

The AusGeochem Platform: A Tool to Unravel Earth's Evolution through 4D Geochemistry Through Seamlessly Integrating New Analytical Data with Large Public Datasets

BRYANT WARE¹, HALIMULATI ANANUER², ANGUS NIXON³, HAYDEN DALTON⁴, DR. YOANN GRÉAU, PHD², MALCOLM MCMILLAN⁴, SAMUEL BOONE⁵, FABIAN KOHLMANN⁶, WAYNE NOBLE⁶, MORITZ THEILE⁶, BRENT I.A. MCINNES¹, ANDREW GLEADOW⁵, BARRY KOHN⁴ AND SALLY-ANN HODGEKISS²

¹John de Laeter Centre, Curtin University

²Macquarie University

³The University of Adelaide

⁴The University of Melbourne

⁵University of Melbourne

⁶Lithodat Pty Ltd

Presenting Author: bryant.ware@curtin.edu.au

Decades of geochemical research have accumulated an enormous amount of data, covering nearly every corner of Earth, into databases such as PetDB and GEOROC. Today, great advancements in geochemical instrumentation have exponentially increased the global geochemistry community's capacity to produce data. Coupling increasing production with the growing availability of geochronological and geochemical data has highlighted the need for community analytical and reporting standards to allow end users to successfully interact with, and evaluate quality of large datasets drawn from multiple sources. To unlock the full potential of such large amounts of data, novel tools are needed to connect the various and numerous datasets at a global scale, through time. AusGeochem is an open-access, cloud-based geospatial data platform designed to provide researchers a single platform for the archiving, dissemination, and interrogation of global Earth Science samples and their associated data, adhering to FAIR data principles. AusGeochem allows for the integration of publicly available 'legacy' data, but also enables the seamless upload of geochemical data directly from analytical facilities, granting users full authorship and control over their data management, including minting DOIs for their datasets and IGSNs for their samples. Facilitating the capture of data at the source, promotes and streamlines public dissemination.

AusGeochem supports bulk upload of various types of geochemical datasets through specialized, bespoke data models (major and trace elements, fission track, (U-Th)/He, U-Pb, and ⁴⁰Ar/³⁹Ar, with more models in development). Each data model utilises relational schemas, unlocking the potential for seamless integration of diverse data types and numerical geoscience techniques in the future. AusGeochem also provides users with powerful on-the-fly data synthesis and visualization tools as well as direct exports to IsoplotR, enabling integration of their own

datasets with a rich framework of ever-growing public data. Combining samples with various map layers and contextual paleogeographic reconstructions provides users with a broader perspective to analyze data in a 4D framework. AusGeochem aims to serve as an active part of the research pathway, holding immense potential for advancing numerical geoscience techniques, promoting data interoperability, and driving further research and discovery in geochemistry.