

A Database of Melting Experiments: Compiling Decades of Research to Facilitate New Knowledge Discoveries in the Geosciences

Maria Luisa Crawford and Drew Mirante (Bryn Mawr College)

Metamorphic petrology, like many disciplines within the geosciences, does not have any type of standards for reporting data or the handling of metadata. This situation limits the usefulness of computers for data analysis and hinders the scientist from potentially making new science discoveries. To address this problem, we have developed a simple but powerful database that contains the records of melting experiments from the scientific literature. This database was created to demonstrate that it is possible to collect and group disparate data from the literature in a way that promotes data sharing, use, and preservations within the geoscience community.

The tables in the experimental database are grouped in a way similar to that suggested by Staudigel et al. (2003) so that the database is scalable as more data are added. Currently, there are almost 1500 experiments registered with a total number of records nearing 300,000. These records contain all the information about the experiments; including the intensive variables and the abundance and composition of the resultant assemblages. Over the last year, we have begun to add partition coefficients for minerals and coexisting melts in an effort to broaden the scope of the database.

Currently, the database is in Microsoft Access™ format. We have been working with our colleagues in Computing Services at Bryn Mawr College to migrate the database to MySQL on the GEON point of presence node similar to that of the Ghioriso et al (2002) pMelts database. We have had success migrating a smaller database donated by the Delaware Geologic Survey and expect to have a queryable version of the experimental database online soon.

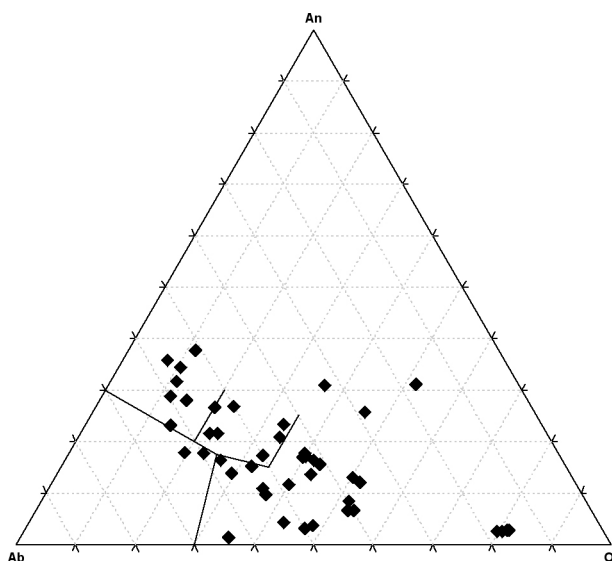


Figure 1. Ab-An-Or normative diagram showing glass compositions in experiments that also contain garnet.

The goal of this database is to provide scientists and other interested parties with access to information. To that end, we have also developed a tool that allows for instant visualization of information from the experimental database -an open-source Applet written in the Java programming language that allows users to plot their geological data on a ternary diagram via a web page (Ionescu and Mirante, 2006). Shown in Figure 1 is data from the experimental database that was queried and plotted in a single step.

Our database has been designed to evolve and grow as more research is done and data become available. This database contains information that had been heretofore scattered throughout the scientific literature. Our goal is more than a quality database. We envision a scenario where a diverse user community can also contribute data as well as use data already on-line via the GEON Portal.

References:

- Ghiorso, Mark S., Hirschmann, Marc M., Reiners, Peter W., and Kress, Victor C. III. 2002. The pMELTS: A revision of MELTS aimed at improving calculation of phase relations and major element partitioning involved in partial melting of the mantle at pressures up to 3 GPa. *Geochemistry, Geophysics, Geosystems* v. 3, n. 5.
- Ionescu, C.A. and Mirante, D.C., 2006. Online creation of ternary diagrams using the Java™ programming language. *Geological Society of America, Abstracts with Programs*, v. 38, n.7, p. 142
- Staudigel, H. and 10 others. 2003. Electronic data publication in geochemistry. *Geochemistry, Geophysics, Geosystems*. v. 4, n. 3