NEXTGEOSS

European Data Hub and Platform

NextGEOSS Biodiversity Pilot 6.2.1:
Remote Sensing- enabled Essential Biodiversity Variables

What are EBVs?

Essential Biodiversity Variables (EBVs) have been proposed by GEO BON as a layer between biodiversity observation and biodiversity indicators used in the policy formulation. However, the biodiversity community still lacks a global observing system that revolves around the monitoring of a set of agreed variables essential to the tracking of changes in biological diversity on Earth. Therefore, there is an urgent need for remote sensing for EBVs to fill the spatial and temporal gaps between in situ observation data of biodiversity.

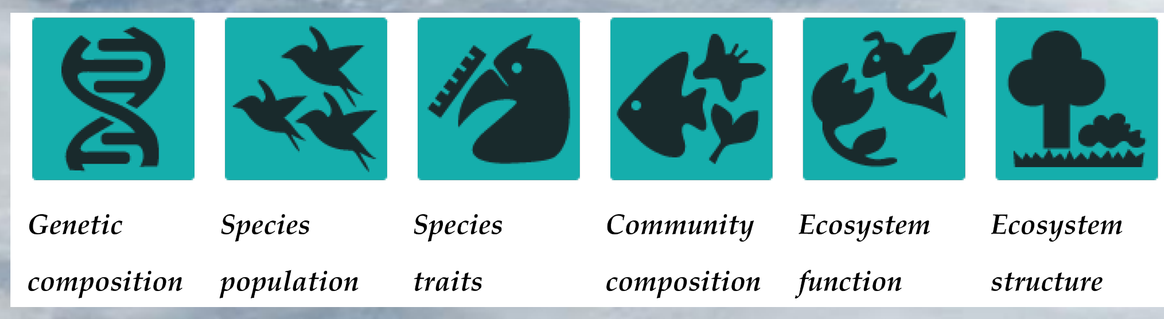

Fig. 1. Essential biodiversity variables classes which suggested by GEO BON community.

In NextGEOSS Biodiversity Pilot WP 6.2.1, we focus on:

Creating the NextGEOSS European remote sensing-enabled EBVs (i.e., RS enabled-EBVs) data-hub by identifying and populating available RS- enabled EBVs products.

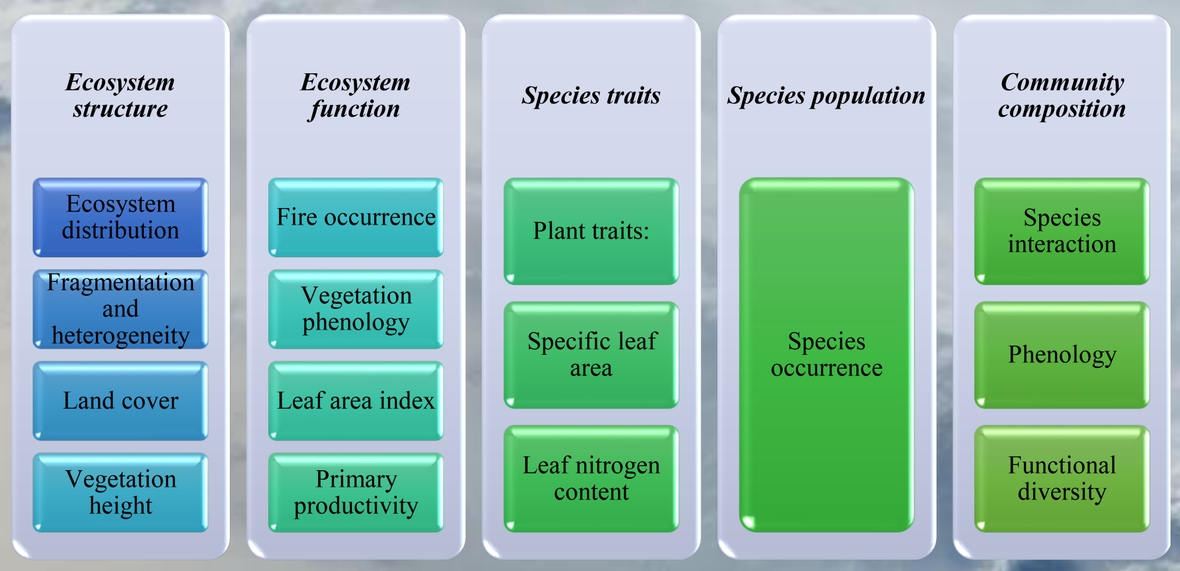

Fig. 2. Essential biodiversity variables candidates proposed by Skidmore (2015).

The NextGEOSS European RS-enabled EBVs data-hub was created following four stages (Fig. 3)

- Phase 1- Prioritizing RS-enabled EBVs
- Phase 2- Identifying available RS-enabled EBVs
- Phase 3- Providing metadata
- Phase 4- Populating RS-enabled EBVs into the NextGEOSS data-hub

Fig. 3. The procedure followed to create NextGEOSS European RS-enabled EBVs data-hub.

Phase 1

123 variables were compiled as EBV candidates for five out of six EBV classes (Fig. 1), as the genetic composition cannot be measured using remote sensing data. All EBV candidates were prioritized based on different criteria and observation requirements including relevancy to Aichi biodiversity targets, availability through remote sensing data (i.e., feasibility), and a measure of accuracy and maturity of remote sensing technologies and techniques.

Phase 2

The 30 highest-prioritized RS-enabled EBVs were selected, and from these available RS-enabled EBVs products were identified with special consideration to their spatial resolution and scales

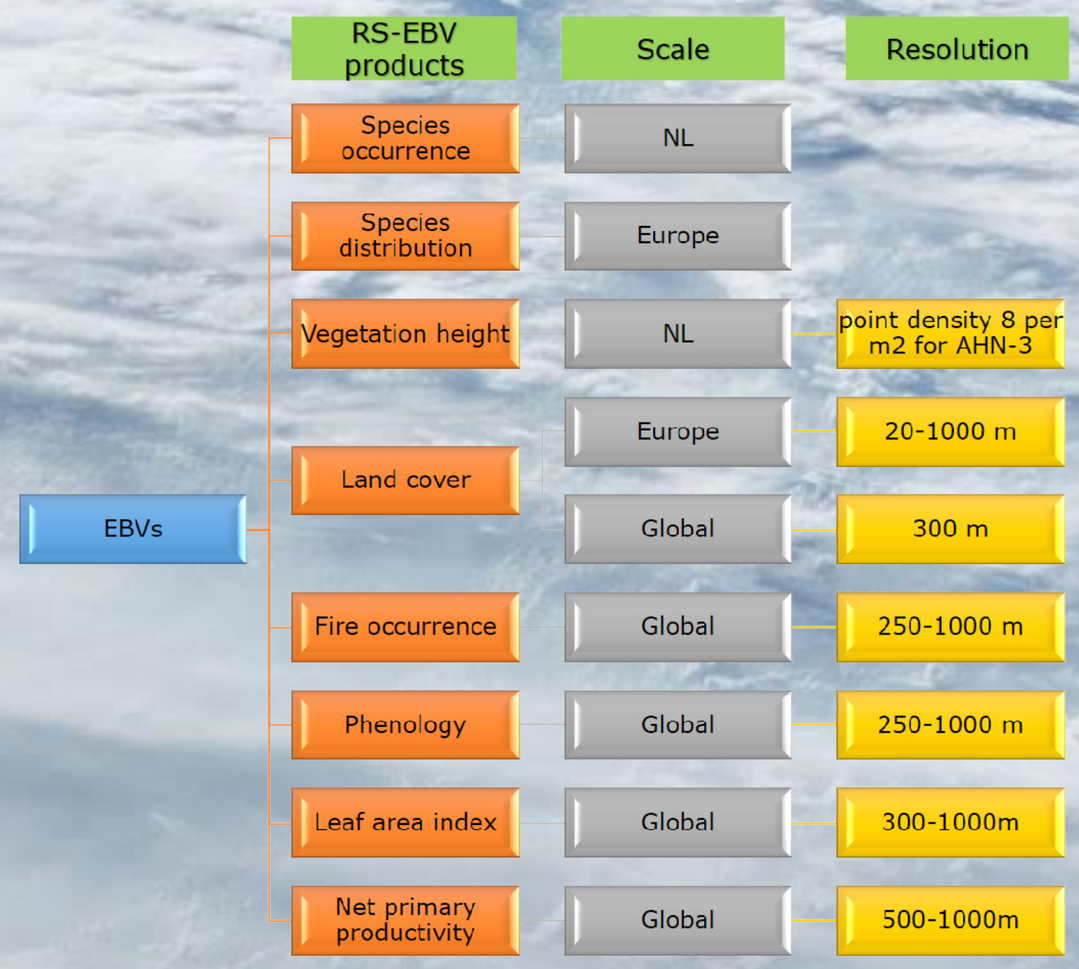

Fig. 4. Identification of the available RS- enabled EBVs products according to their scale and resolution.

Phase 3

The metadata was provided for each auxiliary RS-enabled EBV data.

Phase 4

The metadata was further populated in the NextGEOOS catalouge.

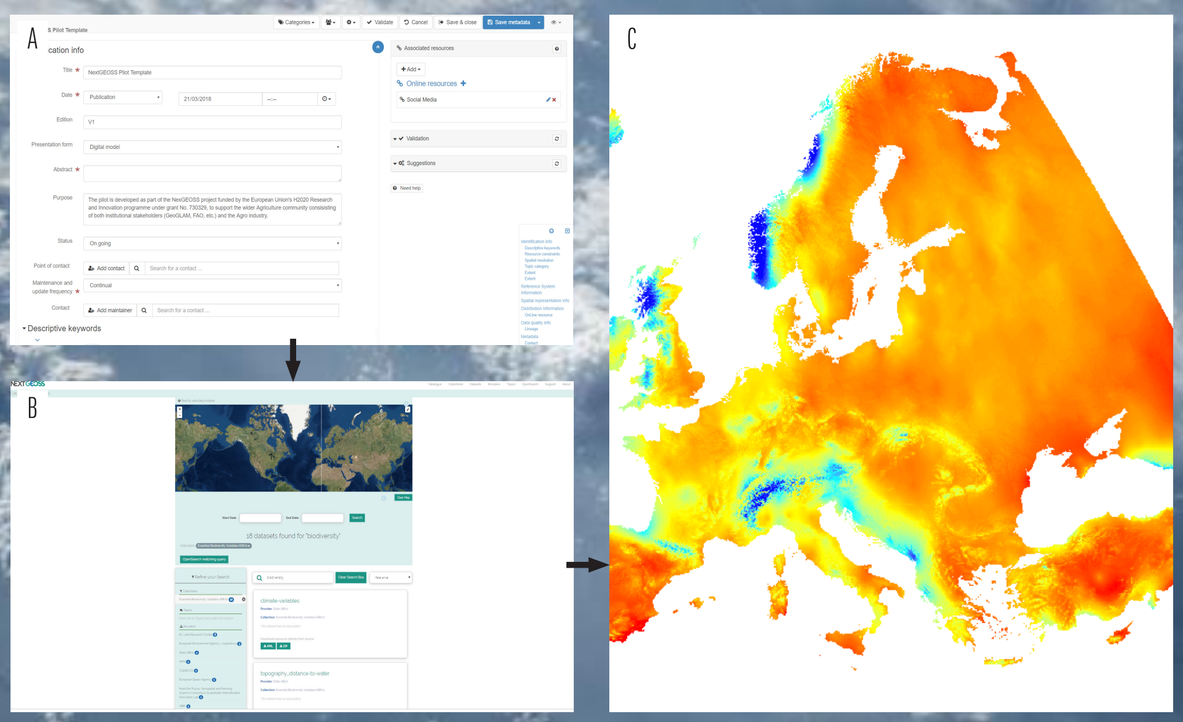

Fig. 5. The procedure followed to populate RS-enabled EBVs data-hub in the NextGEOSS data-hub providing metadata (a), populating into the NextGEOSS catalogue (b), accessibility of the products for the users (c).

The potential use of the NextGEOSS RS-enabled EBVs data-hub for GEO Community

- The unique value of using EBVs Data-hub as a platform is that users can find and harvest the available continuous and auxiliary RS-enabled EBV products provided by different space agencies, national and international organizations at various scales (e.g., local, national and global).
- This service facilitates the monitoring of biodiversity and provides the first level of concept between low-level primary observation and high-level indicators of biodiversity as required for researchers, science institutions, stakeholders, and decision-makers.

Reference

Skidmore, A. (2015). Agree on biodiversity metrics to track from space (vol 523, pg 403, 2015). NATURE, 524, 31-31

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For more information

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NextGEOSS Biodiversity Pilot 6.2.1:

Generating Remote Sensing- enabled Essential Biodiversity Variables using high-resolution data

What are EBVs?

Essential Biodiversity Variables (EBVs) have been proposed by GEO BON as a layer between biodiversity observation and biodiversity indicators used in the policy formulation. However, the biodiversity community still lacks a global observing system that revolves around the monitoring of a set of agreed variables essential to the tracking of changes in biological diversity on Earth. Therefore, there is an urgent need for remote sensing for EBVs to fill the spatial and temporal gaps between in situ observation data of biodiversity.

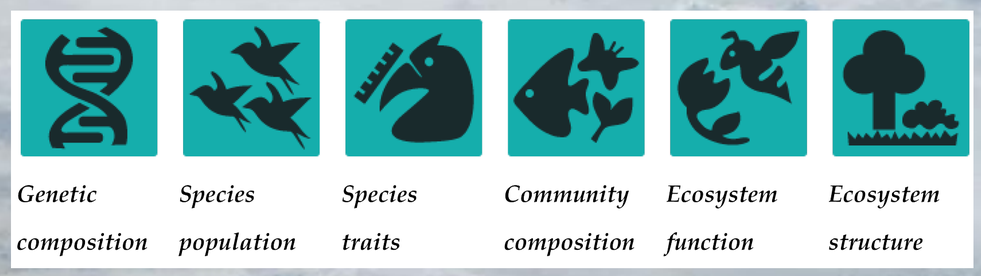

Fig. 1. Essential biodiversity variables classes which suggested by GEO BON community.

In NextGEOSS Biodiversity Pilot WP 6.2.1, we focus on:

Generating RS-enabled EBVs using high-resolution satellite data (Sentinel-2). From the RS-enabled EBVs, which were initially proposed to be derived from high-resolution satellite data, leaf area index (LAI) was selected as one of the most important vegetation biophysical parameters as well as the EBVs.

The Terradue cloud platform was used for the implementation of the data processing algorithm, and the product was deposited at ITC server (Faculty of Geo-Information Science and Earth Observation, University of Twente, the Netherlands). The product is available in Geo TIFF format and will be removed from the server after 48h.

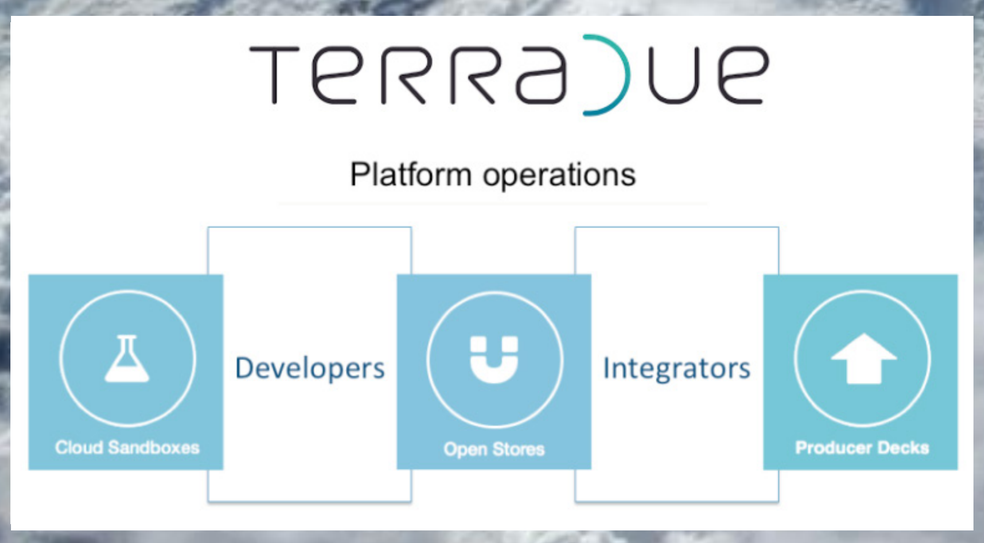

Fig. 2. The cornerstone of Terradue's cloud platform operations (Caumont et al. 2014)

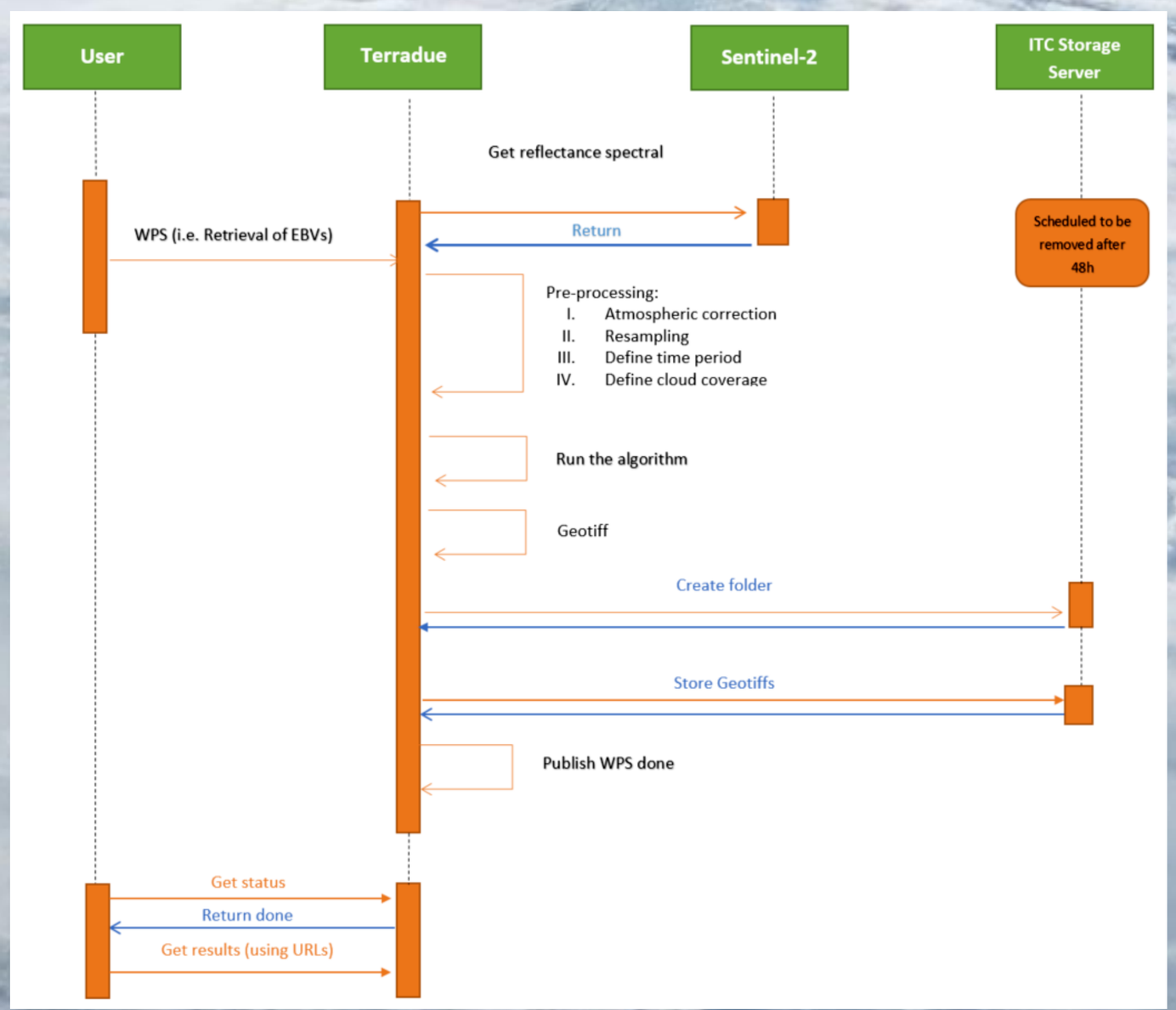

Fig. 3. The integration process for data processing for the prediction of the RS-enabled EBVs LAI over the Netherlands on Terradue cloud platform.

Sentinel-2 data (Level-2A product) was used and further LAI was retrieved using the relationship between LAI and Enhanced Vegetation Index established by Boegh et al. (2002).

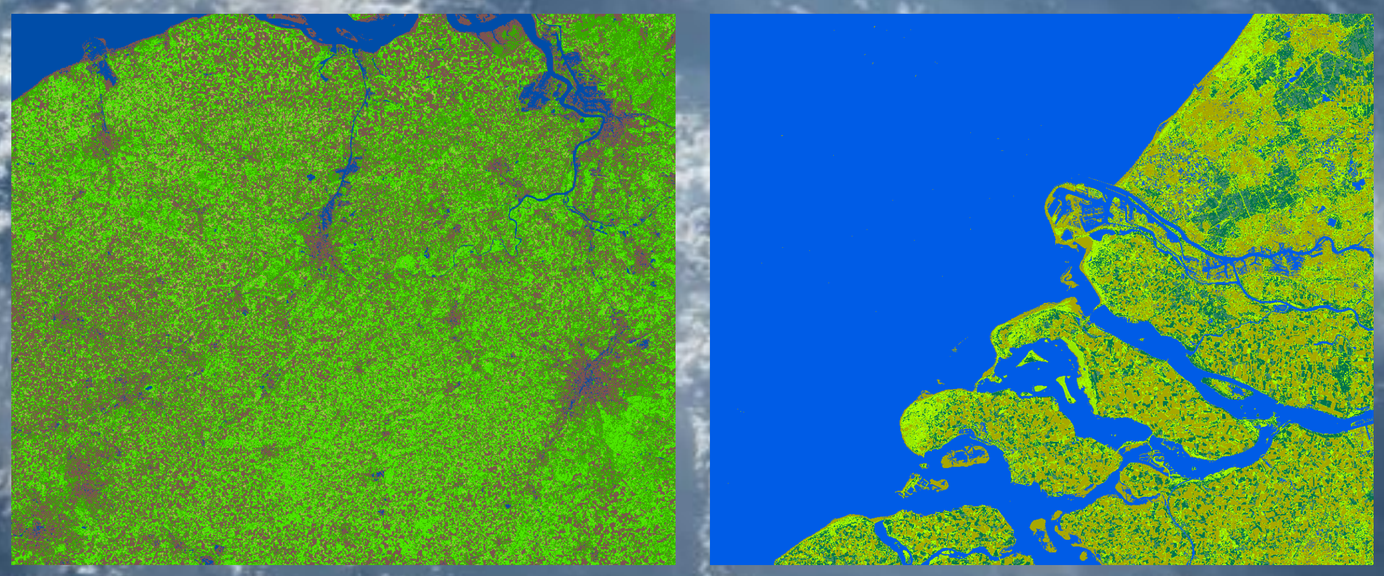

Fig. 4. Leaf area index predicted over the Netherlands using Sentinel-2 data, on 6th May 2018 in NextGEOSS biodiversity pilot.

The potential use of the NextGEOSS Biodiversity pilot to generate EBVs for GEO Community

- The unique value of using EBVs community portal is that users can retrieve and compute the critical EBVs using high-resolution remotely sensed data (Sentinel-2.)
- This service facilitates the monitoring of biodiversity and provides the first level of concept between low-level primary observation and high-level indicators of biodiversity as required for researchers, science institutions, stakeholders, and decision-makers.

References

Boegh, E., Søgaard, H., Broge, N., Hasager, C., Jensen, N., Schelde, K., & Thomsen, A. (2002). Airborne multispectral data for quantifying leaf area index, nitrogen concentration, and photosynthetic efficiency in agriculture. Remote Sensing of Environment, 81, 179-193

Caumont, H., Brito, F., & Boissier, E. (2014). Big Earth Sciences & the new 'Platform economy. In, Big Data From Space Conference, Frascati, Italy: Citeseer

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