



GSSML: An Observations and Measurements profile for GlobalSoilMap.net (Oceania)

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The Oceania node of the GlobalSoilMap.net consortium has defined GSMMML, a profile of the Observations and Measurements (O&M) Geography Markup Language (GML) application schema, to support the delivery of project data using Open Geospatial Consortium (OGC) Web Feature Services (WFS). This paper describes GSMMML, and the results of initial testing, and proposes linkages to other OGC service types and soil data exchange standards.

GlobalSoilMap.net will create a global soil dataset providing predictions for twelve agreed soil properties within a three-dimensional grid. The grid consists of 'Spatial Entities' spaced at 3 arc second intervals and extending to a depth of 2 meters with ten physical soil property predictions made at six predefined depth intervals. In addition, two properties predicting the depth of the profile are made for each Spatial Entity. Each prediction must include: an estimate of its uncertainty; its age and that of the source data; and a description of the process used to generate the value.

The approach taken in GSMMML is to map the GlobalSoilMap.net requirements on to classes within the O&M Observation and Sampling Features packages. The GlobalSoilMap.net Spatial Entities represent a sampling regime across the earth's terrestrial surface and are modelled as nested O&M 'SF_SpatialSamplingFeatures'. The property predictions are related 'OM_Observation' instances that carry the result, age properties, estimation process, and uncertainty. GSMMML defines two concrete classes ('GSM_PrimarySpatialEntity' and 'GSM_SecondarySpatialEntity') with no properties of their own that specialize the SF_SpatialSamplingFeature. Uncertainty is encoded by adopting the UncertML profile of O&M. The schema is accompanied by a set of conformance classes to constrain content, and Semantic Web vocabularies that define the observed properties.

Test GSMMML services show that a WFS can only reliably support the provision of comprehensive data for requests returning a few hundred Spatial Entities before the service fails. This highlights the importance of carefully structuring the encoded response, and providing a set of service interfaces appropriate to a variety of use cases and client applications. To this end we also use Web Map Services (WMS) for data display and discovery, and propose using Web Coverage Services (WCS) as a means of delivering soil property surfaces.

Subject to successful development and testing of the complete suite of services, including testing links to the ANZSoilML soil data exchange standard, the GSMMML will be proposed as the global GSM standard. It is recommended that the GSMMML O&M profile be linked into the SoilML soil data exchange standard being developed by the International Union of Soil Sciences Working Group on Soil Information Standards. Together these efforts should support the provision of a comprehensive set of digital information describing the world's soil resource.