GeoReM, a cornerstone of solid geoanalytical research: the legacy of Klaus Peter Jochum and future developments in a modern and safe database structure

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GeoReM, the database of geological and environmental reference materials was founded in 2005 by Klaus Peter Jochum (1944-2024) and curated by him and dedicated colleagues at the MPIC Mainz [1]. His strong commitment to metrology, his recognition of the importance of well-characterised reference materials and his energy in driving this project forward have made GeoReM a unique and indispensable tool in geoanalytical research.

Recently, the IAG (International Association of Geoanalysts) and the DIGIS team (University of Göttingen), have joined forces to build a sustainable environment for GeoReM by integrating it into the DIGIS|GEOROC database structure. This will safeguard existing data and enable continued data curation.

In the future we strive to develop new tools for database curation and data analysis:

- An expert user interface for GeoReM via API,
- Monitoring data entry for accuracy (spurious errors) using a range of quality criteria,
- Advanced filters to select and screen data according to various criteria,
- Implementation of outlier tests in relation to the analytical techniques used,
- Providing method-specific robust statistical analysis tools.

Another important feature will be the restoration of interconnectivity with the GEOROC database and, in the future, with other geoscientific and environmental databases. Further, we aim to serve the scientific community in the future by providing quality-controlled, assembles of recommended analytical values of a large range of reference materials for automated API-based integration into analytical software systems.

The implementation of a basic 'expert quality control index' for individual published geoanalytical data (sets) derived from GeoReM-based reference materials is also intended and facilitated via direct data links between GeoReM and GEOROC data bases.

A significant step in the curation of database content is the establishment of an automated system for locating relevant data records in both scientific journals and data publications in repositories. This system would be based on Large Language Models (LLMs).

These measures are pivotal in the ongoing transformation of GeoReM into a sustainable instrument for geoanalytical research.

[1] Jochum, K.P. et al. (2005) GeoReM: A New Geochemical Database for Reference Materials and Isotopic Standards. Geostandards and Geoanalytical Research 29 (3) 333-338, 10.1111/j.1751-908X.2005.tb00904.x