# Compilation of Geochemical Databases

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**GEOROC**: GEOROC (Geochemistry of Rocks of the Oceans and Continents) is intended to become a global geochemical database containing published chemical and isotopic data as well as extensive metadata for rocks, minerals and melt/fluid inclusions.
http://georoc.mpch-mainz.gwdg.de/georoc/

**Focus**
- compositions of igneous materials from convergent margins, oceanic islands, and large igneous provinces

**Geographic coverage**
- global (oceans and continents)

**Earth materials**
- volcanic igneous rocks
- plutonic igneous rocks
- mantle xenoliths
- volcanic glasses
- metamorphic rocks (not emphasized)
- sedimentary rocks (not emphasized)
- minerals (from rocks and veins)
- inclusions (glass, mineral, and fluid)

**Strengths**
- data is easily searchable by tectonic setting, geographic region, igneous province, and in many cases volcanic field or igneous suite
- lots of precompiled datasets arranged by tectonic setting, geographic location, and rocktype

**Limitations**
- age data is only included if it is mentioned in the original reference, hence the number of samples with quantitative age information is lacking
- the tabulated isotopic compositions are of limited use because of the lack of age information (e.g., initial isotopic ratios are not available)

**Downloading options**
- Excel-compatible comma-separated textfiles
- HTML files

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**PETDB**: PETDB provides an interactive petrological database of the **ocean floor**.
http://earthchem.org/petdb

**Focus**
- compositions of igneous materials from the ocean floor

**Geographic coverage**

- global (ocean floor)

**Earth materials**

- volcanic igneous rocks
- plutonic igneous rocks
- volcanic glasses
- mantle xenoliths
- metamorphic rocks (not emphasized)
- minerals
- glass inclusions

**Strengths**

- data is easily searchable by tectonic setting, geographic region, and in some cases igneous suite
- precompiled datasets include global rock data grouped by chemical element, and MORB data grouped by region

**Limitations**

- the database is mainly limited to samples of approximately zero age

**Downloading options**

- Excel-compatible comma-separated text files (.csv format)
- HTML files

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**MetPetDB**: MetPetDB is a database for metamorphic petrology that is being designed and built by a global community of metamorphic petrologists in collaboration with computer scientists at Rensselaer Polytechnic Institute as part of the National Cyberinfrastructure Initiative and supported by the National Science Foundation.
http://metpetdb.rpi.edu/metpetweb/#home

**Focus**

- Petrologic and geochemical data for metamorphic rocks, including spatial context for data

**Geographic coverage**

- global - dependent on user entries

**Earth materials**

- metamorphic rocks

**Strengths**

- Searchable database of metamorphic rocks by rock types, metamorphic grade, location, minerals, chemistry, provenance
- Allows for correlation of geochemical data with spatial context
- Easy to upload data from spreadsheets into database
- Allows users to enter and regulate public availability of data sets

**Limitations**

- Unable to have multiple users separately log into and share access to private datasets

**Downloading options**

- Excel-compatible tsv textfiles

- Google Earth compatible kml files

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**NAVDAT**: The wester North America Volcanic and Intrusive Database: The NAVDAT project is compiling existing age, chemical, and isotopic data from Late Cretaceous to Holocene extrusive and intrusive igneous rocks from the western United States, British Columbia, and northern Mexico into a web-accessible electronic database
http://www.navdat.org

**Focus**
- ages and compositions of Cenozoic igneous rocks from western North America

**Geographic coverage**
- western U.S., western Mexico, and British Columbia

**Earth materials**
- volcanic igneous rocks
- plutonic igneous rocks

**Strengths**
- every sample is accompanied by quantitative age data. This makes it ideal for examining and plotting space-time-composition trends
- contains an automated feature that generates maps

**Limitations**
- not easily searchable by tectonic setting, geographic regions smaller than states or provinces, or by igneous province or suite
- no precompiled files other than those obtained from queries (not really a problem, though)

**Downloading options**
- Excel-compatible tab-delimited textfiles
- HTML tables
- maps of sample locations
- major element variation ("Harker") diagrams
- total alkali vs. silica (TAS) diagrams (used for rock classification)
- geology, elevation, gravity, and magnetic GIS coverages for western states

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**LEPR**: LEPR is a database of results of published experimental studies involving liquid-solid phase equilibria relevant to natural magmatic systems.
http://lepr.ofm-research.org/YUI/access_user/login.php

**Focus**
- composition of minerals and melts from laboratory experiments
- digitized metadata for each experiment

**Strengths**

- only database of strictly experimental results
- strong search options, including compositional indices, CIPW norms, and mineral formulas.
- Good plotting capabilities and extensive on-line help.
- Can search the EarthChem databases to find rocks similar to experimental run products
- Become a LEPR data contributor. Add your own data to LEPR or help us expand the scope of LEPR and maintain a current data collection (see below).
- Extensive discussion forum
- Access to list of Papers in queue for entry into LEPR.
- REST-based web services that permit remote access to the LEPR database.

**Limitations**

- restricted to liquid-melt equilibria, does not include solid-fluid or solid-solid phase equilibria results **(stay tuned for future ENKI database! http://www.enki-portal.org)**
- addition of new experimental data requires manual file sharing. Last database update was 10/23/2011

**Downloading options**

- Excel workbooks

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**GERM**: Geochemical Earth Reference Model: This database contains summary data on the geochemistry of all reservoirs in the Earth. All search results are customizable, allowing the user to sort and convert units and to download the data in a format of your choice with one click. This relational database only includes peer-reviewed data.
https://earthref.org/GERM/

Also includes a database of published partition coefficients for elements between earth materials: https://earthref.org/KDD/

**Strengths**

- Widest range of Earth reservoirs in any one database

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**Strabospot**: Strabo is a database in development for structural geology and tectonics data. It includes the capability to collect and enter a variety of data in the field using a mobile device. Data such as GPS coordinates, measurements of orientations of features, and images captured using the device directly can be coupled with entries of observational data such as rock type, deformation feature type, etc. to create a virtual field notebook. This database is designed ultimately to interface with other online databases.
https://strabospot.org

**Focus**

- Structural geology data

- Data that can be collected in the field

**Geographic coverage**

- global - dependent on user entries

**Earth materials**

- metamorphic rocks
- sedimentary rocks
- igneous rocks

**Strengths**

- Ability to incorporate data collected directly in the field using a mobile device with other observational data
- Ultimately will interface with other online databases such as SESAR, MetPetDB, etc.

**Limitations**

- Still in development

**Downloading options**

- Excel-compatible .xls files
- Google Earth compatible kml files
- Shapefiles
- Stereonet
- Field Book

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## Compilations of Geochemical Databases

## IEDA

**IEDA:** IEDA or **Interdisciplinary Earth Data Alliance** is a community-based data facility funded by the US National Science Foundation (NSF) to support, sustain, and advance the geosciences by providing data services for observational solid earth data from the Ocean, Earth, and Polar Sciences.

IEDA systems serve as primary community data collections for global geochemistry and marine Geoscience research to support the preservation, discovery, retrieval, and analysis of a wide range of observational field and analytical data types, enabling these data to be discovered and reused by a diverse community now and in the future. IEDA provides free and open access to all data holdings.

IEDA *data collections* and *tools* are developed based on an active understanding of the practices, needs, and concerns of their user communities, through an open and responsive dialog, engaging investigators in the design of the systems, seeking their feedback, and

educating the community about responsibilities and benefits of scientific data management and sharing.

IEDA is a partnership between EarthChem and the Marine Geoscience Data System (MGDS). EarthChem and MGDS systems include the geochemical databases PetDB and SedDB, the geochemistry data network EarthChem, the Ridge2000 and MARGINS Data Portals, the Academic Seismic Portal field data collection, the Antarctic and Southern Ocean Data System, the Global Multi Resolution Topography synthesis, and the System for Earth Sample Registration SESAR.

## EarthRef.Org

https://earthref.org

Clearinghouse of Earth Science reference data and models including GERM, Magnetics Information Consortium (MagIC), the Seamont Biogeosciences Network (SBN) and Enduring Resources for Earth Science Education (ERESE). Sponsored by NSF EAR 0000998
Webservices and Database Support by the San Diego Supercomputer Center
Supported by Scripps Institution of Oceanography and the College of Earth, Ocean and Atmospheric Sciences.

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## Relevant Courses and Education Tools r.e. Geochemical Databases

pdf of SERC short course on geochemical databases:
http://www.earthchem.org/sites/earthchem.org/files/Shortcourse-Tutorial_2008.pdf

SERC list of example exercise and activities using geochemical databases:
https://serc.carleton.edu/research_education/cyberinfrastructure/examples.html