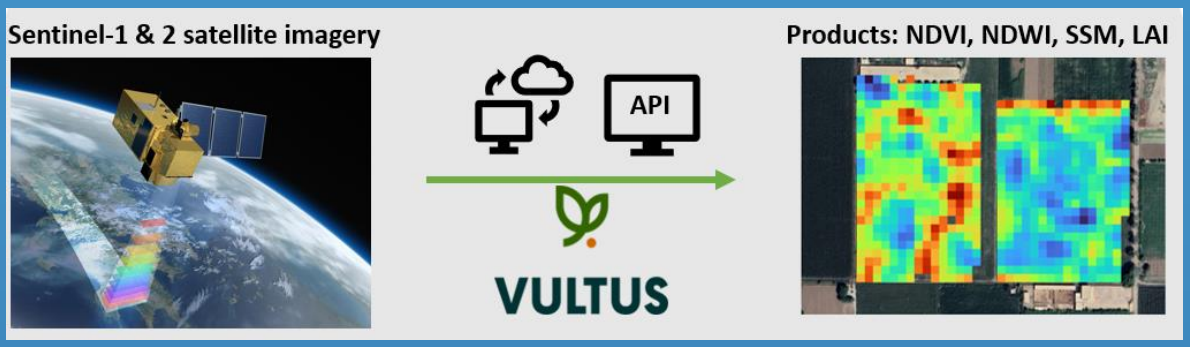
WATERAGRI

FACTSHEET

REMOTELY SENSED DATA FOR WATER AND NUTRIENT RESOURCES MANAGEMENT



Key information

The remote sensing product takes into account the different agricultural crops, topography and soil types of the fields to develop our products for precise fertilisation and irrigation.

Target audience: farmers and advisor services

This project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement No 858735.

A. Brief Introduction:

Remote sensing data, especially satellite imagery, are now widely used for monitoring land cover change, agricultural and forestry management, and urban development. For agricultural water and nutrient resource management, VULTUS has developed and implemented a remote sensing processing pipeline to obtain biophysical parameters of vegetation and soil, such as various vegetation-related indices (Normalised Difference Vegetation Index NDVI, Normalised Difference Water Index NDWI, Leaf Area Index LAI, etc.) and soil surface moisture (SSM), using optical and microwave remote sensing observations from Sentinel-1 and Sentinel-2 satellite imagery. These data are valuable for monitoring and managing water surpluses and shortages and for improving nutrient recycling in agricultural catchments.

B. Testing and design concept:

The concept is a fully automated pre-processing chain through its Application Programming Interface (API) to provide fully geo-referenced and parameterised (calibrated and in physically meaningful units) spectral data to end users in WP3 and WP5 (Figure 1). Satellite images are searched and filtered based on the required date and then the processing engine is deployed in a cloud architecture and automatically performs calibration, correction, cloud removal and analysis based on different monitoring methods using satellite imagery and outputs the products of LAI, NDVI, NDWI, SSM. Users can access these products through our API platform.

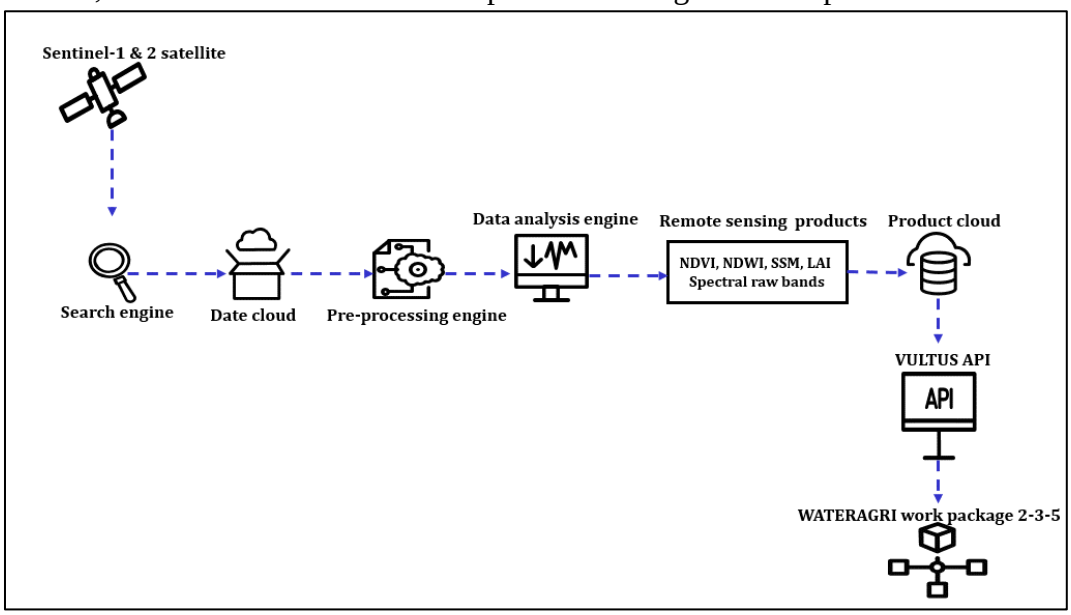


Figure 1. Design and workflow of VULTUS remote sensing pipeline.

C. Technical information:

In order to access the VULTUS API, users must install the Postman platform. In addition, users must contact VULTUS to create an account on the VULTUS platform and obtain an access token to register the fields or polygons of interest. Therefore, the basic requirement for the user is to know how to use the Rest API and Postman.

The requirements for remote sensing information are the Sentinel-1 and Sentinel-2 images.

D. Costs and Benefits:

The cost of providing the VULTUS API is 200 SEK / .19 EUR per API request. This includes all cloud computing, cloud storage and related personnel costs associated with maintaining the VULTUS API.

Results from the remote sensing pipeline, such as NDVI, can be used as an indicator of crop health and further integrated into fertiliser calculations to help farmers improve yields and reduce fertiliser use. Other products, such as NDWI and SSW, are important parameters that can be used for sustainable water retention and management practices. All products in the pipeline can be used directly or further developed to advise on agricultural practices, irrigation management and landscape changes resulting from socio-economic development. The ultimate mission of the VULTUS platform is to help users reduce greenhouse gas emissions and increase biodiversity in their agricultural practices.

E. Challenges and opportunities

VULTUS does not provide an application front-end / user interface for the VULTUS API. This means that VULTUS relies on partners to integrate the VULTUS API into their partner platform to provide data to farmers and growers. Currently, we have a technical limit of no more than 1,000 hectares of field at any one time on our platform. Theoretically, it has the potential to reach 5,000 hectares. As more users join the VULTUS platform and provide us with more feedback from the field, we will be able to provide more accurate and reliable products in return.

F. Reference and demonstration:

Kandekar, V.U., Pande, C.B., Rajesh, J., Atre, A.A., Gorantiwar, S.D., Kadam, S.A., & Gavit, B. (2021). Surface water dynamics analysis based on sentinel imagery and Google Earth Engine Platform: a case study of Jayakwadi dam. Sustainable Water Resources Management, 7:44.

Lohse, J., Doulgeris, A., & Dierking, W. (2020). Mapping sea-ice types from Sentinel-1 considering the surface-type dependent effect of incidence angle. Annals of Glaciology, 61(83), 260-270. doi:10.1017/aog.2020.45

Misra, G., Cawkwell, F., & Wingler, A. (2020). Status of Phenological Research Using Sentinel-2 Data: A review. Remote Sensing.12.17. 10.3390/rs12172760.

Phiri, D., Simwanda, M., Salekin, S., Nyirenda, V., Murayama, Y., & Ranagalage, M. (2020). Sentinel-2 Data for Land Cover/Use Mapping: A Review. Remote Sensing. 12. 2291. 10.3390/rs12142291.

WATERAGRI

Contact Information

Email : info@vultus.se

Website: https://www.vultus.se

Postal Address: Scheelevägen 15, 223 63 Lund, Sweden

This project has received funding from the European Union's Horizon 2020 research and innovation program under Grant Agreement No 858735.