Geophysical Research Abstracts
Vol. 13, EGU2011-6013, 2011
EGU General Assembly 2011

An extensible model for describing real world properties in observational contexts.

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Many, if not all, scientific domains have controlled vocabularies for the real-world properties that they observe or model. We can refer generically to these terms as Observable Properties. An Observable Property may be a physical property (such as temperature, length, etc.), a classification (such as species), frequency or count, or an existence indication.

The governance and format of these terms and vocabularies varies between communities. While there have been attempts to provide a comprehensive upper-level ontology including Observable Properties (e.g. SWEET) they are not easily harmonised, nor is this necessarily desirable. What is desirable though is that these vocabularies can be referenced and reused easily within common metadata frameworks.

An unambiguous understanding of the property being measured is key to any type of observational data, and the Observations & Measurements (OGC, ISO 19156) standard has a key place for the observed property. Yet there is no standard model for encoding such a property that supports common requirements such as composition and quantitative constraints.

We propose a mechanism for applying constraints to observable properties in particular data instances. For example ‘temperature’ may be a controlled term in a vocabulary, but ‘temperature at 10m depth’ may not be, yet it is the later term the scientist needs to capture or interpret. The explicit yet flexible derivation model complements the capabilities provided by basic ontologies of observable properties, such as SWEET, which may nevertheless provide the primitive semantics for both the core observable property and many of the constraints.

This simple yet generic pattern whereby controlled terms are ‘constrained’ in some way for specific data instances is extensible for more complex constraint patterns. For example the OGC MetOcean Domain Working Group has expressed interest in extending this model to describe complex climatological observing strategies such as “decadal monthly means”, and even using this model as a way to link different, similar vocabularies together.

Note that an earlier iteration of this model was published in the OGC SensorML standard (07-000). It is expected that this revised model will supersede the SensorML model in due course.