The EOC Geoservice: Standardized Access to Earth Observation Data Sets and Value Added Products

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ABSTRACT

Within long-term data preservation, providing sustainable, user friendly and interoperable access to archived data sets becomes more and more important. The rising interest of users in accessing EO data and products results in the need to offer fast, easy-to-use, and reliable data access. Data access for the Earth Observation Community of the German Satellite Data Archive at DLR is available through the data portal Earth Observation on the WEB (EOWEB®). The EOC Geoservice has been established at DLR to provide interoperable access to both, selected German Satellite Data Archive data sets and data sets provided by external providers. Opposite to EOWEB, the EOC Geoservice provides direct data access through standardized interfaces in addition to the classical order-based ones.

Keywords: LTDP, D-SDA, DIMS, EOWEB, GDAS, Geoservice, OGC, data access

INTRODUCTION

The German Satellite Data Archive (D-SDA) at DLR maintains a large archive of Earth Observation (EO) data supplied by national, European and international EO missions. The current data volume exceeds 2.3 petabytes, increasing by roughly one petabyte a year. A major task of D-SDA is long-term data preservation (LTDP). By following Europe-wide LTDP guidelines the valuable and unique data, including extended time series, are safeguarded against loss and kept accessible and useable for future generations. Providing user friendly and interoperable access to the archived data sets becomes more and more important within LTDP. To enable interdisciplinary use of EO in combination with other spatial data, interoperability and harmonization of data formats and access protocols are crucial.

Figure 1 shows the different paths of spatial data access provided by DLR. Currently, EOWEB®-NG (Earth Observation on the WEB – Next Generation) is the main portal for accessing D-SDA data. Through HMA (Heterogeneous Mission Accessibility) [1] compliant data interfaces the users can search for and order EO data and products via EOWEB®-NG. The EOC Geoservice augments the traditional functionality by providing interoperable and direct data access through spatial data services compliant with standards established by the Open Geospatial Consortium (OGC). The technical foundations for the EOC Geoservice are software components which retrieve and register selected data sets from the archive and register available data of external providers in specific OGC-compliant, web-based spatial data services. In order to ensure a reliable service is being provided, an Operations and Management Framework has been set up which performs administrative tasks, defines operational procedures, plans the technical evolution, and defines data integration policies.
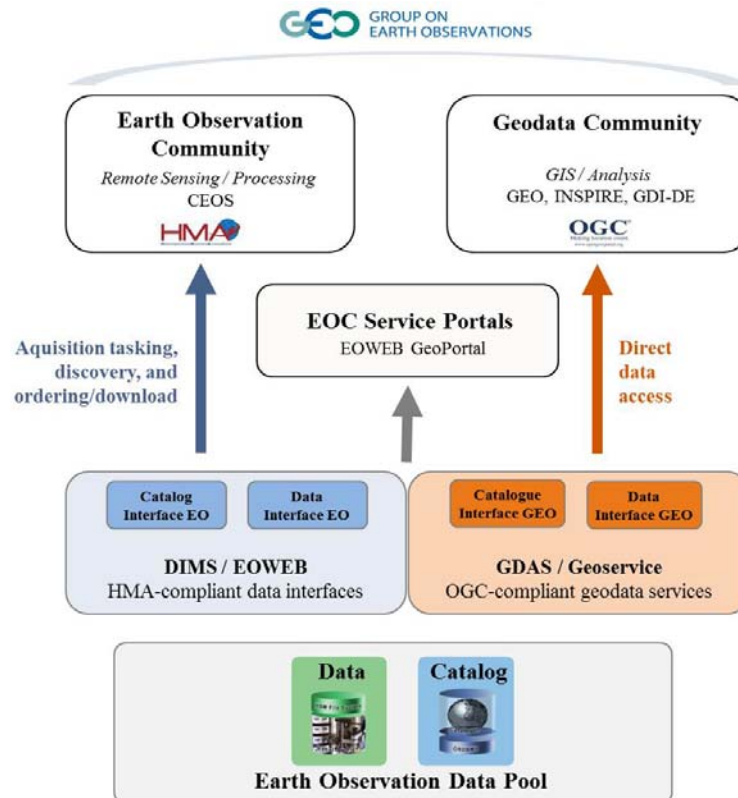
Figure 1: Access to EO data through HMA & OGC compliant interfaces & services. The new EOWEB GeoPortal (EGP) as the EOC portal for data access is also shown.

This paper first describes the relevant standards followed by a short description of the Data Information and Management System (DIMS) with EOWEB®-NG as its main access portal for EO data. As an extension and improvement of the data access, the Geodata Access System (GDAS) with the EOC Geoservice as data interface service will be introduced next.

STANDARDS

In the past access to EO data gathered by different missions was very difficult because of different processing standards, interfaces or ground segment services. Under the lead of the European Space Agency (ESA) the Heterogeneous Mission Accessibility project was launched to define technical frameworks for achieving the necessary level of harmonization in earth observation ground segments based on standards specified within the Open Geospatial Consortium. At DLR the HMA standards are integrated in the EOWEB®-NG interface providing multi-mission access to EO data. A detailed description of the HMA standards is given in [1].

Within the European Union the INSPIRE directive (Infrastructure for Spatial Information in the European Community) provides the legislative framework to enable the sharing of environmental spatial information and better facilitate public access to spatial information across Europe. An example for the implementation of the directive on the national level is the German Geospatial Data Infrastructure GDI-DE. Both initiatives adopt and tailor OGC standards. Nowadays, spatial data services and interfaces based on OGC standards have become the common baseline for accessing EO and other spatial data sets. For a detailed description of OGC standards please refer to [2].

The aim of the Group on Earth Observations (GEO) is to harmonize data access by unifying standards and protocols used for spatial data discovery and access. While differences between discovery and access standards in use are decreasing, the need for fast and easy access to higher level products, i.e. geo-referenced and value-added products, becomes more urgent and drives the implementation of direct data access services, such as those provided by the EOC Geoservice.

THE EOC GEOSERVICE AS AN EXTENSION TO EOWEB

In order to simplify access to data and products held in the D-SDA the EOC Geoservice, providing direct data download capability, has been implemented in addition to EOWEB®-NG - the traditional D-SDA data discovery and ordering mechanism. In this paragraph the system design is discussed.

System Design

In the left part of Figure 2 DIMS with EOWEB®-NG as its data access portal is shown. The Data Information and Management System (DIMS) is composed of distributed services which allow reception, processing, archiving, ordering and delivering of data products. It provides a traditional, order based access system for users of the EO Community [3, 4]. The Long Term Archive (LTA) Product Library (PL) [5] serves as the main data source. Within the DIMS system the DIMS Product Upload Service is triggered whenever new data is available in the LTA PL. Corresponding metadata is then being uploaded to the EOWEB®-PL. With the interactive user interface EOWEB®-NG users of the EO Community are able to search for and order products.
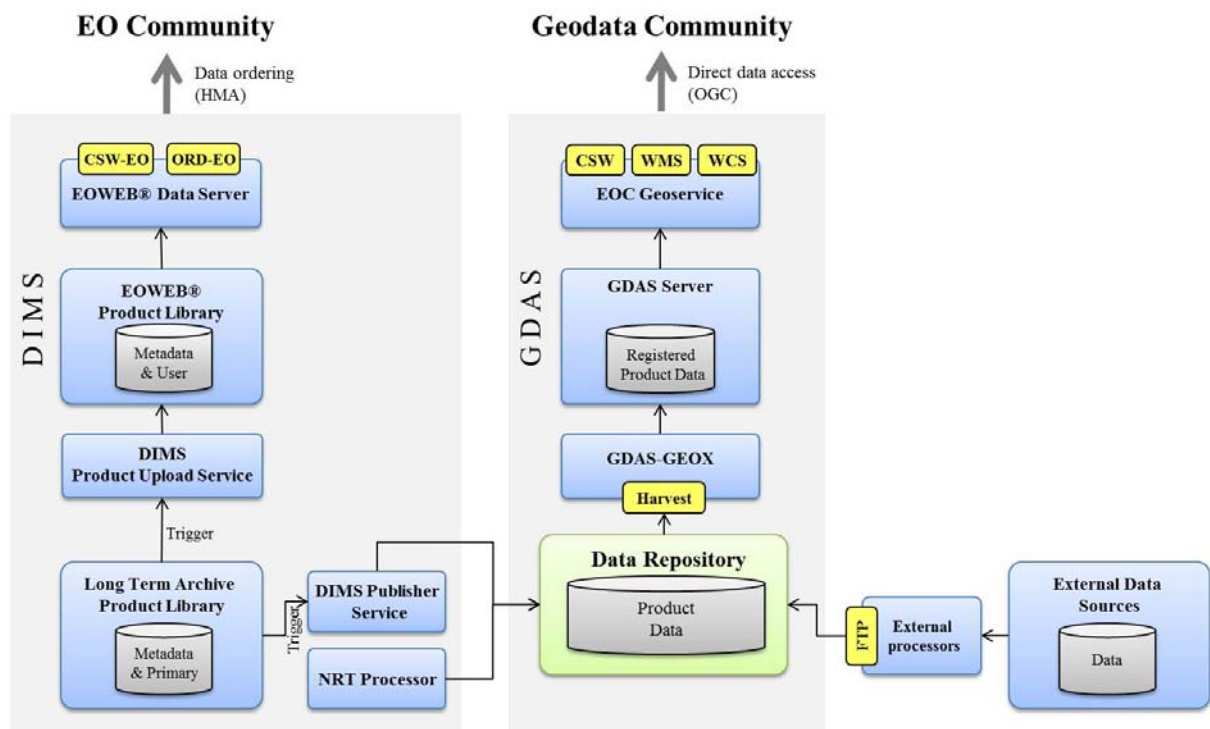

Figure 2: System design of the Geospatial Access System (GDAS) together with the ordering section of the Data Information and Management System (DIMS). Details of ordering and delivering are not included for the sake of clarity.

The middle part of Figure 2 shows how the EOC Geoservice is integrated into the existing data archiving and access infrastructure, adding OGC-compliant direct access services to the traditional search and ordering functionality. For specified data sets the DIMS Publisher Service is triggered by ingesting corresponding new data into the LTA PL. This data are then uploaded to the Data Repository which serves as the main data source for the EOC Geoservice. Additionally near real time (NRT) products are delivered to the EOC Geoservice by the NRT processor. Beside data available in the LTA PL an ftp pick-up point is available for uploading data from external providers. External data has to be geo-referenced and processed to specific data formats required for upload into the EOC Geoservice. All the data are held available for immediate and direct access. The data of the Data Repository is harvested through the GDAS GEOX Service and registered in thematic services following the INSPIRE Spatial Data Themes as defined in [6]. Fast and direct data access is provided through the EOC Geoservice interface which allows data discovery through the Catalogue Service Web (CSW), data viewing through the Web Mapping Service (WMS) and data download through the Web Coverage Service (WCS). Additionally, the EOWEB® GeoPortal (EGP), as an upgrade of the traditional

EOWEB®-NG, has been expanded to provide a common user interface for accessing data through the EOC Geoservice and the traditional EOWEB®-NG services. Thus both functionalities – traditional HMA-based data ordering as well as OGC-compliant direct data access - have been incorporated into a single data portal.
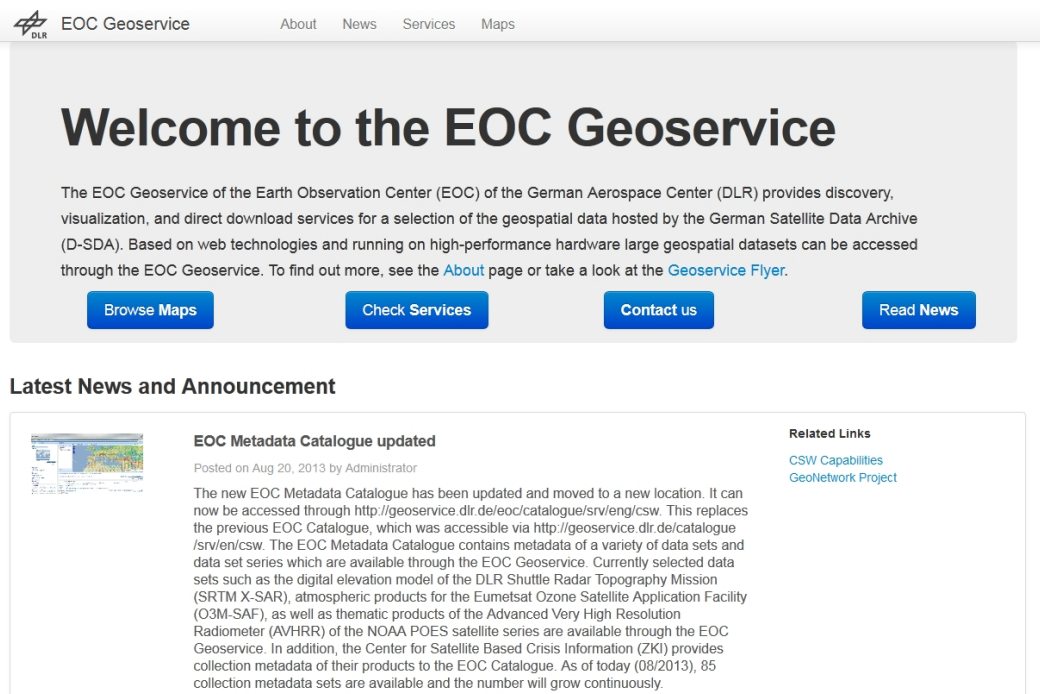
Available Datasets

Within the EOC Geoservice the following data sets of the German Satellite Data Archive and external providers are currently available:

- Global digital elevation model mosaics, generated from elevation data of the Shuttle Radar Topography Mission (SRTM X-SAR), including hillshade, an elevation error map and a shaded relief visualization.

- Daily and near real time (NRT) atmospheric products for the Eumetsat Ozone Satellite Application Facility (O3M-SAF) of the MetOp-A and MetOp-B missions. Additionally, a combined product of both missions (MetOp-AB) is processed and accessible.

- Mosaic of Germany and adjacent territory at 250 m spatial resolution processed from data of the Moderate Resolution Imaging Spectroradiometer (MODIS) onboard the American platforms Terra and Acqua.

As more data are being integrated, the Geoservice data pool will continue to grow significantly.

EOC Geoservice Website

The main entrance page (Figure 3) for the EOC Geoservice is http://geoservice.dlr.de which provides information about the service interfaces and available data sets.

Figure 3: Main entrance page to the EOC Geoservice providing general information about services and data sets available.

The website explains how the services can be used to access the data but it does not serve as a portal through which data access is possible. Users can read the latest news and announcements, browse

through available data sets, and check for the capabilities of available services. Using the OGC services listed the data can be viewed in virtual globes (e.g. Google Earth) and in common online or desktop GIS clients. A user guide describing how to access the data is also provided.

CONCLUSIONS

Earth Observation (EO) data archived in the Long Term Archive (LTA) Product Library (PL) of the German Satellite Data Archive (D-SDA) have been accessible to the EO Community through the Data and Information Management System (DIMS) and its EOWEB®-NG data portal. This data access is order-based using HMA compliant interfaces.

The rising interest of users in accessing EO data and products results in the need to offer fast, easy-to-use, and reliable data access. Therefore, the Geospatial Data Access System (GDAS) with the EOC Geoservice as data access service has been established to provide users with direct, standardized access to selected EO datasets of the LTA PL and other value-added datasets. By relying on standardized interfaces it is ensured, that the datasets are accessible for public sector, downstream service providers and can be integrated into Spatial Data Infrastructures.

To simplify data access the EOWEB® GeoPortal (EGP) has been developed as a client and user interface which combines traditional HMA-based data ordering as well as OGC-compliant direct data access in a single data portal.

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