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The ESA GML Application Schema for EO Products: extension to new product types

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The Heterogeneous Missions Accessibility (HMA) project is a joint activity of the European and Canadian Space Agencies lead by ESA through its Ground Segment Coordination Body (GSCB). It aims to provide a seamless and harmonised access to heterogeneous Earth observation (EO) datasets from multiple mission ground segments. To achieve this goal of interoperability, the HMA project is developing standardised metadata descriptions at collection- and product-level, as well as standardised network service interfaces for data discovery, ordering, planning, user management, and data access. These interfaces will be implemented in the EO Data Access and Integration Layer (DAIL), providing an integrated, harmonised access across multiple mission ground segments.

A standardised description of EO data products is provided through a GML Application Schema for EO Products, endorsed as a Best Practice paper (06-080) by the standards body, Open Geospatial Consortium (OGC). Product-level metadata conforming to this schema may be ingested into an HMA standard catalogue service implementing the ebRIM profile of OGC's CSW interface with an extension package for EO products (OGC document 06-131). The GML application schema is based on the GML observation, adding detail to the following properties for an Earth observation:
• general metadata describing identifier, downlink, archiving information, etc.
• the acquisition duration
• the platform/instrument/sensor used for the acquisition, and other acquisition parameters
• the observed ground footprint
• the observation result (browse, mask, and product descriptions)
In addition, the schema takes a layered form: a foundation 'Earth Observation' schema is applicable for any type of EO product, with more specialised schemas derived from this for specific product types (optical, radar, atmospheric) .

We report on new work sponsored by ESA (in the 'HMA Follow-On' project) which is extending the existing application schemas to additional product types: altimetry, limb-sounding, and 'synthesis' products. These product types present new challenges for the application schema. For limb-sounding products, the vertical sampling geometry is as important as a ground footprint, and the observed property (e.g. radiance, spectra, or derived geophysical parameters) is a crucial part of the description. For altimetry, along-track products have a very different footprint geometry to gridded products. Systematic and synthesis products are derived from multiple source EO products, with the range of geophysical product types demanding a rigorous use of controlled terms.

As well as the metadata extensions themselves, new implementation techniques are being considered. First, the model-driven approach enhances quality by maintaining a single normative artefact (a UML model), with GML application schemas and documentation automatically derived. Second, a new standard (ISO 19156) on Observations and Measurements is likely to be adopted as a replacement for the GML observation model on which the EO schemas have been based. Third, parallel work on an EO data access service and the new release of a GML-based OGC Web Coverage Service specification, offers the potential for harmonisation between the product metadata and exploitation metadata.