

# The CANTUS Database: Progress Report

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**Abstract:** The CANTUS database provides indices of chant manuscripts for the Office in both electronic and printed formats. The database was developed in the 1980s at the Catholic University of America under the leadership of Ruth Steiner. The goals and basic structure of the project remain true to the vision of its founder; however, since the move to Canada there have been some changes in format and presentation of the data. This progress report is the first official presentation of these alterations. Seventy-one liturgical books have been indexed. The centre of distribution is the project's website at <http://publish.uwo.ca/~cantus/>. The database consists of indices that indicate the actual contents of individual sources. The project has proven useful in a variety of fields including liturgical chant, early music, medieval liturgy, hagiography, and ecclesiastical history.

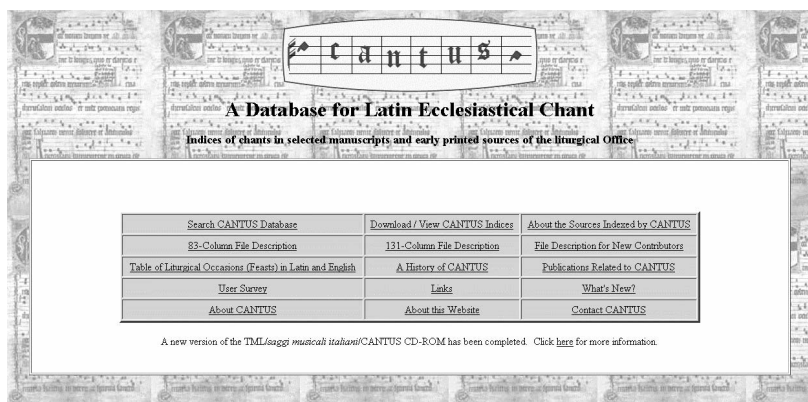
**Keywords:** liturgical books, liturgical chants, mediaeval liturgy

A formidable challenge in the study of the chant of the medieval Office is the very large number of surviving sources and their considerable contents. Each hand-copied manuscript, which regularly may contain thousands of chants, is unique and testifies to the tradition of a specific time and place. Although the liturgy in the various antiphoners and breviaries is often similar from one book to another, the ordering, selection, and placement of specific chants can differ substantially. Owing to the volume of material and variability in arrangement, there is clearly a need for tools to assist in research involving these sources. The CANTUS database provides indices of chant manuscripts for the Office in both electronic and printed formats and has become an increasingly useful research tool for chant scholarship over the past decade.

CANTUS was developed in the 1980s at the Catholic University of America under the leadership of Ruth Steiner, and has been based since 1997 at the University of Western Ontario under the direction of Terence Bailey. The goals and basic structure of the project remain true to the vision of its founder; however, since the move to Canada there have been some changes in format and

presentation of the data, most of which were necessary owing to the growth of the database. This progress report is the first official presentation of these alterations.

Seventy-one liturgical books have been indexed so far. The main centre of distribution is the project's website<sup>1</sup> at <http://publish.uwo.ca/~cantus/> (see *Figure 1*). The indices can be searched online, or users can extract and download them from the database free of charge. The indices can be imported easily into word processing or database programmes for viewing and manipulation. CANTUS indices are also available from other sources: several have been published in print,<sup>2</sup> and a new CD-ROM containing the CANTUS database was completed last winter in cooperation with *Thesaurus Musicarum Latinarum*.<sup>3</sup>



*Figure 1: CANTUS homepage*

The CANTUS format is well known to many chant scholars. Each record in the database, or line in a printed version of an index, represents an individual chant in a particular source. The database currently contains 230,234 records. The most complete versions of the indices are those with 131 columns, or characters, per line (*Figure 2*). Each line is divided into sixteen fields in the database format; the fields contain information for each chant such as folio, liturgical occasion, incipit, mode, Office, genre, and so on. Complete descriptions of the contents of each field can be found on the website through the links to the “83-Column File Description” and the “131-Column File Description” (see *Figure 1*).

<sup>1</sup> A brief history of the development of CANTUS is given on the website, as well as a general explanation of the project—a particularly useful starting point for those who may not be familiar with CANTUS. The “What’s New” link provides announcements of updates to the files and to the site.

<sup>2</sup> See <<http://publish.uwo.ca/~cantus/publicant.html>> for details.

<sup>3</sup> <http://www.music.indiana.edu/tml/start.html>.

004rDom. 1 Adventus	In illa die stillabunt*	*	GBEMVHRDFS	cao3244	V A
004rDom. 1 Adventus	Ostende nobis domine*	*	C	Lcao8166	V W
004rDom. 1 Adventus	Spiritus sanctus*	*	GBEMVHRDFS	Lcao5006	V A M
004rAndreae	Spiritus sanctus*	*	GBEMVHRDFS	Lcao5006	V A R
004rAndreae	Ostende nobis domine*	*	C	Lcao8166	V W R
004rIn tempore Adventus	Regem venturum dominum venite	G	*CGEE VHR	cao1149	M I
004rDom. 1 Adventus	Missus est Gabriel angelus ad	GcG1C	GBEMVHRDFS	Lcao3794	M A1.1
004rDom. 1 Adventus	Ave Maria gratia plena	DaE1C	GBEMVHRDFS	Lcao1539	M A1.2
004rDom. 1 Adventus	Ne timeas Maria invenisti	GcG1	GBEMVHRDFS	Lcao3863	M A1.3
004rDom. 1 Adventus	Ostende nobis domine	r C		Lcao8166	M W1.

Figure 2: The first ten reports of *Città del Vaticano (Rome), Biblioteca Apostolica Vaticana, San Pietro B. 79*

The website's prized feature is a powerful search engine which extracts chants either by the first few words of their text incipit, keywords from the incipit, or their "Chant Identification Number." (See *Figures 3, 4, and 5*.) Searches can also be made on the name of the liturgical occasion, also known as "feast". Each index is accompanied by a concise description of the source and its contents.<sup>4</sup> The website also includes a full list of the Latin and English names of the liturgical occasions employed in the database, as well as some introductory information about CANTUS.

Figure 3: The "Search" feature

<sup>4</sup> These manuscript details are available through clickable links from <http://publish.uwo.ca/~cantus/mssindex.html>. See "About the Sources Indexed by CANTUS" on the homepage.

**Search Results for**  
**Incipit stella maris**

Total found: 22  
To see details do one of the following:

- To see one chant:  
Click on the incipit.
- To see several chants:  
Click the check boxes in front of the chants,  
then click one of the *Display*  
*Selected Chants* buttons.

**Display Selected Chants**

Chant ID	Incipit	Siglum
<input type="checkbox"/> ton0435	<a href="#">Stella maris apellaris operum</a>	B-TO 63
<input type="checkbox"/> ton0435	<a href="#">Stella maris apellaris operum</a>	B-TO 64
<input type="checkbox"/> gra0839	<a href="#">Stella maris fulgida*</a>	A-Gu 30
<input type="checkbox"/> klo0737	<a href="#">Stella maris mundi tenebras</a>	A-KN 1012
<input type="checkbox"/> klo0737	<a href="#">Stella maris mundi tenebras</a>	A-KN 1018
<input type="checkbox"/> klo0737	<a href="#">Stella maris mundi tenebras</a>	A-KN 589
<input type="checkbox"/> kra0667	<a href="#">Stella maris O Maria</a>	SI-Lua 18
<input type="checkbox"/> klo0698P	<a href="#">Stella maris O Maria tibi</a>	A-KN 1010
<input type="checkbox"/> klo0698P	<a href="#">Stella maris O Maria tibi</a>	A-KN 1011
<input type="checkbox"/> klo0698P	<a href="#">Stella maris O Maria tibi</a>	A-KN 1012
<input type="checkbox"/> klo0698P	<a href="#">Stella maris O Maria tibi</a>	A-KN 1015

Figure 4: Sample search results

**Details**

**Stella maris mundi tenebras, R, A-KN 1012**

Incipit [Stella maris mundi tenebras](#)

Siglum [A-KN 1012](#)

Location [065r 05](#)

Occasion [Nativitas Mariae,8](#)

Office [M](#)

Genre [R](#)

Position [1](#)

Mode [6](#)

Differentia

Chant ID [klo0737](#)

Concordance

Addendum

**Back**

**Main Search Page**

Figure 5: Sample search detail

When CANTUS came to the University of Western Ontario in 1997, the forty-four inherited indices were imported into the database programme *Access* and the staff began to rewrite as *Access* queries the electronic proof-reading programmes which had been previously run on a mainframe computer in rather outdated COBOL machine language routines. The files were thoroughly checked electronically and some inconsistencies such as non-standard spellings and what was termed “line noise” were uncovered and normalized. In 1999, the genre letter for versicles was changed from a lower-case “v” to an upper-case “W”, since *Access* is not automatically case-sensitive in its commonly-used programmable queries, and the website search feature to restrict by genre could not differentiate between the upper-case “V”, used for the verses of responsories and antiphons, and lower-case “v”, used for versicles. Later, the field name “CAO Number” was changed to “Chant ID Number” to acknowledge the increasing number of chants not included in *Corpus Antiphonalium Officii*, the standard reference source by René-Jean Hesbert.<sup>5</sup> Most of the “non-CAO” chants in the database are those of saints’ feasts and rhymed Offices. The “feast” field has also been renamed the “liturgical occasion” field.

In 2001, the field for “Chant ID Numbers” was lengthened from five to eight characters. Formerly, this field contained a CAO number of four digits plus a suffix, if applicable, of one character. For non-CAO chants, the field contained a source code of one character, a chant number of three digits which was unique for each source, that is, not carried across indices (with the exception of manuscripts from the same tradition, such as a pair of antiphoners from the same liturgical centre), and a space for a suffix. A change was required for the indices of the antiphoner pair *Ljubljana, Nadškofijski arhiv (Archiepiscopal Archives)*, 17 and 18, in which there are more than 1000 non-CAO chants, the most accommodated by the three-digit numbering system just described. Even so, an adjustment to the method of identifying non-CAO chants was inevitable since, with reference to the source codes of one character, each letter of the alphabet was already in use in upper-case, and several were duplicated in lower-case. If the database were to continue to grow, a way to increase the number of available source codes needed to be found. The enlarging of the “Chant ID Number” field solved these problems. The field now contains a source code of three letters,<sup>6</sup> allowing for thousands of unique manuscript identifiers,<sup>7</sup> and a chant code of four digits: this code is either the CAO num-

<sup>5</sup> René-Jean Hesbert, ed., *Corpus Antiphonalium Officii*, 6 vols. (Rome: Herder, 1963–1979).

<sup>6</sup> Lower-case letters were adopted to visually distinguish the beginning of the “Chant ID Number” from the end of the manuscript concordances in the previous field.

<sup>7</sup> Chants which are included in CAO are prefaced by the letters “cao”.

ber, or a unique non-CAO number,<sup>8</sup> 9999 of which can now be assigned in a single source.

The most recent change to the format was the removal of the initial “S”s from the saints’ names in the Liturgical Occasion field. Although this deviates from the style set by Hesbert in CAO, there are two benefits: searching and/or sorting by feast name online or in a downloaded file is now much simpler since saints’ names no longer all start with “S”; and the removal of the “S”s allows for space to create more detailed descriptions of the liturgical occasions and to lengthen previously abbreviated words.

Finally, in consideration of the future of the database, the name of the project has been changed from “A Database for Gregorian Chant” to “A Database for Latin Ecclesiastical Chant” in order to include other repertories. For example, a recent addition to the database was an index of the Vatican manuscript, San Pietro, B.79,<sup>9</sup> the well-known representative of the so-called “Old Roman” tradition.

The current focus of CANTUS is to continue indexing as many sources as possible. As mentioned earlier, the database currently holds the contents of seventy-one sources – an initial target of 100 was proposed by the founders of CANTUS. We are keen to improve the database as it grows, as attested to by our occasional remodeling of the format. We often receive suggestions from users and indexers, and have been able to implement some. For example, the “Search by Feast Name” feature on the website grew out of a discussion at the Hagiography Society session at the International Congress on Medieval Studies at Kalamazoo in May 2000. Even so, we have decided that, despite limitations of the current format and temptations to include additional information in each chant record, it is still better at this point to index more sources. CANTUS also maintains an advisory panel consisting of several well-known chant scholars, who on occasion provide input in the manner of suggestions of important sources to include in the database and general improvements to the project.<sup>10</sup>

If funding were available to hire more researchers, we might consider including a second “incipit” field for the actual reading in the manuscript, preferably with the full text of each chant but at least showing the spelling of the incipit in the original source. The current “incipit” field could then conform exactly to the standardized CAO text, and therefore provide greater ease

<sup>8</sup> The previously assigned numbers for chants not found in CAO were adopted into the new numbering system with the addition of a leading zero.

<sup>9</sup> *Città del Vaticano (Roma), Biblioteca Apostolica Vaticana, San Pietro B.79.*

<sup>10</sup> The panel includes Terence Bailey, Rebecca Baltzer, Margot Fassler, David Hughes, Alejandro Planchart, Anne Walters Robertson, Alma Santosuosso, Ruth Steiner, and Tom Ward.



in searching. Currently, spellings are standardized but word order and case endings remain those of the manuscript.<sup>11</sup>

It has long been thought that full texts instead of merely incipits would be helpful. If full texts for all records were to be realized, however, all manuscripts would need to be reindexed to ensure accuracy in content, such as word ordering, case endings, and other features. The present solution for those desiring electronic versions of the full texts is to download the CAO antiphons and responsories from the *Cantus Planus* website.<sup>12</sup> The best source for the full texts is, of course, the original documents, and it is expected that scholars working with CANTUS will refer directly to the original manuscripts, films or facsimiles since the indices are merely research tools and not critical editions.

It has often been suggested that the greatest deficiency in the indices is the lack of detailed information on the melodies of the chants. The possibility of including either letter notation, scanned-in images of neumes, or some other indication of the melodies has been considered at various times. However, all these methods are either extremely time-consuming or excessively costly with regard to memory storage on the website server. Again, CANTUS is a research tool; the high degree of interpretation involved in deciphering neume forms and melody types is, at this point, best left with individual scholars.<sup>13</sup>

A consistent numbering system for “non-CAO” chants would be of great benefit to many researchers. Such a system would, however, require an enormous number of working hours and a high degree of late-Medieval Latin expertise. The current “non-CAO” incipits cannot merely be sorted and renumbered; their full texts would have to be confirmed since some texts that are different begin in a similar way. Such a task would require careful editing and textual analysis with respect to wording differences among manuscript sources to ensure accuracy in a new table of “non-CAO” texts, and standard spellings and forms of the texts would need to be decided upon for the search functions to operate properly. Despite the challenges and after having consulted with the CANTUS staff, Ike de Loos (an independent Dutch scholar) has begun work on a preliminary non-CAO concordance and numbering system. The initial results look promising, but many more hours will need to be

<sup>11</sup> Standardized spellings are essential for searches by incipit to function properly. If individual words can be found easily, editing the data is then an efficient procedure in Access: a simple query – a short programme embedded within the database – can be written to find records that do not match, and changes can then be made where appropriate.

<sup>12</sup> [http://www.uni-regensburg.de/Fakultaeten/phil\\_Fak\\_I/Musikwissenschaft/Cantus/intro1\\_en.htm](http://www.uni-regensburg.de/Fakultaeten/phil_Fak_I/Musikwissenschaft/Cantus/intro1_en.htm)

<sup>13</sup> This said, there are ongoing and evolving research projects exploring ways of encoding chant notation in an electronic form, such as the “NEUMES” project (an acronym for NEumed Unicode Manuscript Encoding Standard) under the direction of Thomas Forrest Kelly. This project is still in its infancy, but may prove useful in the future.

invested into this project before it might be fully implemented into the CANTUS database.

In addition to the materials available on the CANTUS website, the project has engendered a body of scholarly activity. Most obvious are the introductions in the series of indices published in print by the Institute of Mediaeval Music in Ottawa, Canada.<sup>14</sup> The Institute has also published facsimiles of some of the manuscripts indexed by CANTUS. These introductions contain varied commentary on selected manuscripts in the database. In the latest volume, an index of four antiphoners from Salamanca, James Boyce discusses the ecclesiastical and liturgical history of this diocese and its cathedral chapter and provides analysis of the antiphoners' contents. Indices have also been published outside of the CANTUS series. One example is by Lisa Fagin Davis in her book on the Gottschalk antiphoner fragments.<sup>15</sup> In her analysis, Davis uses the database (along with other sources) to isolate unique chants and Offices.

Lora Matthews and Paul Merkley have recently used the CANTUS index of Piacenza 65<sup>16</sup> to compare the manuscript's assignment of *differentiae* to that of some tonaries.<sup>17</sup> Interest in analyzing *differentiae* was indeed one of the impulses that led to the creation of the CANTUS database, as Ruth Steiner has related in a presentation on the origins of the project.<sup>18</sup> Matthews and Merkley also search CANTUS for antiphons that have conflicting modal assignments in tonaries. The quick access to the location of the fully notated chants in the manuscripts provided by the index aid them in considering reasons for the conflicts. Steiner has also referenced the database in a recent study of *differentiae* for antiphons with Gevaert's Thème 29.<sup>19</sup>

In an article of 1999, Ike de Loos quotes excerpts from the index of Utrecht 406 and uses CANTUS indices (as well as other manuscripts) to provide a

<sup>14</sup> <http://members.rogers.com/mediaeval1/>

<sup>15</sup> Lisa Fagin Davis, "The Gottschalk Antiphonary: Music and Liturgy in Twelfth-Century Lambach", *Cambridge Studies in Palaeography and Codicology*, 8 (Cambridge: Cambridge University Press, 2000). See also the index of a fragmented fifteenth-century choirbook from Spain by Debra Lacoste in *Chant and its Peripheries: Essays in Honour of Terence Bailey* (Ottawa: Institute of Mediaeval Music, 1998), and that contained with Hartmut Moeller's colour microfiche edition of "*Karlsruhe, Badische Landesbibliothek – Musikabteilung, Aug. LX*", entitled "*Antiphonarium: Karlsruhe, Badische Landesbibliothek, Aug. perg. 60*", *Codices illuminati medii aevi*, 37 (Munich: Edition Helga Lengenfelder, 1995).

<sup>16</sup> Keith Glaeske, Lila Collamore, Keith Falconer, and Richard Rice, "Piacenza, Biblioteca Capitolare 65, Printouts from an Index in Machine-Readable Form: A CANTUS Index", *Musicological Studies*, no. LV/2, with an introduction by Paul Merkley (Ottawa: Institute of Mediaeval Music, 1993).

<sup>17</sup> Lora Matthews and Paul Merkley, "CANTUS and Tonaries", in *The Divine Office in the Latin Middle Ages*, 546–560, ed. by Margot Fassler and Rebecca Baltzer (New York: Oxford University Press, 2000).

<sup>18</sup> Ruth Steiner, "Medieval Tonaries and the CANTUS Database", unpublished paper delivered at Harvard University, November 1997.

<sup>19</sup> Ruth Steiner, "Thème 29 and the Medieval System of Differentiae", *Gedenkschrift für Walter Pass*, ed. by Martin Czernin (Tutzing: Hans Schneider, 2002): 141–145.



broader European context for responsories with problematic modal assignment in the manuscript.<sup>20</sup> In a later paper, she uses the database to examine the regional affiliations of responsory verses in a group of sources representing the chapter churches of Utrecht, Aachen and Cambrai, and demonstrates how these affiliations can vary throughout the liturgical year.<sup>21</sup> With access to the database, she can also make general comments on the types of modal ordering that occur among antiphons for the feast of the Assumption.

De Loos also maintains a website (with her husband Hans Lub) on which one can search the indices, compare the chants in specified feasts or groups of feasts, compare modes of specific chants or the assignment of responsory verses in different manuscripts, and search or generate lists of chants not found in CAO.<sup>22</sup> Another electronic tool related to CANTUS is being developed by Morné Bezuidenhout in South Africa to speed up the process of creating indices.<sup>23</sup>

Creating an index is an effective way to introduce graduate students to the study of Office chant or for more seasoned researchers to familiarize themselves with the details of a particular manuscript.<sup>24</sup> CANTUS staff receive regular inquiries about procedures for submitting indices to the project and this paper will close with some general comments on the topic. A researcher with a specific manuscript in mind should contact the CANTUS office initially to ensure that the manuscript will be an acceptable addition to the database and that the work is not being duplicated by someone else. CANTUS staff can also

<sup>20</sup> Ike de Loos, "The Transmission of the Responsoria Prolixa According to the Manuscripts of St. Mary's Church Utrecht", *Tijdschrift van de Koninklijke Vereniging voor Nederlandse Muziek Geschiedenis* (1999/1): 5–31.

<sup>21</sup> de Loos, "The Transmission of Office Chants in the Low Countries: The Distribution of Responsory Verses", *Cantus Planus: Papers Read at the 10th Meeting, Visegrád Hungary, 2000* (Budapest: Institute for Musicology of the Hungarian Academy of Sciences, forthcoming).

<sup>22</sup> [http://www.let.uu.nl/ogc/cantus/HTML/CANTUS\\_index.htm](http://www.let.uu.nl/ogc/cantus/HTML/CANTUS_index.htm)

<sup>23</sup> *The Cantus Index GUI* is a visual interface that facilitates the creation of plainchant database indices. The project presently focuses on Office manuscripts and is based on the file structure and content of the CANTUS project at the University of Western Ontario. It enables the user to search for and copy data from close-matching records in electronic plainchant resources (at present the Cantus Index SDF files and a revision of the electronic CAO that has appeared on the Cantus Planus Archiv website), thereby eliminating the unnecessary input of existing data.

<sup>24</sup> Steiner has described the benefit of preparing indices: "Making a CANTUS index enables a student (and his advisor) to focus on the most individual features of a source ... When he has finished his index, he knows how many different invitatory tones there are, and what they are. He knows how many and which responsory verses are sung to original melodies rather than tones. He knows which offices in the sources appear to be unique or have unusual features. He knows whether or not the *Tonus Peregrinus* is ever called for. He knows whether there are any fully notated psalm tones. All of these are matters on which the student becomes expert in the course of his work, and any of them has the potential to be developed into a publication, or at least an element in one. At present we have very little of this kind of information concerning individual sources apart from what can be gleaned from CANTUS files." (Ruth Steiner, "Scholarship Concerning the Divine Office in the 21st Century", unpublished paper delivered at the 2000 meeting of the American Musicological Society in Toronto.)

suggest possible projects to interested researchers. The indexer will need prolonged access either to the manuscript itself, a readable microfilm, or facsimile. A microfilm copy or facsimile will also have to be made available to CANTUS staff for the duration of the proofreading process, which can take a number of months. The indexer must also have prolonged access to volumes 3 and 4 of CAO, so that the full text of each chant can be carefully checked. This is a lengthy task, but it is necessary to maintain the integrity of the files. The full texts of the CAO responsories and antiphons are available on the Internet,<sup>25</sup> but other chants have to be checked with the printed edition of CAO.

The format for indices is detailed on the CANTUS website. CAO concordances and the “Liturgical Occasion” codes can be added electronically by the CANTUS staff, so indexers need not include these in their submissions. Indices can be compiled in database tables using fixed-width fields or in word-processor files.

The CANTUS database consists of indices that indicate the “actual” contents of individual sources, as far as that is possible, rather than indices that reconstruct the liturgy of a particular place or religious Order. The value in CANTUS as a research tool lies in this “Table of Contents” approach. Our focus is on directing researchers to the individual chants of the sources to save them valuable time and effort in their own research. Therefore, we do not fill in lacunae in a manuscript with chants from other sources and we only include items in the index that are actually listed in full or in incipit in the source. For example, if on Pentecost, a source indicates that the antiphons of Lauds are used throughout the octave, but does not give these chants or their incipits again on any of the days of the octave, then the antiphons are only included in the index on the Sunday.

Although there is a detailed procedure for the indexing of sources, some flexibility in the manner of data entry is possible. Two fields, named “extra” and “addendum”, can be used for additional information. Also, on occasion, methods of data entry have been adjusted. For example, since the antiphons and responsories of San Pietro B.79, the “Old-Roman” source mentioned earlier, are not restricted to the eight church modes, we included in the “mode” field the letter-names of the finals rather than mode numbers. For antiphons, the reciting tone (as shown by the *differentia*) is included.

At all stages of the process, indexers are strongly encouraged to maintain contact with CANTUS staff. Much undue effort has been spent by indexers working in isolation; staff members will tackle all types of questions.

<sup>25</sup> See the Cantus Planus website: [http://www.uni-regensburg.de/Fakultaeten/phil\\_Fak\\_I/Musikwissenschaft/cantus/intro1\\_en.htm](http://www.uni-regensburg.de/Fakultaeten/phil_Fak_I/Musikwissenschaft/cantus/intro1_en.htm).

Once completed and submitted to CANTUS staff, new indices undergo a thorough manual and electronic proofreading process. After their inclusion in the database, files are occasionally revised to accommodate changes in policy and to correct any errors. Such changes are documented on the “What’s New” page of the website.

CANTUS has grown into a major international collaborative endeavour with submissions of new indices from scholars around the world. Indices have been consulted and downloaded by users across Europe, in North and South America, South Africa, Australia, New Zealand, Hong Kong, Japan, and Israel. The UWO server measured over 13,000 accesses to the website in the month of January 2002, and approximately the same number in February 2002.<sup>26</sup> The project has proven useful in a variety of fields including liturgical chant, early music, medieval liturgy, hagiography, and ecclesiastical history.

Leading academics have attested to the significance of CANTUS to chant scholarship. It provides opportunities for researchers from around the world to work together and to exchange ideas. It has given young scholars the chance to contribute meaningful research and taught them skills which will be applicable throughout their careers. And, we hope it continues to motivate scholars at all levels to use technologies such as personal computers, databases and the Internet to gain new insight into the medieval Office.

<sup>26</sup> These Web Access figures do not include .gif image files.