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Automated Creation of Earth Observation Products for Water Resource Monitoring

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Due to climate changes and the ongoing intensification of agriculture, water industry associations, suppliers and municipalities have to face new challenges with regards to the quality controlling of drinking water. Fertilization measures, heavy rain effects and soil erosion results in increased sediment and material inputs into watercourses and dams. In order to ensure an environmentally friendly water resource management there is a great need for an improved water management programme as well as strategies to reduce pollutant inputs into surface waters. Especially, geolocating and quantifying of material inputs into surface water bodies is a very important task that contributes to this goal.

The WaCoDiS research project focuses on the development of innovative water management analytics services and the improvement of hydrological models including but not limited to

* Identification of turbidity sources in water bodies
* Differentiation between sealed and unsealed areas
* Identification of the catchment areas responsible for sediment inputs.

In the past, water management associations primarily utilized in-situ data for small-scale hydrological models. With advances in global earth observations and the broader availability of remote sensing products new approaches can be developed. Hence, the WaCoDiS project aims to exploit the great potential of Earth Observation (EO) data (e.g. as provided by the Copernicus Programme) for the development of innovative water management analytics service and the improvement of hydrological models in order to optimize monitoring processes. Existing SDI based geodata and in-situ data from the sensors that monitor water bodies will be combined with Sentinel-1 and Sentinel-2 data. The WaCoDiS monitoring system is designed as a modular and extensible software architecture that is based on interoperable interfaces such as the Open Geospatial Consortium (OGC) Web Processing Service. This allows a sustainable and flexible way of integrating different EO processing algorithms. In addition, we consider architectural aspects like publish/subscribe patterns and messaging protocols that increase the effectiveness of processing big EO data sets.

In summary, the WaCoDiS monitoring system provides a way to flexibly define the automated and recurring creation of EO products. The results can be utilized in further downstream analysis and also provide means to detect temporal anomalies and changes within water bodies and their catchments areas. The system is planned to be evaluated in the broader region of the Wupper river during the timeframe of the project. As the approach is designed in a generic way, follow-up activities will focus on transferring the system to other regions and countries where the addressing of similar environmental issues is of high importance.

In our contribution, we will present the current state of the WaCoDiS system for supporting water resource monitoring. Selected EO processes and algorithms will be illustrated and the automated integration and execution, including input data discovery and provision, will be highlighted.