

# Satellite Remote Sensing for Reservoir Catchment Monitoring

Satellite remote sensing provides means to acquire spatially explicit information on land cover change and vegetation dynamics. A major asset of these mapping products is that they can be globally obtained in a highly automated, cost-effective manner. Thus remote sensing contributes to reservoir monitoring by quantifying terrestrial substance outputs on large scales complementing in-situ observations.

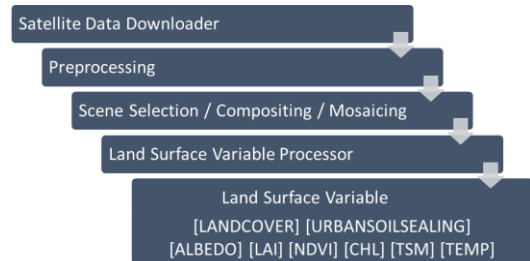
## Satellite Data

The Sentinel-2 multispectral satellites of the European Copernicus program acquire high spatial resolution (up to 10 m) data with a temporal revisit time of at least 5 days. These time series are compiled to datacubes representing defined windows in space and time. Processed to selected land surface variables these data quantify the status and change of land cover as well as intra-/interannual vegetation dynamics as factors of terrestrial substance outputs and reservoir water quality.

## Processing Chain

An automated processing chain was established aiming at generating data which is globally available transferable and cost efficient.

The processing chain comprises the download of satellite time series data from the data providers as well as preprocessing operations such as atmospheric correction. A further downstream component handles multi-spectral time series datacubes, supporting the selection of scenes and pixels based on quality criteria (e.g. absence of clouds, cloud shadows, snow) temporal aggregation for cloud-free composites. Finally a land surface processor is applied.



## Land Surface Variables

**(A) Land cover:** Describes the physical or biological coverage of the Earth's surface. It can be linked to (human) land use and associated pollutant emissions. Moreover, it is the basis for erosion modeling.

**(B) Urban Soil Sealing:** Provides detailed information on the permeability of settlement areas, which impact surface runoff and substance transport as well as microclimatic processes.

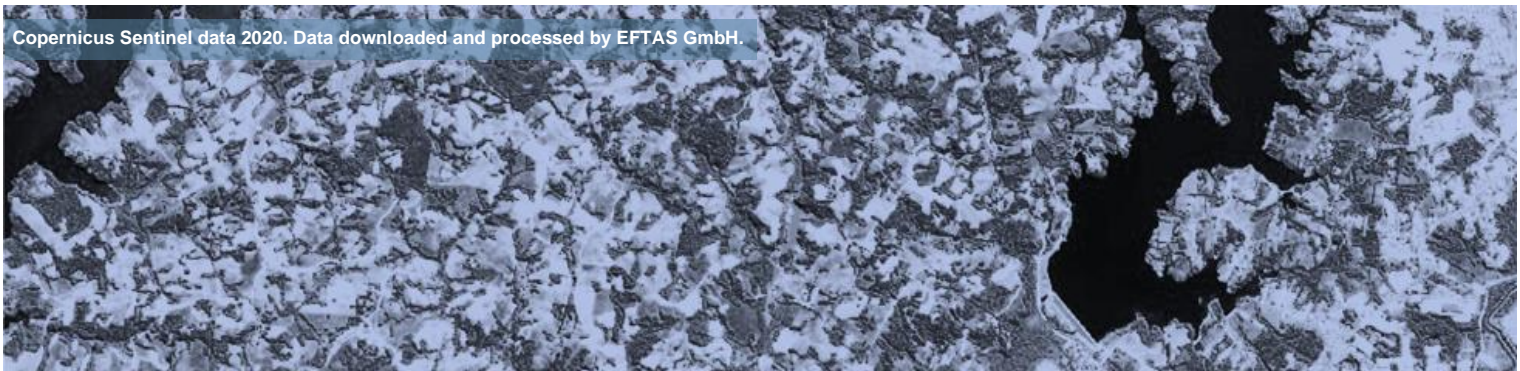
**(C) NDVI:** The Normalized Difference Vegetation Index (NDVI) provides proxy information on biomass and vitality of vegetation. It supports erosion modeling with vegetation periods information.

**(D) Surface Albedo:** Describes the 'reflectivity' of the Earth's surface. It is an essential input parameter for energy balance calculations, including the estimation of evaporation rates.

**(E) Leaf Area Index:** Quantifies the one-sided green leaf area per unit ground surface area, thereby characterizing plant canopies. It is an essential parameter for the estimation of evapotranspiration.

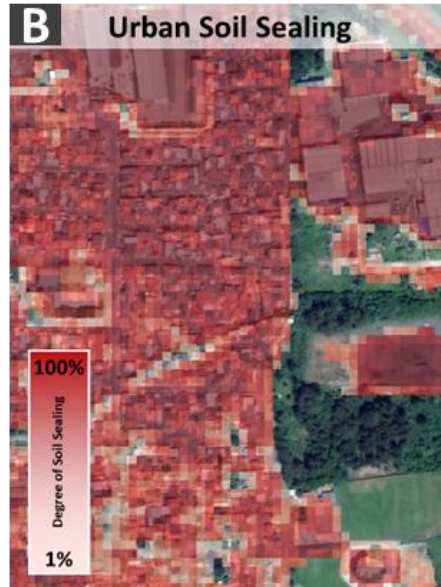
**(F) Water Quality:** Chlorophyll-a, Total Suspended Matter and Temperature are obtained from water surfaces to monitor and model water quality on a large scale.

Copernicus Sentinel data 2020. Data downloaded and processed by EFTAS GmbH.

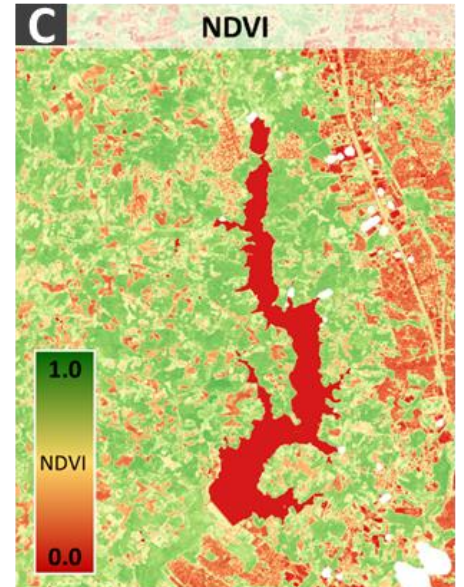




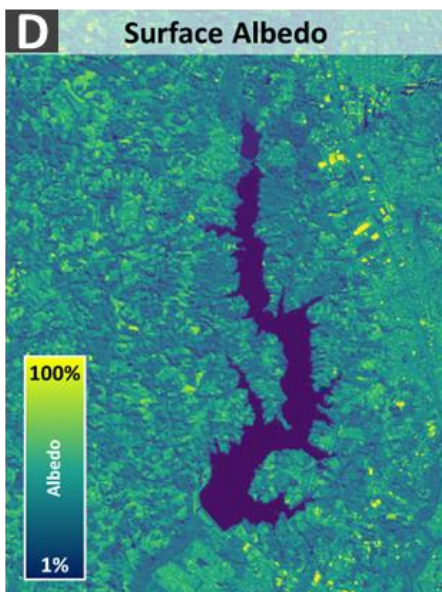
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 Temporal resolution **yearly**  
 Data format **GeoTIFF**



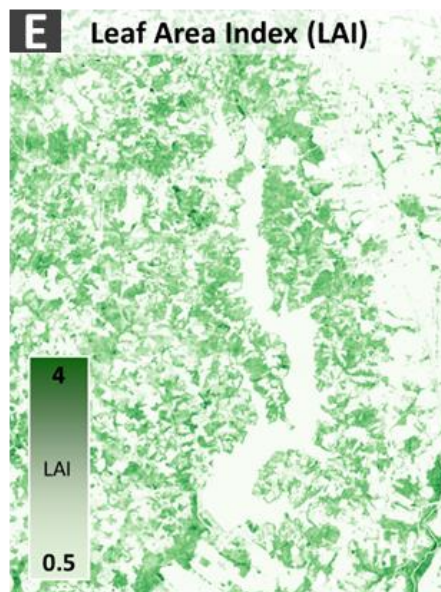
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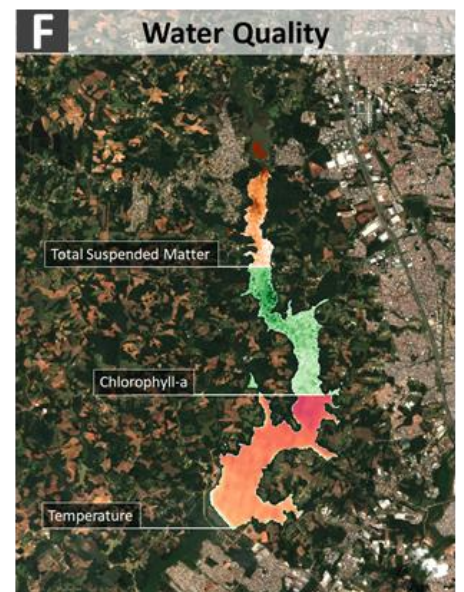
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 Data format **GeoTIFF**



Spatial resolution **20 m**  
 Temporal resolution **monthly**  
 Data format **GeoTIFF**



Spatial resolution **20 m**  
 Temporal resolution **monthly**  
 Data format **GeoTIFF**



Spatial resolution **20-100 m**  
 Temporal resolution **5-16 days**  
 Data format **GeoTIFF**

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