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## GEOROC and EarthChem: Optimizing Data Services for Geochemistry through Collaboration

Marthe Klöcking<sup>1</sup>, Kerstin Lehnert<sup>2</sup>, Lucia Profeta<sup>2</sup>, Bärbel Sarbas<sup>3</sup>, Jan Brase<sup>4</sup>, Sean Cao<sup>2</sup>, Juan David Figueroa<sup>2</sup>, Wolfram Horstmann<sup>4</sup>, Peng Ji<sup>2</sup>, Annika Johansson<sup>2</sup>, Leander Kallas<sup>1</sup>, Stefan Möller-McNett<sup>1</sup>, Mariyam Mukhumova<sup>1</sup>, Jens Nieschulze<sup>5</sup>, Adrian Sturm<sup>4</sup>, Hannah Sweets<sup>2</sup>, Matthias Willbold<sup>1</sup>, and **Gerhard Wörner**<sup>1</sup>

<sup>1</sup>Geoscience Centre Göttingen, University of Göttingen, Göttingen, Germany (marthe.kloecking@uni-goettingen.de)

<sup>2</sup>Lamont-Doherty Earth Observatory, Columbia University, Palisades, USA

<sup>3</sup>Max Planck Institute for Chemistry, Mainz, Germany

<sup>4</sup>Göttingen State and University Library, Göttingen, Germany

<sup>5</sup>eResearch Alliance, University of Göttingen, Göttingen, Germany

Geochemical data are fundamental to understanding many planetary and environmental processes – yet in the absence of a community-endorsed data culture that adheres to common data standards, the geochemical data landscape is highly fragmented. The GEOROC and PetDB databases are leading, open-access resources for geochemical and isotopic rock and mineral data that have collaborated for nearly 25 years to provide researchers with access to large volumes of curated and harmonized data collections. PetDB is a global synthesis of published chemical, isotopic and mineralogical data for rocks, minerals and melt inclusions with a focus on data for igneous and metamorphic rocks from the ocean floor, ophiolites, xenolith samples from the Earth's mantle and lower crust and tephra, operated by the EarthChem data facility. Its counterpart, GEOROC hosts a collection of published analyses of volcanic and plutonic rocks, minerals and mantle xenoliths, predominantly derived from ocean islands and continental settings. These curated, domain-specific databases are increasingly valuable to data-driven and interdisciplinary research and form the basis of hundreds of new research articles each year across numerous earth data disciplines.

Over the last two decades, both GEOROC and EarthChem have invested great efforts into operating data infrastructures for findable, accessible, interoperable and reusable data, while working together to develop and maintain the EarthChem Portal (ECP) as a global open data service to the geochemical, petrological, mineralogical and related communities. The ECP provides a single point of access to >30 million analytical values for >1 million samples, aggregated from independently operated databases (PetDB, NAVDAT, GEOROC, USGS, MetPetDB, DARWIN). Yet one crucial element of FAIR data is still largely missing: interoperability across different data systems, that allows data in separately curated databases, such as GEOROC and PetDB, to be integrated into comprehensive, global geochemical datasets.

Both EarthChem and GEOROC have recently embarked on major new developments and upgrades to their systems to improve the interoperability of their data systems. The new Digital Geochemical Data Infrastructure (DIGIS) initiative for GEOROC 2.0 aims to develop a connected platform to meet future challenges of digital data-based research and provide advanced services to the community. EarthChem has been developing an API-driven architecture to align with growing demands for machine-readable, Analysis Ready Data (ARD). This has presented an opportunity to make the two data infrastructures more interoperable and complementary. EarthChem and DIGIS have committed to cooperation on system architecture design, data models, data curation, methodologies, best practices and standards for geochemistry. This cooperation will include: (a) joint research projects; (b) optimized coordination and alignment of technologies, procedures and community engagement; and (c) exchange of personnel, data, technology and information. The EarthChem-DIGIS collaboration integrates with the international OneGeochemistry initiative to create a global geochemical data network that facilitates and promotes discovery and access of geochemical data through coordination and collaboration among international geochemical data providers, in close dialogue with the scientific community and with journal publishers.