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Atmospheric Sciences data cube

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The scientific and industrial communities are being confronted with a strong increase of Earth Observation (EO) satellite missions and related data. This is in particular the case for the Atmospheric Sciences communities, with the already launched Copernicus Sentinel-5 Precursor and the upcoming Sentinel-4, -5 and -3B, and ESA's Earth Explorers scientific satellites ADM-Aeolus and EarthCARE. Besides satellite-based products, numerical models play a fundamental role in describing and forecasting atmospheric parameters and composition. The challenge is not only to manage the large volume of data generated by each data source, but also to allow users to analyse the data streams in near-real-time and for long-term monitoring tasks. Creating synergies among the different datasets is key to exploit the full potential of the available information, especially once events such as volcanic eruptions occur.

In order to improve the capability to understand the impact of natural hazard events on the atmosphere, an "Atmospheric Sciences" data cube has been set up hosting satellite-based products (e.g. aerosol information from MODIS), as well as numerical model forecast data (weather, forecast and chemistry such as WRF-Chem). Satellite data and model data are periodically updated with the last available products, namely 72h model forecast updated every 12 hours, global aerosol data @ 3Km resolution from satellite updated daily. The data cube exposes OGC-standardised interfaces, namely OpenSearch for data discovery and WCS 2.0 for data access. Three main user interfaces are provided to make the user experience as much close as possible to the user preferences: a web-based data visualization and analysis interface is provided, as well as Jupyter notebook (deployed on the same platform where the data reside), and direct OGC-standardised calls on the endpoint.

In the framework of the current work the structure and use of the Atmospheric Sciences data cube is described, both as stand-alone data structure and as federated with other data cubes (e.g. the Earthserver ECMWF data cube) through the eodataservice technology.