-3.1
DEBRECEN HU	47.47051	21.49042	110	-11.8	0.3	-3.1
DEBRECEN HU	47.47051	21.49042	110	-5	0.3	-3
DEBRECEN HU	47.47051	21.49042	110	-16.44	3.8	-3
DEBRECEN HU	47.47051	21.49042	110	-11.62	0.6	-2.7
DEBRECEN HU	47.47051	21.49042	110	-9.97	0.1	-2.5
DEBRECEN HU	47.47051	21.49042	110	-20.95	0.4	-2.5
DEBRECEN HU	47.47051	21.49042	110	-12.63	3.2	-2.2
DEBRECEN HU	47.47051	21.49042	110	-12.45	1.6	-2.2
DEBRECEN HU	47.47051	21.49042	110	-13.84	7.1	-2
DEBRECEN HU	47.47051	21.49042	110	-18.9	1.7	-1.6
DEBRECEN HU	47.47051	21.49042	110	-12.9	0.2	-1.5
DEBRECEN HU	47.47051	21.49042	110	-6.93	0.1	-1.4
DEBRECEN HU	47.47051	21.49042	110	-9.41	1.5	-1.3
DEBRECEN HU	47.47051	21.49042	110	-22.13	9.8	-1.3
DEBRECEN HU	47.47051	21.49042	110	-17.2	11.6	-1.2
DEBRECEN HU	47.47051	21.49042	110	-21.45	2.5	-1.2
DEBRECEN HU	47.47051	21.49042	110	-11.45	2.7	-1.1
DEBRECEN HU	47.47051	21.49042	110	-16.4	15.6	-1
DEBRECEN HU	47.47051	21.49042	110	-10.97	7.7	-1
DEBRECEN HU	47.47051	21.49042	110	-8.25	1.6	-0.9
DEBRECEN HU	47.47051	21.49042	110	-3.8	3.3	-0.8
DEBRECEN HU	47.47051	21.49042	110	-8.28	6.9	-0.8
DEBRECEN HU	47.47051	21.49042	110	-12.11	2.6	-0.8
DEBRECEN HU	47.47051	21.49042	110	-18.1	4	-0.8
DEBRECEN HU	47.47051	21.49042	110	-9.2	2.9	-0.7
DEBRECEN HU	47.47051	21.49042	110	-7.77	0.9	-0.7
DEBRECEN HU	47.47051	21.49042	110	-6.27	0.2	-0.5
DEBRECEN HU	47.47051	21.49042	110	-11.55	1	-0.4
DEBRECEN HU	47.47051	21.49042	110	-11.6	1	-0.4
DEBRECEN HU	47.47051	21.49042	110	-11.05	13.3	-0.3

DEBRECEN HU	47.47051	21.49042	110	-14.06	20.4	-0.3
DEBRECEN HU	47.47051	21.49042	110	-18.7	1.4	-0.3
DEBRECEN HU	47.47051	21.49042	110	-16.07	3.9	-0.2
DEBRECEN HU	47.47051	21.49042	110	-8.92	0.8	-0.1
DEBRECEN HU	47.47051	21.49042	110	-16.3	7.7	-0.1
DEBRECEN HU	47.47051	21.49042	110	-9.83	10.4	-0.1
DEBRECEN HU	47.47051	21.49042	110	-13.5	4	0.1
DEBRECEN HU	47.47051	21.49042	110	-9.1	24	0.2
DEBRECEN HU	47.47051	21.49042	110	-15.9	2.7	0.2
DEBRECEN HU	47.47051	21.49042	110	-10.01	34.2	0.4
DEBRECEN HU	47.47051	21.49042	110	-9.3	3	0.4
DEBRECEN HU	47.47051	21.49042	110	-16.2	3.2	0.4
DEBRECEN HU	47.47051	21.49042	110	-9.7	2.7	0.4
DEBRECEN HU	47.47051	21.49042	110	-19.48	3.2	0.4
DEBRECEN HU	47.47051	21.49042	110	-13	0.2	0.5
DEBRECEN HU	47.47051	21.49042	110	-16.7	11.7	0.5
DEBRECEN HU	47.47051	21.49042	110	-11.42	0.1	0.6
DEBRECEN HU	47.47051	21.49042	110	-9.93	1	0.6
DEBRECEN HU	47.47051	21.49042	110	-11.3	0.1	0.6
DEBRECEN HU	47.47051	21.49042	110	-15.08	12.4	0.6
DEBRECEN HU	47.47051	21.49042	110	-7.94	17.6	0.7
DEBRECEN HU	47.47051	21.49042	110	-12.42	8.5	0.7
DEBRECEN HU	47.47051	21.49042	110	-12.05	1.6	0.7
DEBRECEN HU	47.47051	21.49042	110	-8.12	2	0.9
DEBRECEN HU	47.47051	21.49042	110	-11.35	11	0.9
DEBRECEN HU	47.47051	21.49042	110	-9.49	0.2	1
DEBRECEN HU	47.47051	21.49042	110	-11.18	6.9	1
DEBRECEN HU	47.47051	21.49042	110	-12.46	31.8	1.2
DEBRECEN HU	47.47051	21.49042	110	-13.42	11.1	1.2
DEBRECEN HU	47.47051	21.49042	110	-17.51	2.9	1.3
DEBRECEN HU	47.47051	21.49042	110	-16.48	6.9	1.4
DEBRECEN HU	47.47051	21.49042	110	-12.91	20.2	1.5
DEBRECEN HU	47.47051	21.49042	110	-11.34	27.8	1.5
DEBRECEN HU	47.47051	21.49042	110	-18.44	2.7	1.5
DEBRECEN HU	47.47051	21.49042	110	-16.07	3.7	1.5
DEBRECEN HU	47.47051	21.49042	110	-11.72	3	1.6
DEBRECEN HU	47.47051	21.49042	110	-13.67	3.5	1.6
DEBRECEN HU	47.47051	21.49042	110	-0.56	0.1	1.6
DEBRECEN HU	47.47051	21.49042	110	-17.1	1.6	1.7
DEBRECEN HU	47.47051	21.49042	110	-13.1	11.6	1.7
DEBRECEN HU	47.47051	21.49042	110	-9.2	0.2	1.8
DEBRECEN HU	47.47051	21.49042	110	-3.49	6.3	1.9
DEBRECEN HU	47.47051	21.49042	110	-6.26	3	1.9
DEBRECEN HU	47.47051	21.49042	110	-13.16	1.9	2
DEBRECEN HU	47.47051	21.49042	110	-12.73	4.5	2
DEBRECEN HU	47.47051	21.49042	110	-11.51	0.9	2.1
DEBRECEN HU	47.47051	21.49042	110	-6.96	3.4	2.2
DEBRECEN HU	47.47051	21.49042	110	-12.38	8.7	2.3
DEBRECEN HU	47.47051	21.49042	110	-7.49	2.5	2.4
DEBRECEN HU	47.47051	21.49042	110	-4.52	0.1	2.4

DEBRECEN HU	47.47051	21.49042	110	-18.5	3.1	2.4
DEBRECEN HU	47.47051	21.49042	110	-7.12	1.6	2.6
DEBRECEN HU	47.47051	21.49042	110	-5.27	15.6	2.6
DEBRECEN HU	47.47051	21.49042	110	-11.4	5.5	2.6
DEBRECEN HU	47.47051	21.49042	110	-8.69	0.7	2.6
DEBRECEN HU	47.47051	21.49042	110	-11.41	2.2	2.7
DEBRECEN HU	47.47051	21.49042	110	-15.75	4.1	2.7
DEBRECEN HU	47.47051	21.49042	110	-12.59	10.5	2.8
DEBRECEN HU	47.47051	21.49042	110	-9.76	6.2	3.1
DEBRECEN HU	47.47051	21.49042	110	-13.36	4.8	3.3
DEBRECEN HU	47.47051	21.49042	110	-15.76	3.9	3.3
DEBRECEN HU	47.47051	21.49042	110	-12.7	8.1	3.4
DEBRECEN HU	47.47051	21.49042	110	-9.66	2.3	3.5
DEBRECEN HU	47.47051	21.49042	110	-8.8	0.8	3.6
DEBRECEN HU	47.47051	21.49042	110	-9.97	14	3.7
DEBRECEN HU	47.47051	21.49042	110	-10.02	5.5	3.7
DEBRECEN HU	47.47051	21.49042	110	-9.87	6.5	3.7
DEBRECEN HU	47.47051	21.49042	110	-18.54	18.9	3.7
DEBRECEN HU	47.47051	21.49042	110	-8.7	10.4	3.8
DEBRECEN HU	47.47051	21.49042	110	-6.11	0.5	3.8
DEBRECEN HU	47.47051	21.49042	110	-10.78	1.7	3.8
DEBRECEN HU	47.47051	21.49042	110	-17.25	0.7	4
DEBRECEN HU	47.47051	21.49042	110	-3.59	22.1	4.1
DEBRECEN HU	47.47051	21.49042	110	-9.65	10.5	4.1
DEBRECEN HU	47.47051	21.49042	110	-12.83	10.7	4.2
DEBRECEN HU	47.47051	21.49042	110	-13.09	4.6	4.2
DEBRECEN HU	47.47051	21.49042	110	-4.32	1.8	4.2
DEBRECEN HU	47.47051	21.49042	110	-6.02	0.1	4.2
DEBRECEN HU	47.47051	21.49042	110	-6.49	0.4	4.2
DEBRECEN HU	47.47051	21.49042	110	-12.62	14.6	4.3
DEBRECEN HU	47.47051	21.49042	110	-12.53	10.2	4.3
DEBRECEN HU	47.47051	21.49042	110	-7.07	1.5	4.3
DEBRECEN HU	47.47051	21.49042	110	-7.33	6.9	4.4
DEBRECEN HU	47.47051	21.49042	110	-11.57	9.4	4.4
DEBRECEN HU	47.47051	21.49042	110	-13.3	1.6	4.5
DEBRECEN HU	47.47051	21.49042	110	-5.2	3.3	4.6
DEBRECEN HU	47.47051	21.49042	110	-9.53	2.2	4.6
DEBRECEN HU	47.47051	21.49042	110	-8.45	4.1	4.7
DEBRECEN HU	47.47051	21.49042	110	-9.6	4.4	4.8
DEBRECEN HU	47.47051	21.49042	110	-13.15	11	4.8
DEBRECEN HU	47.47051	21.49042	110	-13.13	3.4	4.8
DEBRECEN HU	47.47051	21.49042	110	-7.3	15.6	4.8
DEBRECEN HU	47.47051	21.49042	110	-6.33	6.9	4.9
DEBRECEN HU	47.47051	21.49042	110	-10.47	6.9	4.9
DEBRECEN HU	47.47051	21.49042	110	-6.61	21.9	5
DEBRECEN HU	47.47051	21.49042	110	0.83	2.5	5
DEBRECEN HU	47.47051	21.49042	110	-7.17	5.3	5
DEBRECEN HU	47.47051	21.49042	110	-14.67	21.8	5
DEBRECEN HU	47.47051	21.49042	110	-11.52	14.2	5
DEBRECEN HU	47.47051	21.49042	110	-4.49	6.5	5.1

DEBRECEN HU	47.47051	21.49042	110	-7.66	6.7	5.1
DEBRECEN HU	47.47051	21.49042	110	-6.72	1.2	5.1
DEBRECEN HU	47.47051	21.49042	110	-2.72	0.5	5.2
DEBRECEN HU	47.47051	21.49042	110	-10.3	4.2	5.2
DEBRECEN HU	47.47051	21.49042	110	-6.29	0.8	5.2
DEBRECEN HU	47.47051	21.49042	110	-5.08	6	5.3
DEBRECEN HU	47.47051	21.49042	110	-5.1	1.3	5.3
DEBRECEN HU	47.47051	21.49042	110	-10.54	15	5.4
DEBRECEN HU	47.47051	21.49042	110	-6.14	12	5.4
DEBRECEN HU	47.47051	21.49042	110	-7.02	34.9	5.4
DEBRECEN HU	47.47051	21.49042	110	-9.04	3.1	5.4
DEBRECEN HU	47.47051	21.49042	110	-12.39	14.3	5.4
DEBRECEN HU	47.47051	21.49042	110	-4.7	4.8	5.5
DEBRECEN HU	47.47051	21.49042	110	-15.33	9.5	5.5
DEBRECEN HU	47.47051	21.49042	110	-11.68	2	5.6
DEBRECEN HU	47.47051	21.49042	110	-9.97	2.2	5.6
DEBRECEN HU	47.47051	21.49042	110	-5.61	0.3	5.6
DEBRECEN HU	47.47051	21.49042	110	-10.53	11.4	5.7
DEBRECEN HU	47.47051	21.49042	110	-12.51	11.1	5.7
DEBRECEN HU	47.47051	21.49042	110	-7.42	0.4	5.7
DEBRECEN HU	47.47051	21.49042	110	-6.43	0.8	5.7
DEBRECEN HU	47.47051	21.49042	110	-11.66	1.4	5.8
DEBRECEN HU	47.47051	21.49042	110	-16.45	5.6	5.8
DEBRECEN HU	47.47051	21.49042	110	-4.06	27.2	5.9
DEBRECEN HU	47.47051	21.49042	110	-5.83	5.5	5.9
DEBRECEN HU	47.47051	21.49042	110	-7.74	4.5	5.9
DEBRECEN HU	47.47051	21.49042	110	-11.72	18.3	5.9
DEBRECEN HU	47.47051	21.49042	110	-9.09	3.5	5.9
DEBRECEN HU	47.47051	21.49042	110	-7.5	15.4	5.9
DEBRECEN HU	47.47051	21.49042	110	-7	20.2	6
DEBRECEN HU	47.47051	21.49042	110	-4.86	1.5	6
DEBRECEN HU	47.47051	21.49042	110	-6.55	6.4	6.1
DEBRECEN HU	47.47051	21.49042	110	-8.04	3.7	6.1
DEBRECEN HU	47.47051	21.49042	110	-12.15	5.7	6.2
DEBRECEN HU	47.47051	21.49042	110	-7.44	2	6.2
DEBRECEN HU	47.47051	21.49042	110	-9.05	0.3	6.2
DEBRECEN HU	47.47051	21.49042	110	-8.33	16.6	6.3
DEBRECEN HU	47.47051	21.49042	110	-5.5	3.5	6.3
DEBRECEN HU	47.47051	21.49042	110	-3.77	4.4	6.4
DEBRECEN HU	47.47051	21.49042	110	-11.08	3.8	6.5
DEBRECEN HU	47.47051	21.49042	110	-7.84	0.5	6.6
DEBRECEN HU	47.47051	21.49042	110	-14.38	9.4	6.6
DEBRECEN HU	47.47051	21.49042	110	-13.12	10.5	6.7
DEBRECEN HU	47.47051	21.49042	110	-7.51	4	6.7
DEBRECEN HU	47.47051	21.49042	110	-7.33	2.3	6.7
DEBRECEN HU	47.47051	21.49042	110	-10	11.6	6.8
DEBRECEN HU	47.47051	21.49042	110	-13.28	33.2	6.8
DEBRECEN HU	47.47051	21.49042	110	-11.61	5.4	6.8
DEBRECEN HU	47.47051	21.49042	110	-14.51	4.1	6.8
DEBRECEN HU	47.47051	21.49042	110	-5.32	3.2	6.9

DEBRECEN HU	47.47051	21.49042	110	-7.16	3.1	6.9
DEBRECEN HU	47.47051	21.49042	110	-10.37	0.5	6.9
DEBRECEN HU	47.47051	21.49042	110	-14.9	30.3	6.9
DEBRECEN HU	47.47051	21.49042	110	-4.95	9.5	7
DEBRECEN HU	47.47051	21.49042	110	-8.64	5.1	7
DEBRECEN HU	47.47051	21.49042	110	-11.4	12	7.1
DEBRECEN HU	47.47051	21.49042	110	-5.35	2.1	7.1
DEBRECEN HU	47.47051	21.49042	110	-10.62	6	7.1
DEBRECEN HU	47.47051	21.49042	110	-6.86	13.3	7.3
DEBRECEN HU	47.47051	21.49042	110	-10.85	32.7	7.4
DEBRECEN HU	47.47051	21.49042	110	-13.17	36.6	7.4
DEBRECEN HU	47.47051	21.49042	110	-7.94	3.3	7.5
DEBRECEN HU	47.47051	21.49042	110	-6.71	3.2	7.6
DEBRECEN HU	47.47051	21.49042	110	-8.99	3.4	7.6
DEBRECEN HU	47.47051	21.49042	110	-11.01	6.2	7.6
DEBRECEN HU	47.47051	21.49042	110	-7.77	4.1	7.8
DEBRECEN HU	47.47051	21.49042	110	-4.16	0.3	7.8
DEBRECEN HU	47.47051	21.49042	110	-12.51	6.7	7.8
DEBRECEN HU	47.47051	21.49042	110	-4.96	2.9	7.8
DEBRECEN HU	47.47051	21.49042	110	-4.48	1.1	7.8
DEBRECEN HU	47.47051	21.49042	110	-11.4	7.3	7.9
DEBRECEN HU	47.47051	21.49042	110	-5.31	1	7.9
DEBRECEN HU	47.47051	21.49042	110	-11.4	9.7	7.9
DEBRECEN HU	47.47051	21.49042	110	-9.01	11.3	7.9
DEBRECEN HU	47.47051	21.49042	110	-4.92	16.6	8
DEBRECEN HU	47.47051	21.49042	110	-10.99	46.2	8
DEBRECEN HU	47.47051	21.49042	110	-10.09	0.6	8
DEBRECEN HU	47.47051	21.49042	110	-7.78	13.7	8.1
DEBRECEN HU	47.47051	21.49042	110	-10.01	8.8	8.1
DEBRECEN HU	47.47051	21.49042	110	-8.45	6.4	8.1
DEBRECEN HU	47.47051	21.49042	110	-8.18	11.5	8.2
DEBRECEN HU	47.47051	21.49042	110	-9.13	7.2	8.2
DEBRECEN HU	47.47051	21.49042	110	-9.98	8.5	8.3
DEBRECEN HU	47.47051	21.49042	110	-6.85	1.2	8.3
DEBRECEN HU	47.47051	21.49042	110	-10.18	11.2	8.6
DEBRECEN HU	47.47051	21.49042	110	-5.23	4	8.6
DEBRECEN HU	47.47051	21.49042	110	-10.51	3.1	8.6
DEBRECEN HU	47.47051	21.49042	110	-5.85	1.2	8.6
DEBRECEN HU	47.47051	21.49042	110	-3.43	0.1	8.6
DEBRECEN HU	47.47051	21.49042	110	-5.89	14	8.7
DEBRECEN HU	47.47051	21.49042	110	-2.92	22.5	8.8
DEBRECEN HU	47.47051	21.49042	110	-4.56	2.9	8.8
DEBRECEN HU	47.47051	21.49042	110	-14.2	5.9	8.8
DEBRECEN HU	47.47051	21.49042	110	-6.59	10.8	8.9
DEBRECEN HU	47.47051	21.49042	110	-7.71	5.3	8.9
DEBRECEN HU	47.47051	21.49042	110	-4.33	0.8	9
DEBRECEN HU	47.47051	21.49042	110	-6.89	6.4	9
DEBRECEN HU	47.47051	21.49042	110	-5.56	3.7	9
DEBRECEN HU	47.47051	21.49042	110	-6.76	7.8	9.1
DEBRECEN HU	47.47051	21.49042	110	-16.34	13.6	9.2

DEBRECEN HU	47.47051	21.49042	110	-6.22	1.6	9.2
DEBRECEN HU	47.47051	21.49042	110	-11.69	10.8	9.3
DEBRECEN HU	47.47051	21.49042	110	-7.93	8.6	9.4
DEBRECEN HU	47.47051	21.49042	110	-5.78	4.4	9.4
DEBRECEN HU	47.47051	21.49042	110	-10.74	2.7	9.6
DEBRECEN HU	47.47051	21.49042	110	-1.72	4.3	9.6
DEBRECEN HU	47.47051	21.49042	110	-7.81	2.6	9.6
DEBRECEN HU	47.47051	21.49042	110	-7.31	0.4	9.7
DEBRECEN HU	47.47051	21.49042	110	-6.98	4.9	9.7
DEBRECEN HU	47.47051	21.49042	110	-7.41	1.4	9.8
DEBRECEN HU	47.47051	21.49042	110	-5.99	10	10
DEBRECEN HU	47.47051	21.49042	110	-4.78	54.3	10.1
DEBRECEN HU	47.47051	21.49042	110	-9.59	19.1	10.1
DEBRECEN HU	47.47051	21.49042	110	-3.42	2.8	10.2
DEBRECEN HU	47.47051	21.49042	110	-2.88	4	10.3
DEBRECEN HU	47.47051	21.49042	110	-4.25	13.1	10.4
DEBRECEN HU	47.47051	21.49042	110	-7.49	15.9	10.4
DEBRECEN HU	47.47051	21.49042	110	-7.25	3.6	10.5
DEBRECEN HU	47.47051	21.49042	110	-5.59	4.3	10.5
DEBRECEN HU	47.47051	21.49042	110	-5.6	3.4	10.6
DEBRECEN HU	47.47051	21.49042	110	-8.65	4.1	10.7
DEBRECEN HU	47.47051	21.49042	110	-6.17	8.4	10.7
DEBRECEN HU	47.47051	21.49042	110	-6.53	23	10.8
DEBRECEN HU	47.47051	21.49042	110	-5.23	6.6	10.8
DEBRECEN HU	47.47051	21.49042	110	-6.88	14	11
DEBRECEN HU	47.47051	21.49042	110	-3.54	17.2	11.1
DEBRECEN HU	47.47051	21.49042	110	-3.85	33.5	11.1
DEBRECEN HU	47.47051	21.49042	110	-5	6.9	11.1
DEBRECEN HU	47.47051	21.49042	110	-5.35	2.7	11.1
DEBRECEN HU	47.47051	21.49042	110	-11.69	21.1	11.2
DEBRECEN HU	47.47051	21.49042	110	-10.75	20.7	11.2
DEBRECEN HU	47.47051	21.49042	110	-8	32.8	11.2
DEBRECEN HU	47.47051	21.49042	110	-8.64	5.1	11.2
DEBRECEN HU	47.47051	21.49042	110	-7.59	21	11.3
DEBRECEN HU	47.47051	21.49042	110	-8.62	13.6	11.3
DEBRECEN HU	47.47051	21.49042	110	-3.65	4.9	11.4
DEBRECEN HU	47.47051	21.49042	110	-9.64	11.2	11.5
DEBRECEN HU	47.47051	21.49042	110	-8.7	14.3	11.5
DEBRECEN HU	47.47051	21.49042	110	-3.89	8.9	11.7
DEBRECEN HU	47.47051	21.49042	110	-7.11	0.3	11.8
DEBRECEN HU	47.47051	21.49042	110	-9.91	26.9	11.8
DEBRECEN HU	47.47051	21.49042	110	-9.95	17.2	11.9
DEBRECEN HU	47.47051	21.49042	110	-5.86	4.7	11.9
DEBRECEN HU	47.47051	21.49042	110	-4.43	3	11.9
DEBRECEN HU	47.47051	21.49042	110	-4.64	9	11.9
DEBRECEN HU	47.47051	21.49042	110	-10.54	11.1	11.9
DEBRECEN HU	47.47051	21.49042	110	-4.21	1.3	11.9
DEBRECEN HU	47.47051	21.49042	110	-12.01	7.8	12
DEBRECEN HU	47.47051	21.49042	110	-5.94	3.9	12
DEBRECEN HU	47.47051	21.49042	110	-10.01	3.6	12

DEBRECEN	HU	47.47051	21.49042	110	0.08	9.9	12.1
DEBRECEN	HU	47.47051	21.49042	110	-13	32.1	12.1
DEBRECEN	HU	47.47051	21.49042	110	-9	25.7	12.1
DEBRECEN	HU	47.47051	21.49042	110	-6.9	15.8	12.2
DEBRECEN	HU	47.47051	21.49042	110	-2.36	1.3	12.3
DEBRECEN	HU	47.47051	21.49042	110	-7.88	6.4	12.3
DEBRECEN	HU	47.47051	21.49042	110	-5.24	1.8	12.4
DEBRECEN	HU	47.47051	21.49042	110	-2.1	4.2	12.5
DEBRECEN	HU	47.47051	21.49042	110	-11.15	7.4	12.5
DEBRECEN	HU	47.47051	21.49042	110	-6.79	9.9	12.5
DEBRECEN	HU	47.47051	21.49042	110	-11.99	10.5	12.5
DEBRECEN	HU	47.47051	21.49042	110	-2.51	3.7	12.5
DEBRECEN	HU	47.47051	21.49042	110	-3.38	9.5	12.6
DEBRECEN	HU	47.47051	21.49042	110	-8.87	2.4	12.6
DEBRECEN	HU	47.47051	21.49042	110	-5.58	4.7	12.6
DEBRECEN	HU	47.47051	21.49042	110	-8.51	8	12.6
DEBRECEN	HU	47.47051	21.49042	110	-3.81	1	12.7
DEBRECEN	HU	47.47051	21.49042	110	-10.18	25	12.8
DEBRECEN	HU	47.47051	21.49042	110	-6.22	10.4	12.8
DEBRECEN	HU	47.47051	21.49042	110	-7.33	35.9	12.9
DEBRECEN	HU	47.47051	21.49042	110	-8.73	19.3	13
DEBRECEN	HU	47.47051	21.49042	110	0.83	1.2	13
DEBRECEN	HU	47.47051	21.49042	110	-11.14	11.3	13
DEBRECEN	HU	47.47051	21.49042	110	-11.6	0.5	13.1
DEBRECEN	HU	47.47051	21.49042	110	-10.45	11.8	13.1
DEBRECEN	HU	47.47051	21.49042	110	-7.11	4.7	13.2
DEBRECEN	HU	47.47051	21.49042	110	-11.81	3.1	13.2
DEBRECEN	HU	47.47051	21.49042	110	-8.95	20.5	13.3
DEBRECEN	HU	47.47051	21.49042	110	-9.44	11.4	13.3
DEBRECEN	HU	47.47051	21.49042	110	-13.6	11.5	13.4
DEBRECEN	HU	47.47051	21.49042	110	-7.57	3.5	13.4
DEBRECEN	HU	47.47051	21.49042	110	-6.45	9	13.4
DEBRECEN	HU	47.47051	21.49042	110	-9.18	8.4	13.5
DEBRECEN	HU	47.47051	21.49042	110	-3.6	3.8	13.5
DEBRECEN	HU	47.47051	21.49042	110	-11.06	9.7	13.5
DEBRECEN	HU	47.47051	21.49042	110	-7.97	11.5	13.6
DEBRECEN	HU	47.47051	21.49042	110	-5.8	40.3	13.7
DEBRECEN	HU	47.47051	21.49042	110	-7.08	4.1	13.7
DEBRECEN	HU	47.47051	21.49042	110	-4.01	7.9	13.8
DEBRECEN	HU	47.47051	21.49042	110	-9.34	7.9	13.8
DEBRECEN	HU	47.47051	21.49042	110	-4.41	2.8	13.9
DEBRECEN	HU	47.47051	21.49042	110	-9.5	22.4	14.1
DEBRECEN	HU	47.47051	21.49042	110	-2.3	6.7	14.2
DEBRECEN	HU	47.47051	21.49042	110	-4.9	6.9	14.2
DEBRECEN	HU	47.47051	21.49042	110	-1.92	0.4	14.2
DEBRECEN	HU	47.47051	21.49042	110	-6.24	10.2	14.2
DEBRECEN	HU	47.47051	21.49042	110	-7.5	12	14.3
DEBRECEN	HU	47.47051	21.49042	110	-4.24	0.1	14.3
DEBRECEN	HU	47.47051	21.49042	110	-1.59	3.3	14.3
DEBRECEN	HU	47.47051	21.49042	110	-4.17	11.4	14.3

DEBRECEN HU	47.47051	21.49042	110	-4	31.8	14.4
DEBRECEN HU	47.47051	21.49042	110	-6.49	0.2	14.5
DEBRECEN HU	47.47051	21.49042	110	-5.24	50.8	14.6
DEBRECEN HU	47.47051	21.49042	110	-9.89	12.9	14.6
DEBRECEN HU	47.47051	21.49042	110	-9.66	3.8	14.6
DEBRECEN HU	47.47051	21.49042	110	0.7	46.9	14.8
DEBRECEN HU	47.47051	21.49042	110	-7.48	0.7	14.8
DEBRECEN HU	47.47051	21.49042	110	-6.92	11.6	14.8
DEBRECEN HU	47.47051	21.49042	110	-7.05	3.1	14.9
DEBRECEN HU	47.47051	21.49042	110	-4.58	1.2	14.9
DEBRECEN HU	47.47051	21.49042	110	-6.29	11.7	15
DEBRECEN HU	47.47051	21.49042	110	0.25	0.5	15
DEBRECEN HU	47.47051	21.49042	110	-6	19.3	15
DEBRECEN HU	47.47051	21.49042	110	-6.25	2.3	15.1
DEBRECEN HU	47.47051	21.49042	110	-6.16	18.9	15.1
DEBRECEN HU	47.47051	21.49042	110	-7.74	0.2	15.1
DEBRECEN HU	47.47051	21.49042	110	-10.18	15.1	15.1
DEBRECEN HU	47.47051	21.49042	110	-1.03	16.5	15.2
DEBRECEN HU	47.47051	21.49042	110	-3.8	13.1	15.3
DEBRECEN HU	47.47051	21.49042	110	-6.87	7.7	15.3
DEBRECEN HU	47.47051	21.49042	110	-13.7	0.1	15.4
DEBRECEN HU	47.47051	21.49042	110	-5.88	10.4	15.4
DEBRECEN HU	47.47051	21.49042	110	-4.11	5	15.5
DEBRECEN HU	47.47051	21.49042	110	-0.64	1.5	15.6
DEBRECEN HU	47.47051	21.49042	110	-10.8	34.9	15.6
DEBRECEN HU	47.47051	21.49042	110	-6.03	1.7	15.7
DEBRECEN HU	47.47051	21.49042	110	-12.34	60.3	15.8
DEBRECEN HU	47.47051	21.49042	110	-4.68	5.3	15.8
DEBRECEN HU	47.47051	21.49042	110	-7.79	4.3	15.8
DEBRECEN HU	47.47051	21.49042	110	-3.86	15.4	16
DEBRECEN HU	47.47051	21.49042	110	-12.22	18	16.1
DEBRECEN HU	47.47051	21.49042	110	-11.6	12.6	16.1
DEBRECEN HU	47.47051	21.49042	110	-7.46	12.5	16.1
DEBRECEN HU	47.47051	21.49042	110	-8.99	1.5	16.3
DEBRECEN HU	47.47051	21.49042	110	-11.24	12.3	16.4
DEBRECEN HU	47.47051	21.49042	110	-1.72	0.3	16.5
DEBRECEN HU	47.47051	21.49042	110	-5.26	24.2	16.5
DEBRECEN HU	47.47051	21.49042	110	-6.5	11	16.5
DEBRECEN HU	47.47051	21.49042	110	-3.38	3.8	16.5
DEBRECEN HU	47.47051	21.49042	110	-3.15	8.2	16.5
DEBRECEN HU	47.47051	21.49042	110	-3.44	3.3	16.5
DEBRECEN HU	47.47051	21.49042	110	-9.9	24.5	16.5
DEBRECEN HU	47.47051	21.49042	110	-5.93	13.3	16.6
DEBRECEN HU	47.47051	21.49042	110	-5.45	4.1	16.6
DEBRECEN HU	47.47051	21.49042	110	-9.72	7	16.7
DEBRECEN HU	47.47051	21.49042	110	-1.5	5.6	16.8
DEBRECEN HU	47.47051	21.49042	110	-5.73	14.7	16.9
DEBRECEN HU	47.47051	21.49042	110	-6.63	7.1	16.9
DEBRECEN HU	47.47051	21.49042	110	0.04	14.2	17
DEBRECEN HU	47.47051	21.49042	110	-0.65	0.2	17

DEBRECEN HU	47.47051	21.49042	110	-8.96	11.7	17
DEBRECEN HU	47.47051	21.49042	110	-5.78	7.4	17
DEBRECEN HU	47.47051	21.49042	110	-8.9	10	17
DEBRECEN HU	47.47051	21.49042	110	-6.34	13	17
DEBRECEN HU	47.47051	21.49042	110	-4.06	0.6	17.1
DEBRECEN HU	47.47051	21.49042	110	-5.11	11.3	17.1
DEBRECEN HU	47.47051	21.49042	110	-8.14	42.5	17.1
DEBRECEN HU	47.47051	21.49042	110	-1.47	2	17.1
DEBRECEN HU	47.47051	21.49042	110	-7.81	10.1	17.1
DEBRECEN HU	47.47051	21.49042	110	-4.32	4.1	17.1
DEBRECEN HU	47.47051	21.49042	110	0.51	8.6	17.2
DEBRECEN HU	47.47051	21.49042	110	-4.85	1.4	17.2
DEBRECEN HU	47.47051	21.49042	110	-6.27	5.1	17.2
DEBRECEN HU	47.47051	21.49042	110	-7.66	49.8	17.3
DEBRECEN HU	47.47051	21.49042	110	-8.07	3.6	17.3
DEBRECEN HU	47.47051	21.49042	110	-6.17	29	17.3
DEBRECEN HU	47.47051	21.49042	110	-7.9	14.6	17.3
DEBRECEN HU	47.47051	21.49042	110	-4	8.6	17.4
DEBRECEN HU	47.47051	21.49042	110	-14.18	11.8	17.4
DEBRECEN HU	47.47051	21.49042	110	-8.4	10	17.4
DEBRECEN HU	47.47051	21.49042	110	-4.37	7.4	17.4
DEBRECEN HU	47.47051	21.49042	110	-5.34	1.9	17.6
DEBRECEN HU	47.47051	21.49042	110	-4.99	5.9	17.6
DEBRECEN HU	47.47051	21.49042	110	-1.32	35.2	17.7
DEBRECEN HU	47.47051	21.49042	110	-7.62	3.9	17.7
DEBRECEN HU	47.47051	21.49042	110	-4.77	11	17.7
DEBRECEN HU	47.47051	21.49042	110	-3.82	7.6	17.7
DEBRECEN HU	47.47051	21.49042	110	-4.98	25.4	17.9
DEBRECEN HU	47.47051	21.49042	110	-4.18	25.8	18
DEBRECEN HU	47.47051	21.49042	110	-7.11	0.6	18
DEBRECEN HU	47.47051	21.49042	110	-5.45	2.4	18
DEBRECEN HU	47.47051	21.49042	110	-3.78	3.2	18
DEBRECEN HU	47.47051	21.49042	110	-1.17	0.8	18
DEBRECEN HU	47.47051	21.49042	110	-5.23	51.8	18.1
DEBRECEN HU	47.47051	21.49042	110	-3.96	0.6	18.1
DEBRECEN HU	47.47051	21.49042	110	-5.32	4.6	18.2
DEBRECEN HU	47.47051	21.49042	110	-3.31	3.8	18.2
DEBRECEN HU	47.47051	21.49042	110	-2.28	1.3	18.2
DEBRECEN HU	47.47051	21.49042	110	-6.64	11.6	18.3
DEBRECEN HU	47.47051	21.49042	110	-5.22	11.8	18.3
DEBRECEN HU	47.47051	21.49042	110	-5.9	10.5	18.4
DEBRECEN HU	47.47051	21.49042	110	-2.15	2.9	18.4
DEBRECEN HU	47.47051	21.49042	110	-0.36	0.6	18.4
DEBRECEN HU	47.47051	21.49042	110	1.38	3.5	18.5
DEBRECEN HU	47.47051	21.49042	110	-12.48	9.1	18.5
DEBRECEN HU	47.47051	21.49042	110	-2.49	2.5	18.6
DEBRECEN HU	47.47051	21.49042	110	-4.58	15	18.7
DEBRECEN HU	47.47051	21.49042	110	-5.93	9.2	18.7
DEBRECEN HU	47.47051	21.49042	110	-5.43	40.9	18.7
DEBRECEN HU	47.47051	21.49042	110	-4.65	19	18.8

DEBRECEN HU	47.47051	21.49042	110	-6.31	19.7	18.8
DEBRECEN HU	47.47051	21.49042	110	-7	8	18.8
DEBRECEN HU	47.47051	21.49042	110	-4.08	4.9	18.9
DEBRECEN HU	47.47051	21.49042	110	-2.56	8.5	18.9
DEBRECEN HU	47.47051	21.49042	110	-4.45	1.4	18.9
DEBRECEN HU	47.47051	21.49042	110	-4.27	12.3	18.9
DEBRECEN HU	47.47051	21.49042	110	-5.38	6.4	19
DEBRECEN HU	47.47051	21.49042	110	-6.88	18.4	19.1
DEBRECEN HU	47.47051	21.49042	110	-1.56	0.6	19.1
DEBRECEN HU	47.47051	21.49042	110	-4.9	24.2	19.2
DEBRECEN HU	47.47051	21.49042	110	-5.33	4.3	19.2
DEBRECEN HU	47.47051	21.49042	110	-5.54	11	19.2
DEBRECEN HU	47.47051	21.49042	110	-5.16	3.3	19.2
DEBRECEN HU	47.47051	21.49042	110	-7.84	31.8	19.3
DEBRECEN HU	47.47051	21.49042	110	-11.23	0.2	19.3
DEBRECEN HU	47.47051	21.49042	110	-5.22	10.1	19.3
DEBRECEN HU	47.47051	21.49042	110	-13.58	4.7	19.3
DEBRECEN HU	47.47051	21.49042	110	-5.86	6.2	19.3
DEBRECEN HU	47.47051	21.49042	110	-8.8	90.9	19.4
DEBRECEN HU	47.47051	21.49042	110	-2.33	6.5	19.4
DEBRECEN HU	47.47051	21.49042	110	-3.19	7.6	19.4
DEBRECEN HU	47.47051	21.49042	110	-9.43	3.9	19.4
DEBRECEN HU	47.47051	21.49042	110	-7.03	5.8	19.5
DEBRECEN HU	47.47051	21.49042	110	-4.29	1.9	19.5
DEBRECEN HU	47.47051	21.49042	110	-5.13	0.3	19.6
DEBRECEN HU	47.47051	21.49042	110	-4.84	7.6	19.6
DEBRECEN HU	47.47051	21.49042	110	-5.62	1	19.7
DEBRECEN HU	47.47051	21.49042	110	-4.24	5.6	19.7
DEBRECEN HU	47.47051	21.49042	110	-0.19	0.7	19.8
DEBRECEN HU	47.47051	21.49042	110	-2.87	0.7	19.8
DEBRECEN HU	47.47051	21.49042	110	-7.91	1.7	19.9
DEBRECEN HU	47.47051	21.49042	110	-5.02	43.2	19.9
DEBRECEN HU	47.47051	21.49042	110	-6.47	7.7	19.9
DEBRECEN HU	47.47051	21.49042	110	-5.29	1.5	20
DEBRECEN HU	47.47051	21.49042	110	-5.22	25.1	20
DEBRECEN HU	47.47051	21.49042	110	-1.35	8	20
DEBRECEN HU	47.47051	21.49042	110	-6.23	6.1	20
DEBRECEN HU	47.47051	21.49042	110	-6.74	17.8	20
DEBRECEN HU	47.47051	21.49042	110	4.31	1.1	20.2
DEBRECEN HU	47.47051	21.49042	110	-7.92	35.5	20.3
DEBRECEN HU	47.47051	21.49042	110	-4.32	50.9	20.3
DEBRECEN HU	47.47051	21.49042	110	-2.45	2.2	20.3
DEBRECEN HU	47.47051	21.49042	110	-1.81	1.6	20.3
DEBRECEN HU	47.47051	21.49042	110	-2.77	2.7	20.3
DEBRECEN HU	47.47051	21.49042	110	-6.87	5	20.5
DEBRECEN HU	47.47051	21.49042	110	-2.39	10	20.5
DEBRECEN HU	47.47051	21.49042	110	-8.25	14.6	20.6
DEBRECEN HU	47.47051	21.49042	110	-7.18	6.5	20.6
DEBRECEN HU	47.47051	21.49042	110	-5.33	1.7	20.6
DEBRECEN HU	47.47051	21.49042	110	1.76	1.9	20.7

DEBRECEN HU	47.47051	21.49042	110	-8.18	0.4	20.8
DEBRECEN HU	47.47051	21.49042	110	4.28	1.4	20.9
DEBRECEN HU	47.47051	21.49042	110	-1.72	0.1	20.9
DEBRECEN HU	47.47051	21.49042	110	-6.27	13.8	21
DEBRECEN HU	47.47051	21.49042	110	-5.91	14.3	21.1
DEBRECEN HU	47.47051	21.49042	110	-3.16	0.5	21.1
DEBRECEN HU	47.47051	21.49042	110	-4.9	31.7	21.1
DEBRECEN HU	47.47051	21.49042	110	6.6	0.1	21.1
DEBRECEN HU	47.47051	21.49042	110	-5.61	1.6	21.1
DEBRECEN HU	47.47051	21.49042	110	-4.53	9.7	21.1
DEBRECEN HU	47.47051	21.49042	110	-2.33	0.7	21.2
DEBRECEN HU	47.47051	21.49042	110	-3.53	5.8	21.2
DEBRECEN HU	47.47051	21.49042	110	-3.27	5.7	21.3
DEBRECEN HU	47.47051	21.49042	110	-1.78	10.2	21.4
DEBRECEN HU	47.47051	21.49042	110	-4.06	0.4	21.4
DEBRECEN HU	47.47051	21.49042	110	-0.56	3.9	21.4
DEBRECEN HU	47.47051	21.49042	110	-2.53	5.2	21.5
DEBRECEN HU	47.47051	21.49042	110	-5	16.8	21.6
DEBRECEN HU	47.47051	21.49042	110	-3.24	0.6	21.6
DEBRECEN HU	47.47051	21.49042	110	-3.9	3	21.6
DEBRECEN HU	47.47051	21.49042	110	-3.46	7.1	21.6
DEBRECEN HU	47.47051	21.49042	110	-6.16	5.5	21.8
DEBRECEN HU	47.47051	21.49042	110	-8.68	8.7	21.9
DEBRECEN HU	47.47051	21.49042	110	5.28	6.2	21.9
DEBRECEN HU	47.47051	21.49042	110	-6.77	5.3	22
DEBRECEN HU	47.47051	21.49042	110	-3.24	8.1	22.1
DEBRECEN HU	47.47051	21.49042	110	-3.24	9.2	22.1
DEBRECEN HU	47.47051	21.49042	110	3	2.7	22.3
DEBRECEN HU	47.47051	21.49042	110	-2.81	4.1	22.3
DEBRECEN HU	47.47051	21.49042	110	0.91	49	22.4
DEBRECEN HU	47.47051	21.49042	110	-1.39	46.2	22.4
DEBRECEN HU	47.47051	21.49042	110	1.9	1.5	22.4
DEBRECEN HU	47.47051	21.49042	110	-8.63	8.2	22.4
DEBRECEN HU	47.47051	21.49042	110	6.64	23	22.5
DEBRECEN HU	47.47051	21.49042	110	-4.33	8.5	22.5
DEBRECEN HU	47.47051	21.49042	110	-3.28	3.4	22.5
DEBRECEN HU	47.47051	21.49042	110	-4.09	7.2	22.6
DEBRECEN HU	47.47051	21.49042	110	-5.2	18.6	22.6
DEBRECEN HU	47.47051	21.49042	110	-3.66	3	22.7
DEBRECEN HU	47.47051	21.49042	110	-4.98	9	22.8
DEBRECEN HU	47.47051	21.49042	110	-6.66	2.6	22.8
DEBRECEN HU	47.47051	21.49042	110	-6.12	11.1	22.8
DEBRECEN HU	47.47051	21.49042	110	-5.38	7.3	22.8
DEBRECEN HU	47.47051	21.49042	110	0.44	0.4	22.8
DEBRECEN HU	47.47051	21.49042	110	-4.19	10	22.9
DEBRECEN HU	47.47051	21.49042	110	-4.92	19.9	23
DEBRECEN HU	47.47051	21.49042	110	-2.15	3	23.1
DEBRECEN HU	47.47051	21.49042	110	-4.44	18.7	23.1
DEBRECEN HU	47.47051	21.49042	110	-5.24	27.1	23.2
DEBRECEN HU	47.47051	21.49042	110	3.87	0.1	23.2

DEBRECEN	HU	47.47051	21.49042	110	-2.94	6.4	23.2
DEBRECEN	HU	47.47051	21.49042	110	-3.61	27.7	23.2
DEBRECEN	HU	47.47051	21.49042	110	0.88	0.1	23.2
DEBRECEN	HU	47.47051	21.49042	110	2.77	1.4	23.3
DEBRECEN	HU	47.47051	21.49042	110	-4.3	4.1	23.3
DEBRECEN	HU	47.47051	21.49042	110	-0.78	3.9	23.4
DEBRECEN	HU	47.47051	21.49042	110	-4.44	7	23.4
DEBRECEN	HU	47.47051	21.49042	110	-0.7	62.1	23.6
DEBRECEN	HU	47.47051	21.49042	110	-7.35	37	23.6
DEBRECEN	HU	47.47051	21.49042	110	-4.2	10.7	23.6
DEBRECEN	HU	47.47051	21.49042	110	-2.31	3.7	23.6
DEBRECEN	HU	47.47051	21.49042	110	-3.31	6.8	23.9
DEBRECEN	HU	47.47051	21.49042	110	-3.18	12.3	24
DEBRECEN	HU	47.47051	21.49042	110	-3.4	6.7	24
DEBRECEN	HU	47.47051	21.49042	110	-4.32	10	24.1
DEBRECEN	HU	47.47051	21.49042	110	-1.51	2.1	24.4
DEBRECEN	HU	47.47051	21.49042	110	-3.9	1.8	24.8
DEBRECEN	HU	47.47051	21.49042	110	-1.85	3	25.4
DEBRECEN	HU	47.47051	21.49042	110	-4.1	9.5	25.4
DEBRECEN	HU	47.47051	21.49042	110	1.41	1.6	26
DEBRECEN	HU	47.47051	21.49042	110	-2.29	10.1	26.5
DEBRECEN	HU	47.47051	21.49042	110	1.16	2.6	28
BRATISLAV/	SK	48.16905	17.11191	286	-15.67	37.7	-1.1
BRATISLAV/	SK	48.16905	17.11191	286	-12.88	78	-0.7
BRATISLAV/	SK	48.16905	17.11191	286	-10.76	68.2	-0.6
BRATISLAV/	SK	48.16905	17.11191	286	-11.35	27	-0.1
BRATISLAV/	SK	48.16905	17.11191	286	-8.81	23	0.3
BRATISLAV/	SK	48.16905	17.11191	286	-10.67	11.3	0.3
BRATISLAV/	SK	48.16905	17.11191	286	-8.69	36.8	1.2
BRATISLAV/	SK	48.16905	17.11191	286	-9.36	30.7	1.3
BRATISLAV/	SK	48.16905	17.11191	286	-7.39	11	1.5
BRATISLAV/	SK	48.16905	17.11191	286	-11.28	83.8	1.5
BRATISLAV/	SK	48.16905	17.11191	286	-11.53	35	1.8
BRATISLAV/	SK	48.16905	17.11191	286	-6.9	80	2
BRATISLAV/	SK	48.16905	17.11191	286	-12.1	87	2
BRATISLAV/	SK	48.16905	17.11191	286	-8.42	21	2.7
BRATISLAV/	SK	48.16905	17.11191	286	-10.62	30	3.2
BRATISLAV/	SK	48.16905	17.11191	286	-7.34	25	3.8
BRATISLAV/	SK	48.16905	17.11191	286	-12.22	48.3	4.1
BRATISLAV/	SK	48.16905	17.11191	286	-10.58	121	4.2
BRATISLAV/	SK	48.16905	17.11191	286	-11.5	65.5	4.6
BRATISLAV/	SK	48.16905	17.11191	286	-9.95	50.8	5.1
BRATISLAV/	SK	48.16905	17.11191	286	-11.09	77	5.5
BRATISLAV/	SK	48.16905	17.11191	286	-14.37	60.7	5.6
BRATISLAV/	SK	48.16905	17.11191	286	-7.69	34.2	6.7
BRATISLAV/	SK	48.16905	17.11191	286	-5.5	20	8.1
BRATISLAV/	SK	48.16905	17.11191	286	-9.25	63.5	8.4
BRATISLAV/	SK	48.16905	17.11191	286	-14.1	22.9	8.8
BRATISLAV/	SK	48.16905	17.11191	286	-8.54	35.2	8.8
BRATISLAV/	SK	48.16905	17.11191	286	-10.25	76.7	8.9

BRATISLAV,	SK	48.16905	17.11191	286	-8.34	24.9	9
BRATISLAV,	SK	48.16905	17.11191	286	-9.41	19	9.7
BRATISLAV,	SK	48.16905	17.11191	286	-0.86	11	10.1
BRATISLAV,	SK	48.16905	17.11191	286	-7.42	23.2	10.1
BRATISLAV,	SK	48.16905	17.11191	286	-9.25	54.3	10.5
BRATISLAV,	SK	48.16905	17.11191	286	-6.27	52	10.6
BRATISLAV,	SK	48.16905	17.11191	286	-9.58	16.7	10.9
BRATISLAV,	SK	48.16905	17.11191	286	-2.54	32	11.3
BRATISLAV,	SK	48.16905	17.11191	286	-7.62	107.6	11.3
BRATISLAV,	SK	48.16905	17.11191	286	-6.87	71.5	13.1
BRATISLAV,	SK	48.16905	17.11191	286	-2.65	62	14.7
BRATISLAV,	SK	48.16905	17.11191	286	-8.24	94	15.1
BRATISLAV,	SK	48.16905	17.11191	286	-6.31	73.1	15.7
BRATISLAV,	SK	48.16905	17.11191	286	-2.63	37	15.8
BRATISLAV,	SK	48.16905	17.11191	286	-1.95	24	16
BRATISLAV,	SK	48.16905	17.11191	286	-10.25	45.4	16.1
BRATISLAV,	SK	48.16905	17.11191	286	-6.76	54	16.2
BRATISLAV,	SK	48.16905	17.11191	286	-3.6	77	16.5
BRATISLAV,	SK	48.16905	17.11191	286	-5.24	82.3	16.6
BRATISLAV,	SK	48.16905	17.11191	286	-5.5	40	17.7
BRATISLAV,	SK	48.16905	17.11191	286	-5.9	53.7	17.8
BRATISLAV,	SK	48.16905	17.11191	286	-3.98	20	18
BRATISLAV,	SK	48.16905	17.11191	286	-6.01	50.5	18.4
BRATISLAV,	SK	48.16905	17.11191	286	-6.37	70.5	18.8
BRATISLAV,	SK	48.16905	17.11191	286	-13.58	96	19
BRATISLAV,	SK	48.16905	17.11191	286	-8.14	21.8	19.2
BRATISLAV,	SK	48.16905	17.11191	286	4	35.8	19.6
BRATISLAV,	SK	48.16905	17.11191	286	-4.81	107	19.9
BRATISLAV,	SK	48.16905	17.11191	286	-6.49	59.3	20.2
BRATISLAV,	SK	48.16905	17.11191	286	-3.83	104	20.3
BRATISLAV,	SK	48.16905	17.11191	286	0.66	24	21.1
BRATISLAV,	SK	48.16905	17.11191	286	-9.05	6.1	21.6
MILHOSTO'	SK	48.65833	21.73	104	-14.64	24.5	-3.8
MILHOSTO'	SK	48.65833	21.73	104	-13.19	34	-3.7
MILHOSTO'	SK	48.65833	21.73	104	-18.43	12.9	-2.4
MILHOSTO'	SK	48.65833	21.73	104	-13.56	10.4	-2.1
MILHOSTO'	SK	48.65833	21.73	104	-8.05	17	-1.9
MILHOSTO'	SK	48.65833	21.73	104	-15.89	13	-1.7
MILHOSTO'	SK	48.65833	21.73	104	-10.86	26.3	-1.5
MILHOSTO'	SK	48.65833	21.73	104	-8.15	14.2	-1.1
MILHOSTO'	SK	48.65833	21.73	104	-10.5	6.3	-0.9
MILHOSTO'	SK	48.65833	21.73	104	-13.06	13.3	-0.5
MILHOSTO'	SK	48.65833	21.73	104	-11.58	51	-0.4
MILHOSTO'	SK	48.65833	21.73	104	-10.08	11	-0.1
MILHOSTO'	SK	48.65833	21.73	104	-12.78	56	1.2
MILHOSTO'	SK	48.65833	21.73	104	-12.28	40	1.2
MILHOSTO'	SK	48.65833	21.73	104	-12.48	59.4	2.1
MILHOSTO'	SK	48.65833	21.73	104	-15.24	24.3	2.6
MILHOSTO'	SK	48.65833	21.73	104	-9.83	32	3
MILHOSTO'	SK	48.65833	21.73	104	-14.1	67	3.2

MILHOSTO'	SK	48.65833	21.73	104	-10.34	58.8	4.4
MILHOSTO'	SK	48.65833	21.73	104	-11.18	20.7	4.6
MILHOSTO'	SK	48.65833	21.73	104	-9.69	56.5	4.9
MILHOSTO'	SK	48.65833	21.73	104	-8.83	8.9	6.3
MILHOSTO'	SK	48.65833	21.73	104	-10.99	22	6.6
MILHOSTO'	SK	48.65833	21.73	104	-7.64	4	7.6
MILHOSTO'	SK	48.65833	21.73	104	-8.67	75	7.7
MILHOSTO'	SK	48.65833	21.73	104	-9.38	93	8.5
MILHOSTO'	SK	48.65833	21.73	104	-7.95	71.9	8.7
MILHOSTO'	SK	48.65833	21.73	104	-9.92	123.3	8.8
MILHOSTO'	SK	48.65833	21.73	104	-9.85	44.8	9.1
MILHOSTO'	SK	48.65833	21.73	104	-13.57	38	9.3
MILHOSTO'	SK	48.65833	21.73	104	-10.44	28	9.7
MILHOSTO'	SK	48.65833	21.73	104	-9.76	30.1	9.8
MILHOSTO'	SK	48.65833	21.73	104	-8.88	64.8	10.1
MILHOSTO'	SK	48.65833	21.73	104	-6.5	26.7	10.2
MILHOSTO'	SK	48.65833	21.73	104	-6.76	75	11.7
MILHOSTO'	SK	48.65833	21.73	104	-6.1	48.8	12.5
MILHOSTO'	SK	48.65833	21.73	104	-8.06	49.4	13
MILHOSTO'	SK	48.65833	21.73	104	-7.75	56.2	13.8
MILHOSTO'	SK	48.65833	21.73	104	-5.87	81	14.7
MILHOSTO'	SK	48.65833	21.73	104	-11.44	44.1	14.8
MILHOSTO'	SK	48.65833	21.73	104	-5.74	60	14.9
MILHOSTO'	SK	48.65833	21.73	104	-4.63	94.8	15.1
MILHOSTO'	SK	48.65833	21.73	104	-9.97	34	15.3
MILHOSTO'	SK	48.65833	21.73	104	-9.25	12	15.4
MILHOSTO'	SK	48.65833	21.73	104	-6.83	32.2	15.5
MILHOSTO'	SK	48.65833	21.73	104	-9.93	86	16.9
MILHOSTO'	SK	48.65833	21.73	104	-5.91	52	17
MILHOSTO'	SK	48.65833	21.73	104	-4.23	56.7	17.8
MILHOSTO'	SK	48.65833	21.73	104	-7.35	40.3	18.1
MILHOSTO'	SK	48.65833	21.73	104	-5.61	29.7	18.2
MILHOSTO'	SK	48.65833	21.73	104	-5.5	33.7	18.3
MILHOSTO'	SK	48.65833	21.73	104	-3.65	45.9	18.5
MILHOSTO'	SK	48.65833	21.73	104	-6.65	43	18.7
MILHOSTO'	SK	48.65833	21.73	104	-6.01	52.3	18.9
MILHOSTO'	SK	48.65833	21.73	104	-4.58	86.3	19.1
MILHOSTO'	SK	48.65833	21.73	104	-12.44	43	19.2
MILHOSTO'	SK	48.65833	21.73	104	-7.25	19.3	19.3
MILHOSTO'	SK	48.65833	21.73	104	-6.44	66.5	19.3
MILHOSTO'	SK	48.65833	21.73	104	-7.7	52	19.8
MILHOSTO'	SK	48.65833	21.73	104	-7.84	55.8	19.9
MILHOSTO'	SK	48.65833	21.73	104	-8.3	59	20.6
MILHOSTO'	SK	48.65833	21.73	104	-5.01	66.1	20.6
MILHOSTO'	SK	48.65833	21.73	104	-4.59	68.1	21.3
MOCHOVCI	SK	48.28461	18.47571	206	-13.16	32.5	-3.5
MOCHOVCI	SK	48.28461	18.47571	206	-13.9	51.8	-2.7
MOCHOVCI	SK	48.28461	18.47571	206	-15.46	16.3	-2.6
MOCHOVCI	SK	48.28461	18.47571	206	-13.53	21	-1.5
MOCHOVCI	SK	48.28461	18.47571	206	-17.17	10	-1.4

MOCHOVCI	SK	48.28461	18.47571	206	-6.7	8.1	-1.3
MOCHOVCI	SK	48.28461	18.47571	206	-13.98	62.6	-1
MOCHOVCI	SK	48.28461	18.47571	206	-8.9	13	-0.9
MOCHOVCI	SK	48.28461	18.47571	206	-11.05	72.9	-0.9
MOCHOVCI	SK	48.28461	18.47571	206	-9.37	24.9	-0.8
MOCHOVCI	SK	48.28461	18.47571	206	-8.86	12	0.1
MOCHOVCI	SK	48.28461	18.47571	206	-14.31	70	0.9
MOCHOVCI	SK	48.28461	18.47571	206	-12.13	52	1.7
MOCHOVCI	SK	48.28461	18.47571	206	-13.71	63	2
MOCHOVCI	SK	48.28461	18.47571	206	-12.11	19	2.1
MOCHOVCI	SK	48.28461	18.47571	206	-10.05	15.5	2.3
MOCHOVCI	SK	48.28461	18.47571	206	-9.24	41	2.4
MOCHOVCI	SK	48.28461	18.47571	206	-11.98	70	2.8
MOCHOVCI	SK	48.28461	18.47571	206	-16.18	52.3	3.5
MOCHOVCI	SK	48.28461	18.47571	206	-10.66	12.1	3.5
MOCHOVCI	SK	48.28461	18.47571	206	-10.39	30.7	4
MOCHOVCI	SK	48.28461	18.47571	206	-8.98	114.4	4.4
MOCHOVCI	SK	48.28461	18.47571	206	-9.36	81.9	5
MOCHOVCI	SK	48.28461	18.47571	206	-9.88	33	6.3
MOCHOVCI	SK	48.28461	18.47571	206	-11.04	25.6	6.6
MOCHOVCI	SK	48.28461	18.47571	206	-7.07	16.1	6.9
MOCHOVCI	SK	48.28461	18.47571	206	-12.87	21.1	7.9
MOCHOVCI	SK	48.28461	18.47571	206	-8.94	31.5	8.5
MOCHOVCI	SK	48.28461	18.47571	206	-9.39	64.6	8.5
MOCHOVCI	SK	48.28461	18.47571	206	-9.31	23	8.6
MOCHOVCI	SK	48.28461	18.47571	206	-10.85	75.9	8.8
MOCHOVCI	SK	48.28461	18.47571	206	-10.64	74.2	9.7
MOCHOVCI	SK	48.28461	18.47571	206	-8.27	16	9.9
MOCHOVCI	SK	48.28461	18.47571	206	-7.56	34.6	10.6
MOCHOVCI	SK	48.28461	18.47571	206	-10.27	18.5	10.6
MOCHOVCI	SK	48.28461	18.47571	206	-6.07	46	11.2
MOCHOVCI	SK	48.28461	18.47571	206	-7.02	75.9	11.5
MOCHOVCI	SK	48.28461	18.47571	206	-7.21	58.8	12.3
MOCHOVCI	SK	48.28461	18.47571	206	-6.81	68	13.7
MOCHOVCI	SK	48.28461	18.47571	206	-7.58	58	14.8
MOCHOVCI	SK	48.28461	18.47571	206	-2.68	19	14.8
MOCHOVCI	SK	48.28461	18.47571	206	-7.94	62	15.1
MOCHOVCI	SK	48.28461	18.47571	206	-6.72	16	15.4
MOCHOVCI	SK	48.28461	18.47571	206	-8.95	31.9	15.5
MOCHOVCI	SK	48.28461	18.47571	206	-7.36	21.2	15.7
MOCHOVCI	SK	48.28461	18.47571	206	-6.74	85	15.8
MOCHOVCI	SK	48.28461	18.47571	206	-6	48.7	16.6
MOCHOVCI	SK	48.28461	18.47571	206	-6.34	29	16.7
MOCHOVCI	SK	48.28461	18.47571	206	-5.29	54.7	17.1
MOCHOVCI	SK	48.28461	18.47571	206	-7.36	15.5	18.1
MOCHOVCI	SK	48.28461	18.47571	206	-6.07	55.3	18.2
MOCHOVCI	SK	48.28461	18.47571	206	-11.72	53	18.6
MOCHOVCI	SK	48.28461	18.47571	206	-5.59	37.2	18.7
MOCHOVCI	SK	48.28461	18.47571	206	-5.71	69	19
MOCHOVCI	SK	48.28461	18.47571	206	-7.98	122	19.1

MOCHOVCI	SK	48.28461	18.47571	206	-9.61	75.9	19.2
MOCHOVCI	SK	48.28461	18.47571	206	-6.62	25.5	19.4
MOCHOVCI	SK	48.28461	18.47571	206	-6.67	16.6	19.9
MOCHOVCI	SK	48.28461	18.47571	206	-4.49	12	20.2
MOCHOVCI	SK	48.28461	18.47571	206	-3.1	26.8	20.3
MOCHOVCI	SK	48.28461	18.47571	206	-6.44	125.1	21.3
MOCHOVCI	SK	48.28461	18.47571	206	-7.81	30.1	21.3
TOPOLNIKY	SK	47.96013	17.86201	118	-15.45	18.5	-2.5
TOPOLNIKY	SK	47.96013	17.86201	118	-15.11	12.8	-2.2
TOPOLNIKY	SK	47.96013	17.86201	118	-14.26	32.4	-1.1
TOPOLNIKY	SK	47.96013	17.86201	118	-7.92	3.7	-0.3
TOPOLNIKY	SK	47.96013	17.86201	118	-14.01	15.8	-0.1
TOPOLNIKY	SK	47.96013	17.86201	118	-10.35	2.6	0.2
TOPOLNIKY	SK	47.96013	17.86201	118	-12.65	15	0.4
TOPOLNIKY	SK	47.96013	17.86201	118	-14.94	76.3	0.4
TOPOLNIKY	SK	47.96013	17.86201	118	-12.14	7	1.3
TOPOLNIKY	SK	47.96013	17.86201	118	-7.92	20	1.5
TOPOLNIKY	SK	47.96013	17.86201	118	-12.19	18	2.7
TOPOLNIKY	SK	47.96013	17.86201	118	-12.06	70	3
TOPOLNIKY	SK	47.96013	17.86201	118	-11.64	19	3
TOPOLNIKY	SK	47.96013	17.86201	118	-7.31	7.8	3.4
TOPOLNIKY	SK	47.96013	17.86201	118	-12.42	39	4.1
TOPOLNIKY	SK	47.96013	17.86201	118	-13.36	10	4.1
TOPOLNIKY	SK	47.96013	17.86201	118	-16.42	22.4	4.1
TOPOLNIKY	SK	47.96013	17.86201	118	-8.42	117.2	5.2
TOPOLNIKY	SK	47.96013	17.86201	118	-9.59	45.3	5.2
TOPOLNIKY	SK	47.96013	17.86201	118	-6.06	41.2	5.6
TOPOLNIKY	SK	47.96013	17.86201	118	-10.23	49.3	5.8
TOPOLNIKY	SK	47.96013	17.86201	118	-10.76	25.6	7.1
TOPOLNIKY	SK	47.96013	17.86201	118	-9.82	17	8.1
TOPOLNIKY	SK	47.96013	17.86201	118	-8.4	24.2	8.8
TOPOLNIKY	SK	47.96013	17.86201	118	-8.36	68.7	9.1
TOPOLNIKY	SK	47.96013	17.86201	118	-11.02	45.1	9.2
TOPOLNIKY	SK	47.96013	17.86201	118	-5.55	6	10.1
TOPOLNIKY	SK	47.96013	17.86201	118	-10.37	5	10.2
TOPOLNIKY	SK	47.96013	17.86201	118	-8.19	9	10.4
TOPOLNIKY	SK	47.96013	17.86201	118	-10.28	65.8	10.8
TOPOLNIKY	SK	47.96013	17.86201	118	-9.12	27.6	11
TOPOLNIKY	SK	47.96013	17.86201	118	-7.95	4.6	11.3
TOPOLNIKY	SK	47.96013	17.86201	118	-6.23	37	11.4
TOPOLNIKY	SK	47.96013	17.86201	118	-8.86	71.3	12.2
TOPOLNIKY	SK	47.96013	17.86201	118	-8.62	48.5	13.7
TOPOLNIKY	SK	47.96013	17.86201	118	-5.69	40	14.8
TOPOLNIKY	SK	47.96013	17.86201	118	-7.71	15	15.5
TOPOLNIKY	SK	47.96013	17.86201	118	-3.33	59	15.7
TOPOLNIKY	SK	47.96013	17.86201	118	-3.5	18.6	16.1
TOPOLNIKY	SK	47.96013	17.86201	118	-8.4	29.8	16.1
TOPOLNIKY	SK	47.96013	17.86201	118	-8.67	19	16.4
TOPOLNIKY	SK	47.96013	17.86201	118	-6.25	9.2	16.9
TOPOLNIKY	SK	47.96013	17.86201	118	-4.33	29	17.1

TOPOLNIKY SK	47.96013	17.86201	118	-4.37	23	17.9
TOPOLNIKY SK	47.96013	17.86201	118	-6.9	44.4	18
TOPOLNIKY SK	47.96013	17.86201	118	-12.59	60	19.2
TOPOLNIKY SK	47.96013	17.86201	118	-4.03	42.9	19.2
TOPOLNIKY SK	47.96013	17.86201	118	-3.11	45.7	19.3
TOPOLNIKY SK	47.96013	17.86201	118	-6.95	76.1	19.4
TOPOLNIKY SK	47.96013	17.86201	118	-9.02	104.5	19.5
TOPOLNIKY SK	47.96013	17.86201	118	-10.51	29.1	19.9
TOPOLNIKY SK	47.96013	17.86201	118	-4.97	14.1	20.2
TOPOLNIKY SK	47.96013	17.86201	118	-7.81	146	20.4
TOPOLNIKY SK	47.96013	17.86201	118	-7.01	37	20.9
TOPOLNIKY SK	47.96013	17.86201	118	-9.91	63.6	21.3
TOPOLNIKY SK	47.96013	17.86201	118	-4.97	49.2	21.8
TOPOLNIKY SK	47.96013	17.86201	118	-11.9	52	22

Species	Family	Locality	Material	d18O_PO3	d18O_W
Rangifer tarandus	Cervidae	Svalbard Islands	bone	12.9	-10.0
Rangifer tarandus	Cervidae	Svalbard Islands	bone	12.4	-10.0
Rangifer tarandus	Cervidae	Svalbard Islands	bone	11.9	-10.0
Rangifer tarandus	Cervidae	Svalbard Islands	tooth	14.5	-10.0
Rangifer tarandus	Cervidae	Svalbard Islands	tooth	12.7	-10.0
Rangifer tarandus	Cervidae	Svalbard Islands	tooth	11.6	-10.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	13.0	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	12.1	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	11.8	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	11.6	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	11.3	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	11.1	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	10.9	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	10.8	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	10.5	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	9.9	-12.0
Rangifer tarandus	Cervidae	Lapponia-Rovaniemi	bone	10.8	-12.0
Rangifer tarandus	Cervidae	Norwegian Lapland	tooth	12.1	-12.5
Rangifer tarandus	Cervidae	Norwegian Lapland	tooth	11.4	-12.5
Rangifer tarandus	Cervidae	Novaya Zemlya	bone	8.9	-16.0
Rangifer tarandus	Cervidae	Novaya Zemlya	tooth	10.8	-16.0
Rangifer tarandus	Cervidae	Novaya Zemlya	tooth	10.8	-16.0
Rangifer tarandus	Cervidae	Novaya Zemlya	tooth	10.6	-16.0
Rangifer tarandus	Cervidae	Novaya Zemlya	tooth	8.3	-16.0
Rangifer tarandus	Cervidae	Novaya Zemlya	tooth	7.9	-16.0
Rangifer tarandus	Cervidae	Belyj Island	tooth	10.0	-18.0
Rangifer tarandus	Cervidae	Belyj Island	tooth	7.9	-18.0
Rangifer tarandus	Cervidae	Siberyhova Island	tooth	8.6	-18.0
Rangifer tarandus	Cervidae	Siberyhova Island	tooth	7.0	-18.0
Rangifer tarandus	Cervidae	Nadym river	bone	6.9	-18.5
Rangifer tarandus	Cervidae	Nadym river	tooth	9.0	-18.5
Rangifer tarandus	Cervidae	Nadym river	tooth	6.3	-18.5
Rangifer tarandus	Cervidae	Nadym river	tooth	5.4	-18.5
Rangifer tarandus	Cervidae	Nadym river	tooth	5.4	-18.5
Rangifer tarandus	Cervidae	Faddeevsky Island	bone	6.3	-24.0
Rangifer tarandus	Cervidae	Bel'kovsky Island	bone	7.6	-24.0
Sus scrofa	Suidae	Haute-Savoie	bone	14.1	-10.0
Sus scrofa	Suidae	Vienna	bone	14.3	-10.0
Sus scrofa	Suidae	Lorraine	bone	15.4	-8.0
Sus scrofa	Suidae	Sicily	bone	16.4	-7.4
Sus scrofa	Suidae	Ile de France	bone	16.7	-7.2
Sus scrofa	Suidae	Normandie	bone	17.0	-6.8
Sus scrofa	Suidae	Tuscany	bone	17.2	-6.3
Bos primigenius	Bovidae	Wyoming	tooth	13.9	-13.8
Bos primigenius	Bovidae	Wyoming	tooth	9.7	-21.4
Cervus canadensis	Cervidae	Wyoming	tooth	13.8	-13.8
Cervus canadensis	Cervidae	Wyoming	tooth	9.8	-21.4
Cervus canadensis	Cervidae	Croatia	tooth	16.8	-6.3
Cervus canadensis	Cervidae	Croatia	tooth	14.3	-12.0

Ovis aries	Bovidae	Iceland	tooth	16.9	-6.5
Ovis aries	Bovidae	Iceland	tooth	14.3	-8.5
Ovis aries	Bovidae	York	tooth	19.0	-5.6
Ovis aries	Bovidae	York	tooth	15.6	-8.7
Bos primigenius	Bovidae	York	tooth	18.2	-5.6
Bos primigenius	Bovidae	York	tooth	15.9	-8.7
Sus scrofa	Suidae	Philippines	tooth	17.7	-2.9
Sus scrofa	Suidae	Philippines	tooth	15.9	-6.2
Cervus elaphus	Cervidae	Bayerische Wald	bone	12.79	-11.5
Cervus elaphus	Cervidae	Bialowiecza Park	bone	12.78	-11.0
Cervus elaphus	Cervidae	Abruzzo Park	bone	14.90	-9.4
Cervus elaphus	Cervidae	Inland Napier	bone	16.40	-8.2
Cervus elaphus	Cervidae	Bas Rhin	bone	16.50	-8.0
Cervus elaphus	Cervidae	Haute Marne	bone	16.80	-7.7
Dama dama	Cervidae	Pisa	bone	18.38	-6.3

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