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Conference Abstract

Reaching Further with Earth Science Data

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Abstract

Earth Sciences cover a broad spectrum of research fields such as petrology, sedimentology, structural geology, seismology, and geomorphology, to name a few, which aim to understand interrelated processes on the surface and in the interior of our planet. Many of the research questions studied in the Earth sciences, such as, understanding past climates, the human impact on the Critical Zone*[1], or the co-evolution of the geo- and biosphere, require interdisciplinary approaches, employing methodologies and integrating observations from diverse subdisciplines such as geochemistry, mineralogy, geophysics, and paleontology, but also increasingly from other disciplines, specifically biology and genomics. The use of data and samples in multi- and interdisciplinary research is substantially facilitated by consistent metadata including schemas and vocabularies, data formats, and data exchange protocols.

The association of Biodiversity Information Standards (TDWG) with the Earth Science part of the Natural Sciences has, until recently, been largely limited to palaeontology, primarily due to its close affinity with biology. Standards have been developed that support the taxonomy of fossils and include terms for "deep time" intervals (chrono- and bio-stratigraphy) and "paleo-surface environment" (sedimentology). Other important and highly relevant fields such as mineralogy, geochemistry, meteoritics, and soil sciences have not been included or coordinated with so far. Although some progress is being made with the ongoing development of the Mineral Extension for Darwin Core and the inclusion of some geological terms in Latimer Core (Woodburn et al. 2022), more effort should be made to link and align with existing and emerging data standards in these Earth Science communities. These Earth Science communities are very active, building their own

domain-specific FAIR (Findable, Accessible, Interoperable, Reusable) data standards and infrastructures with data systems such as EarthChem, the Astromaterials Data System, Mindat, and WoSIS.

We will introduce the users, data systems, and community standards and best practices, including metadata, vocabularies, and persistent identifiers for data and samples being used and developed in the subdisciplines of the Earth Sciences mentioned above. We advocate for collaboration and coordination with these fields to make TDWG more inclusive, expand accessible resources, and provide an opportunity for TDWG to link to these other communities. Broader networking within an interdisciplinary research framework has the potential to address more fundamental and over-arching issues of both scientific and public relevance.

Keywords

geology, Mineral Extension for Darwin Core, mineralogy, geochemistry, soil science

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Conflicts of interest

The authors have declared that no competing interests exist.

References

- Woodburn M, Buschbom J, Droege G, Grant S, Groom Q, Jones J, Trekels M, Vincent S, Webbink K (2022) Latimer Core: A new data standard for collection descriptions. Biodiversity Information Science and Standards 6 https://doi.org/10.3897/biss.6.91159

Endnotes

*1 "The Critical Zone" is Earth's outer skin, but often defined from bedrock to treetop. This is an environment where rock, soil, water, air, and living organisms interact and shape the Earth's surface." https://criticalzone.org. Accessed 22 August, 2023.