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Evolution of Climate Science Modelling Language within international standards frameworks

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The Climate Science Modelling Language (CSML) was originally developed as part of the NERC Data Grid (NDG) project in the UK. It was one of the first Geography Markup Language (GML) application schemas describing complex feature types for the metocean domain. CSML feature types can be used to describe typical climate products such as model runs or atmospheric profiles. CSML has been successfully used within NDG to provide harmonised access to a number of different data sources. For example, meteorological observations held in heterogeneous databases by the British Atmospheric Data Centre (BADC) and Centre for Ecology and Hydrology (CEH) were served uniformly as CSML features via Web Feature Service.

CSML has now been substantially revised to harmonise it with the latest developments in OGC and ISO conceptual modelling for geographic information. In particular, CSML is now aligned with the near-final ISO 19156 Observations & Measurements (O&M) standard. CSML combines the O&M concept of 'sampling features' together with an observation result based on the coverage model (ISO 19123). This general pattern is specialised for particular data types of interest, classified on the basis of sampling geometry and topology.

In parallel work, the OGC Met Ocean Domain Working Group has established a conceptual modelling activity. This is a cross-organisational effort aimed at reaching consensus on a common core data model that could be re-used in a number of met-related application areas: operational meteorology, aviation meteorology, climate studies, and the research community. It is significant to note that this group has also identified sampling geometry and topology as a key classification axis for data types.

Using the Model Driven Architecture (MDA) approach as adopted by INSPIRE we demonstrate how the CSML application schema is derived from a formal UML conceptual model based on the ISO TC211 framework. By employing MDA tools which map consistently between UML and GML we can treat the formal UML model as the primary governed artefact and automatically produce the GML schema as a secondary output.

Finally we describe how increased convergence between CSML and Scientific Feature Types in the Unidata Commmon Data Model may assist with bridging the implementation gap between OGC/ISO services and the CF-NetCDF binary data management community. This improved agreement at the conceptual (feature type) level is important to enable better interoperability at the data exchange and service levels.