



Benefits of Ontologies in Earth System Science

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The exponential growth of data due to technological developments along with an increased recognition of research data as relevant research output during the last decades substantiates fundamental challenges in terms of interoperability, reproducibility and reuse of scientific information. Being cross-disciplinary at its core, research in Earth System Science comprises divergent domains such as Paleontology, Marine Science, Atmospheric Sciences and Molecular Biology in addition to different types of data such as observation and simulation data. Within the various disciplines, distinct methods and terms for indexing, cataloguing, describing and finding scientific data have been developed, resulting in several controlled Vocabularies, Taxonomies and Thesauri. However, given the semantic heterogeneity across scientific domains, effective utilisation and (re)use of data is impeded while the importance of enhanced and improved interoperability across research areas will increase even further, considering the global impact of Climate Change to literally all aspects of everyday life. There is thus a clear need to harmonise practices around the development and usage of semantics in representing and describing information and knowledge.

Using Ontologies (as a formal mechanism for defining terms and their relations) can help to address this issue, especially with regard to discovery, comprehension and metadata enrichment. If used and maintained, Ontologies also encourage metadata standardisation, idealiter across Disciplines. Examples for enhanced search options include (but are not limited to): term relations for variables as well as for topics and locations; Synonyms and Homonyms; autocomplete function for search terms; support of multiple languages. Indexing of research data can be improved using Ontologies e.g. by proposing terms for variable names or measurement units. Depending on their richness, ontologies ease e.g. finding, comprehension, processing, and reuse, both for human users as well as for automatic reasoning and processing.

Ontologies can represent different levels of granularity, connecting domain specific Vocabularies as e.g. Climate Forecast conventions with generic Taxonomies for e.g. Scientific Disciplines or Funding Policies, thus extending the reach of scientific data to other user groups such as Journalists, Politicians or Citizens.

For a beneficial usage of semantic artefacts, sustainability is the key: any kind of terminology service must be maintained to guarantee that terms and relations are offered in a persistent way. But if they are, Vocabularies, Taxonomies, Thesauri and Ontologies can serve as a driving force for improved visibility and findability of research output within and across different research areas.

Why Ontologies matter, what they are, and how they can be used will be depicted on our Poster in an easy-to-understand way.