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# Sensor Web Standards for Interoperability between in-situ Earth Observation Networks

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Existing earth observation networks deliver a multitude of in-situ data capturing the state of the earth. The data sets delivered by these networks are of high value for scientists and other stakeholders from different domains and backgrounds. However, the access and integration of the data sets made available by these earth observation networks are often complex as different data delivery methods and formats are used.

To strengthen and broaden the use of the available data sets, it is important to offer efficient methods for accessing the data from different types of applications (e.g. for data analysis or data visualisation). The Sensor Web Enablement (SWE) standards of the Open Geospatial Consortium (OGC) are adopted by more and more stakeholders and may serve as a good baseline for increasing the interoperability of data flows. This harmonisation of standards is also one of the core objectives of the ENEON (European Network of Earth Observation Networks) initiative promoted by the European Horizon 2020 project ConnectinGEO (Coordinating an Observation Network of Networks EnCompassing saTellite and IN-situ to fill the Gaps in European Observations).

In this contribution, we illustrate how domain-specific profiles of the OGC SWE standards may help to increase interoperability within specific domains. This includes for example the specification of SWE profiles for hydrology (e.g. resulting from the European GEOWOW project) or the e-Reporting SWE profiles for ambient air quality in Europe. Another example are SWE profiles for oceanology which are currently developed by several projects such as BRIDGES, Eurofleets 2, Fix$O_3$, IOOS, Jerico-Next, NeXOS, ODIP II, and SeaDataNet (e.g. using RelaxNG and Schematron for defining a structure of SWE encoded messages to be applied in tools, vessels and fixed stations). Finally, a Sensor Web-based scenario from the ConnectinGEO project covering energy and solar radiation will be introduced that connects data providers and users.

The standards-based approach presented in this contribution does not only increase interoperability within single domains but also facilitates the link to brokering tools (e.g. the GEOSS Discovery and Access Broker) which help to transform data for usage within different application contexts and communities.

In summary, we show how earth observation networks may benefit from the use of standards by increasing interoperability and subsequently facilitating the exchange of in-situ observation data.