

Events of ductile and brittle deformations and paleomagnetic rotations within a few million years interval in the Pohorje area, Slovenia

László Fodor¹, Emő Márton², Marko Vrabec³, Bogomir Jelen⁴, Mirjam Vrabec³, Balázs Koroknai⁵

¹ MTA-ELTE Geological, Geophysical and Space Science Research Group of the Hungarian Academy of Sciences at Eötvös Loránd University, Hungary, lasz.fodor@yahoo.com

² Geological and Geophysical Institute of Hungary, Palaeomagnetic Laboratory, Hungary, paleo@mfgi.hu

³ Department of Geology, University of Ljubljana, Slovenia, marko.vrabec@ntf.uni-lj.si

⁴ Geozavod Slovenia, Ljubljana, Slovenia, bogomir.jelen@geo-zs.si

⁵ Geomega Ltd. Budapest, Hungary, koronai@geomega.hu

We reconstructed the deformation history of the Pohorje pluton, related subvolcanic rocks and surrounding sediments in NE Slovenia. Methods involved classical field structural measurements, microtectonic observations in thin sections and different approaches of paleomagnetism. Particularly, we compared the main directions of deformation and the main axis of the anisotropy of magnetic susceptibility (AMS). We extended and reinterpreted our existing data base of Márton et al. (2004).

The granodioritic-tonalitic Pohorje pluton suffered ca. greenschist-facies ductile deformation, which is recorded by AMS and structural fabric. The deformation shows varying style within the pluton; extensional in the south and strike-slip type in the northern parts, respectively. Sub-horizontal (S) and steep foliation (N) is well developed while ENE–WSW (S) and SSE–NNW (N) lineation are recorded by stretched minerals and K1 AMS axis. This deformation occurred just after intrusion at 18.6 Ma, during the imminent cooling of the plutonic rocks (Fodor et al. 2008). After this event, the pluton underwent ca. 70° clockwise rotation, certainly before the onset of sedimentation of Karpatian age (17.3 Ma).

During the CW rotation, and slightly after, at ca. 18-17 Ma, the pluton was intruded by diverse, mostly andesitic and aplitic dykes. The AMS indicate ca. E–W minor extension, which is sub-perpendicular to the dykes themselves. In the same time, the Karpatian sediments suffered very early deformation, still at horizontal position. NE–SW or E–W extension was recorded by AMS, and also by pre-tilt normal faults which are associated with macroscopically ductile fault-related folding.

Finally, the last event of ca. 17-16 Ma could be the intrusion of subvolcanic dacitic dykes which show very slight magnetic anisotropy corresponding to dyke emplacement.

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References:

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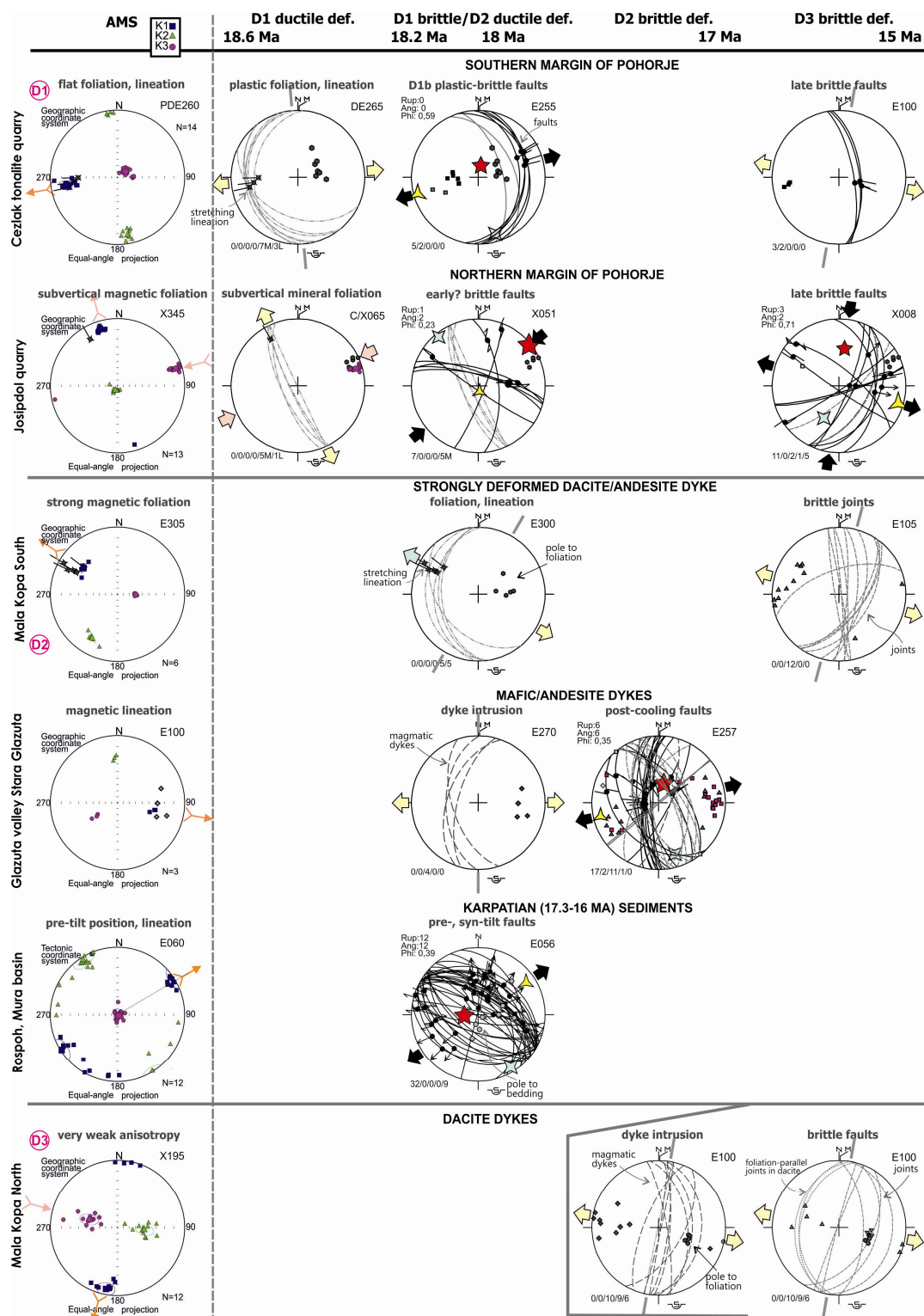


Figure 1: Comparison of AMS and structural data from the Pohorje pluton, related dykes and Karpatian sediments. For D1 and D2 deformation phases note the similarity in orientation of K1 anisotropy axes and of extensional directions deduced from plastic or brittle structures. Structural data: Schmid net, lower hemisphere projection. Upper right corner: deformation style (C: compression, X: strike-slip, E: extension) and direction of maximum horizontal stress axis (for C, X) and minimum stress axis (for E). Left lower corner: number of striated faults/non-striated faults/joints/mineral veins/bedding /metamorphic foliations/lineations. Left upper corner: number of misfitting data using two misfit criteria in stress calculations. Phi: ratio of stress axes, $\sigma_2 - \sigma_3 / \sigma_1 - \sigma_3$.