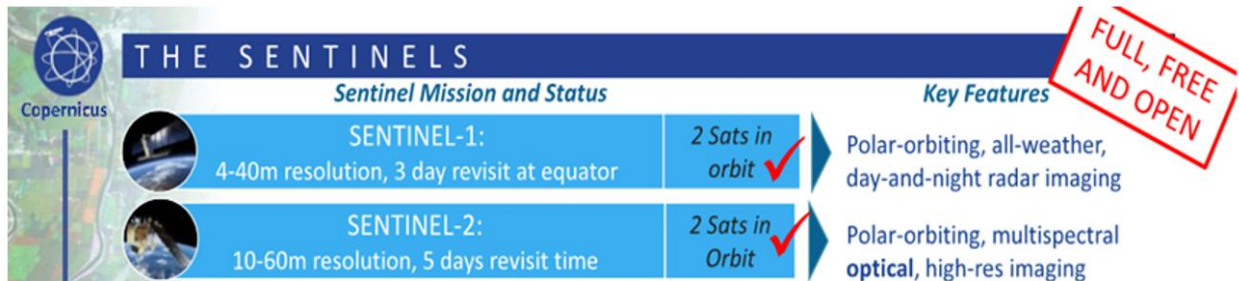# Austrian Data Cube: An EODC service for the Austrian EO user community

Earth Observation (EO) gathers information from our planet from a distance using satellite or airborne data, such as unmanned aerial vehicles. These techniques can be used for a **large number of applications**, to name a few:

- environmental and nature protection (e.g. habitat mapping or oil spill detection);

- agriculture (e.g. crop condition monitoring and yield predictions);

- forestry (e.g. tree species classification and timber stock estimations);

- climate change (i.e. detecting sea ice and water levels); and

- urban development (e.g. urban planning and urban sprawl monitoring).

The **European Copernicus programme** is operating and expanding an extensive constellation consisting of various EO satellites carrying a range of different sensors, such as **Sentinel-1** fitted with an all-weather, day-and-night radar system and **Sentinel-2** equipped with a multispectral high-resolution sensor. In total six different Sentinels are planned with each having multiple satellites. Sentinel-1 and Sentinel-2 have a revisit time of six and respectively five days, in effect provide a **global coverage every six and five days**. These are long-term operated and will be collecting data for the upcoming decades. The current seven operation Sentinels collect daily 15TB of raw data, thus an extensive archive of EO data needs to be maintained.

The **massive volumes of data** provided by the Copernicus programme need to be processed to higher-level products to unlock their full potential. For instance, Sentinel-1s' raw radar data can be transformed to level-1 products (single look complex and ground range detection) or level-2 ocean products, while the data provided by Sentinel-2 needs to be athmospherically corrected to level-2A. **These transformations require:** a) know-how on where to retrieve the data, b) programming experience to implement the algorithms, c) large amounts of disk space, and d) ample processing power. All these factors are limiting the uptake of satellite data and result in a high entry level, requiring specific technical skills, software and hardware.

The **Austrian Data Cube project** delivers a system mitigating these negative effects, making Copernicus data available to the broad public. The consortium of five Austrian partners introduces a state-of-the-art infrastructure integrating a cloud-based data cube concept for Austria. The data cube concept stores data in a gridded multi-dimensional database capable of **providing time-series of highly standardized and harmonized radiometrically and geometrically corrected satellite data**. These higher-level data are

made available through a user-friendly and standardized interface, with QGIS and web map services plugins (WMS) for novel users and a dedicated application programming interface (API) for advance users. The benefits include cloud-based storage and processing, so users can directly download the ready-to-use data for their specific region of interest, without performing the time-consuming pre-processing steps. In addition, the scalable service allows for integration of user relevant geodata (e.g. digital elevation model, leaf area index, open street maps).

The **project consortium** consists of national and international leaders in their respective fields.

The **Earth Observation Data Centre for Water Resources Monitoring** (EODC) will provide the cloud computing environment and storage capacity.

Technical University of Vienna (TU Wien) and **University of Natural Resources and Life Sciences, Vienna** (BOKU) are research institutions and experts in processing and analyzing Sentinel-1 (TU Wien) and Sentinel-2 (BOKU) data, these institutions will provide the data and algorithms to generate higher-level products.

The **Federal Ministry of Sustainability and Tourism** (BMNT) and the **Federal Ministry of Defense** (BMLV) are key users of EO data, suppling user requirements and testing the data cube system.

The project is funded by the **Austrian Research Promotion Agency** (FFG) which is the national funding agency for industrial research and development in Austria.