

RAM NA

Rangeland Monitoring for Africa Using Earth Observation - Continental Demonstrator

Project achievements – Sponsor request 3210bc



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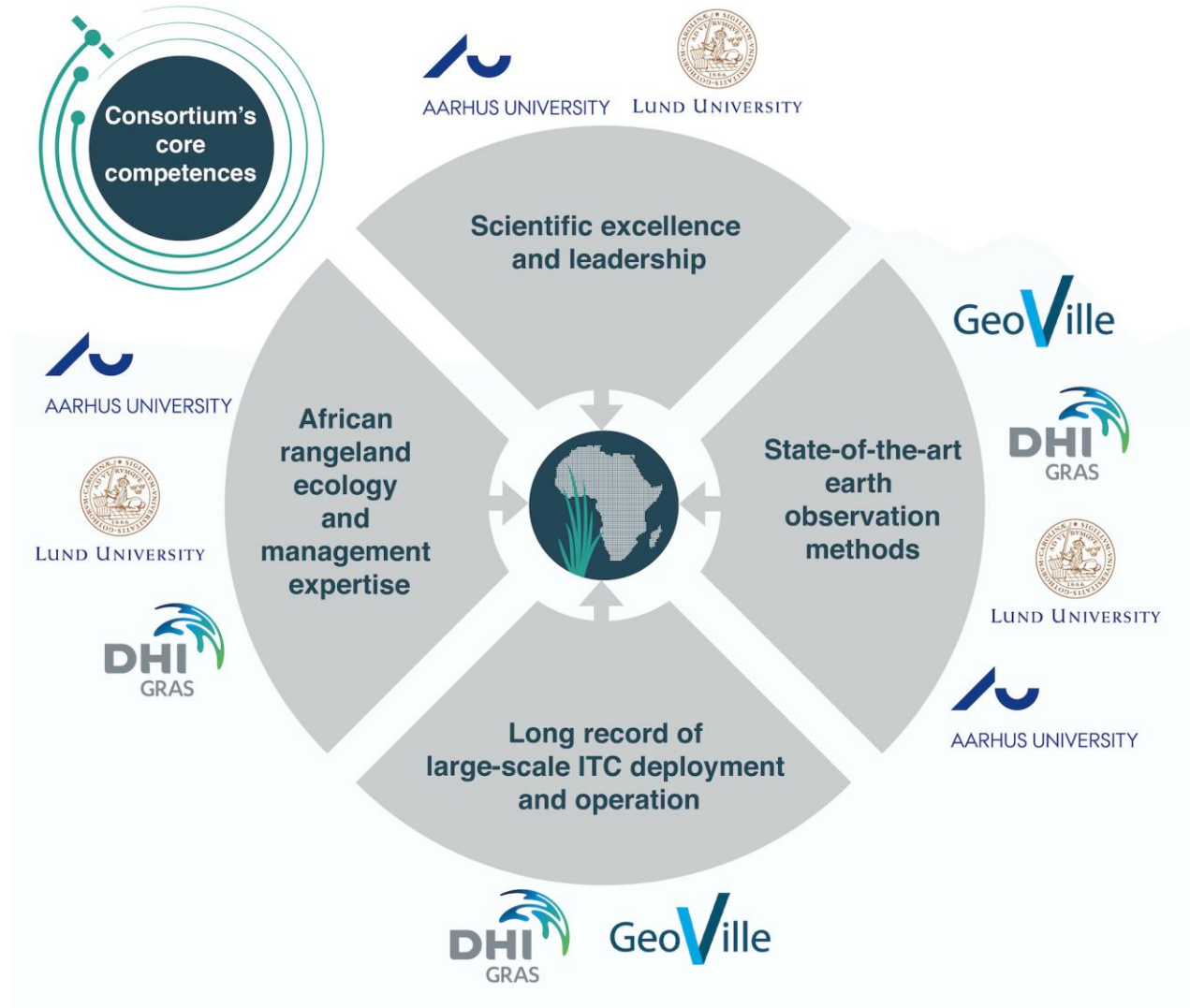


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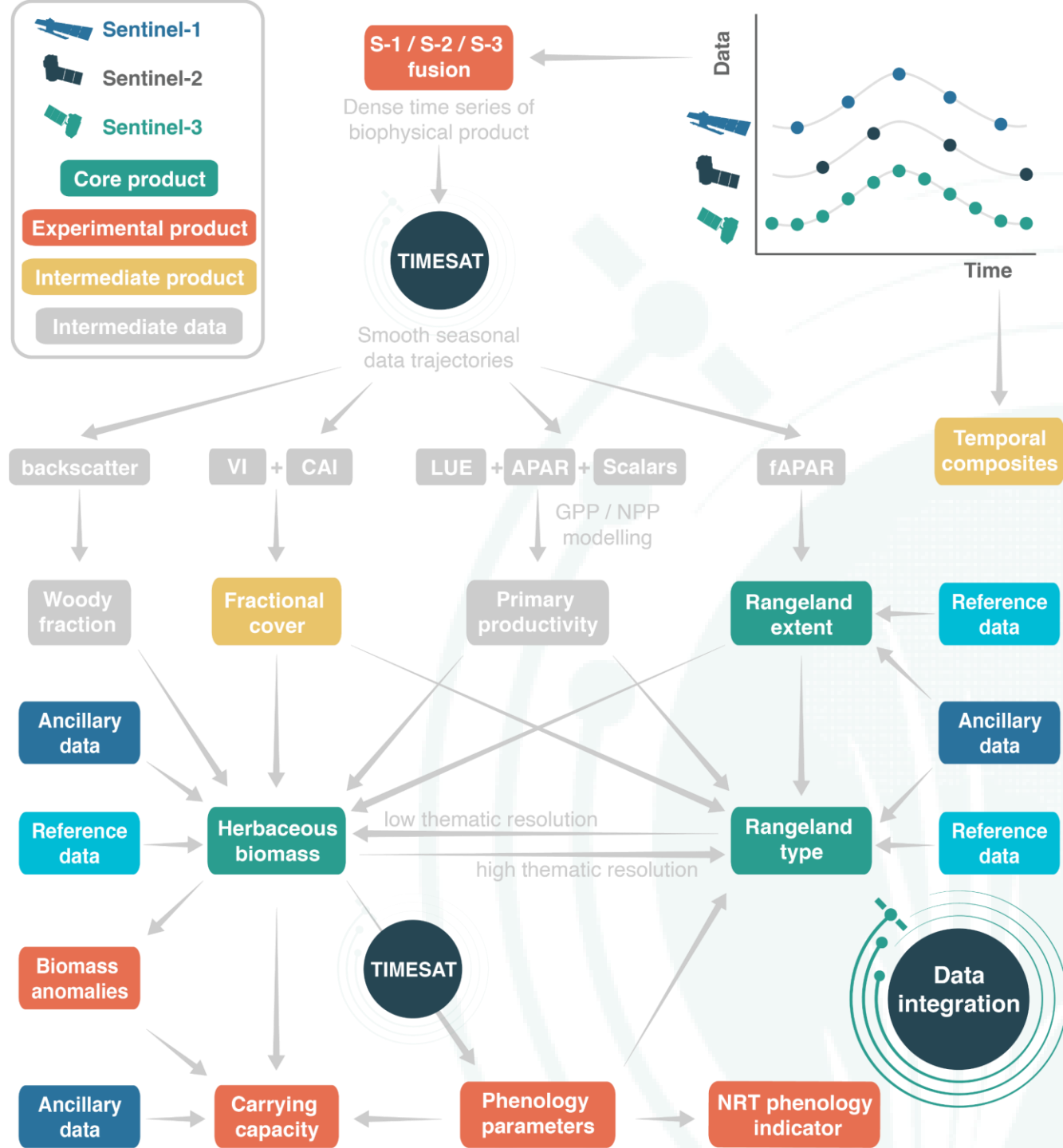
Consortium & Partners:



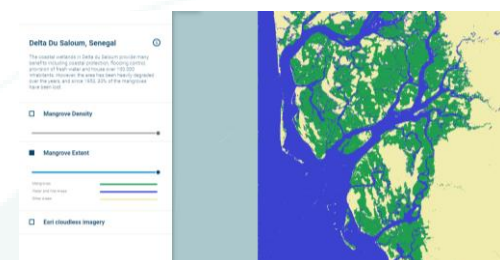
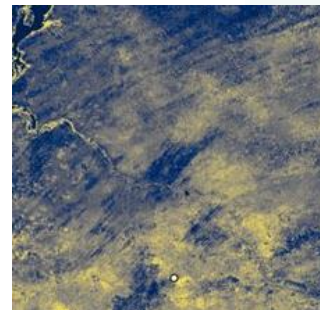
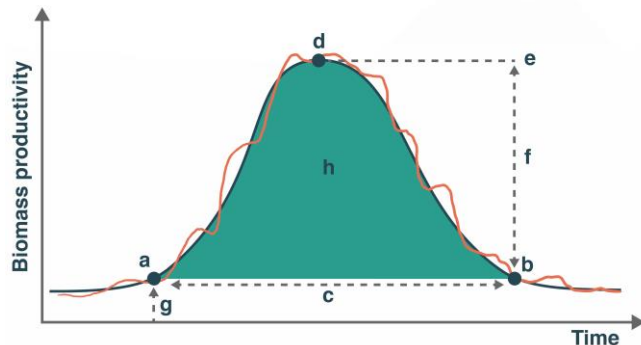
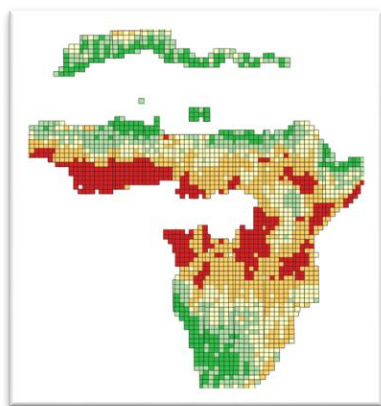
Project objectives

- Develop and implement a prototype for an EO based rangeland monitoring system at continental scale for Africa. It shall be based on synergetic utilisation of Sentinel-1 SAR and Sentinel-2 as well as Sentinel-3 multi-spectral data and shall cover the entire continent at 10m spatial resolution.
- The products, under which the core products are Rangeland type, extent and herbaceous biomass, makes use of the synergies from the three Sentinel constellations in order to get cloud-free dense timeseries data.
- More information available at: <https://www.ramona.earth/>

Detailed project flow



Simplified project flow



1. Input data

Sentinel
synergetic
input data

2. TIMESAT

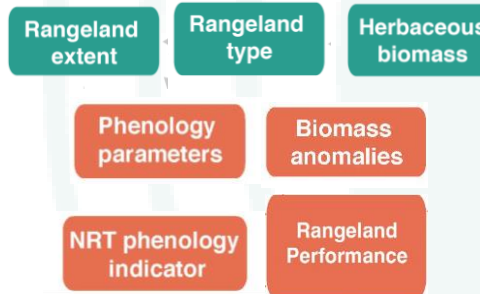
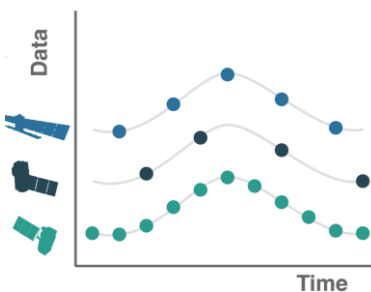
Smoothing

3. Products

Core &
experimental

4. Continental scale

Finalize and
scale

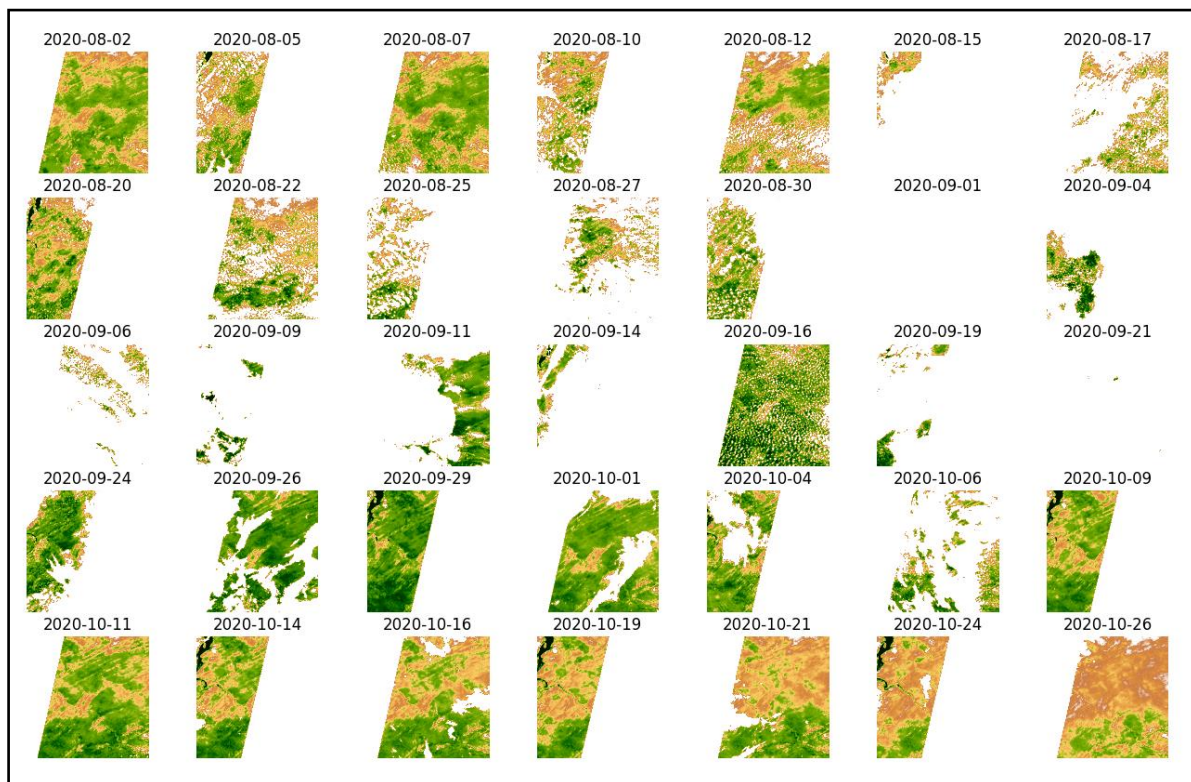


Note: This is also the structure used for the presentation moving forward ⁵

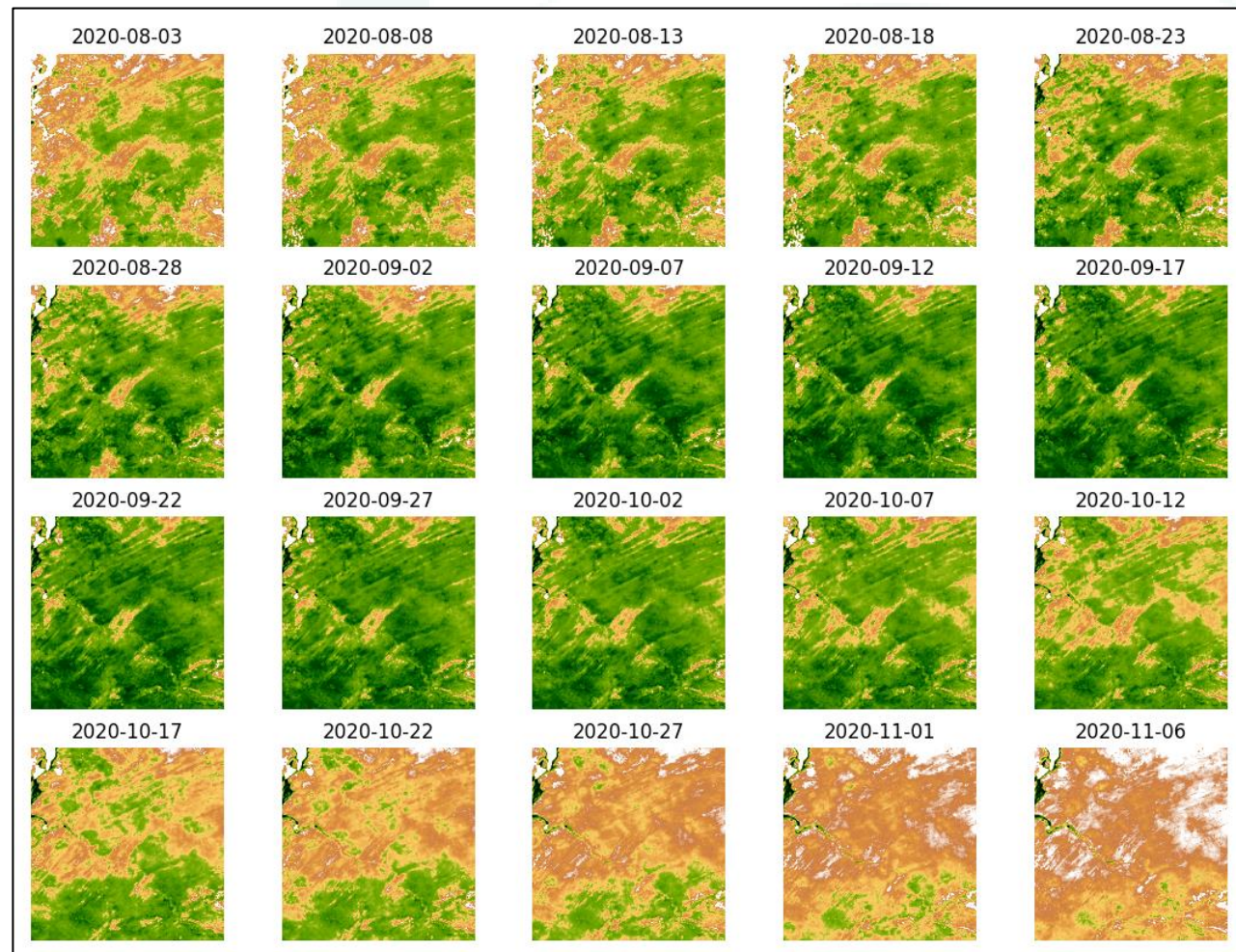
1. Fusion product output

Example of the output from the first step of the project workflow (Fusion step):

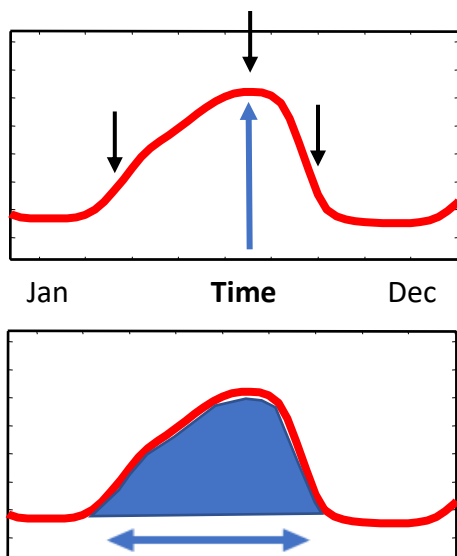
Sentinel-2



Fusion products



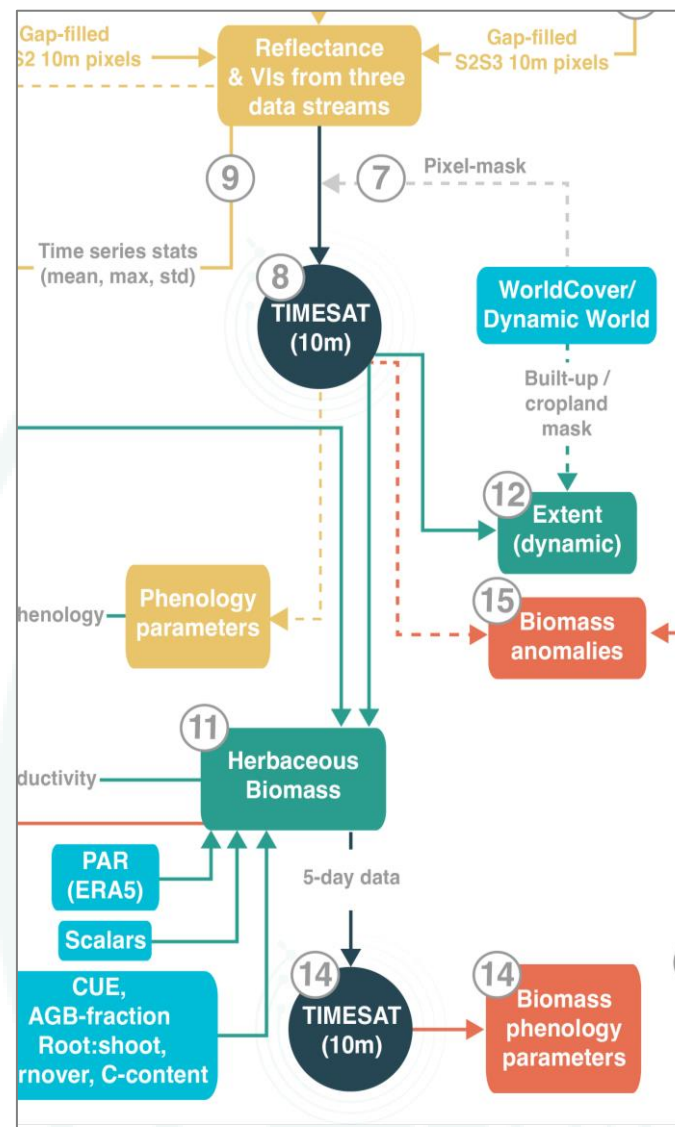
2. TIMESAT product output



- Start of season
- End of season
- Length of season
- Total productivity
- Amplitude
- etc.

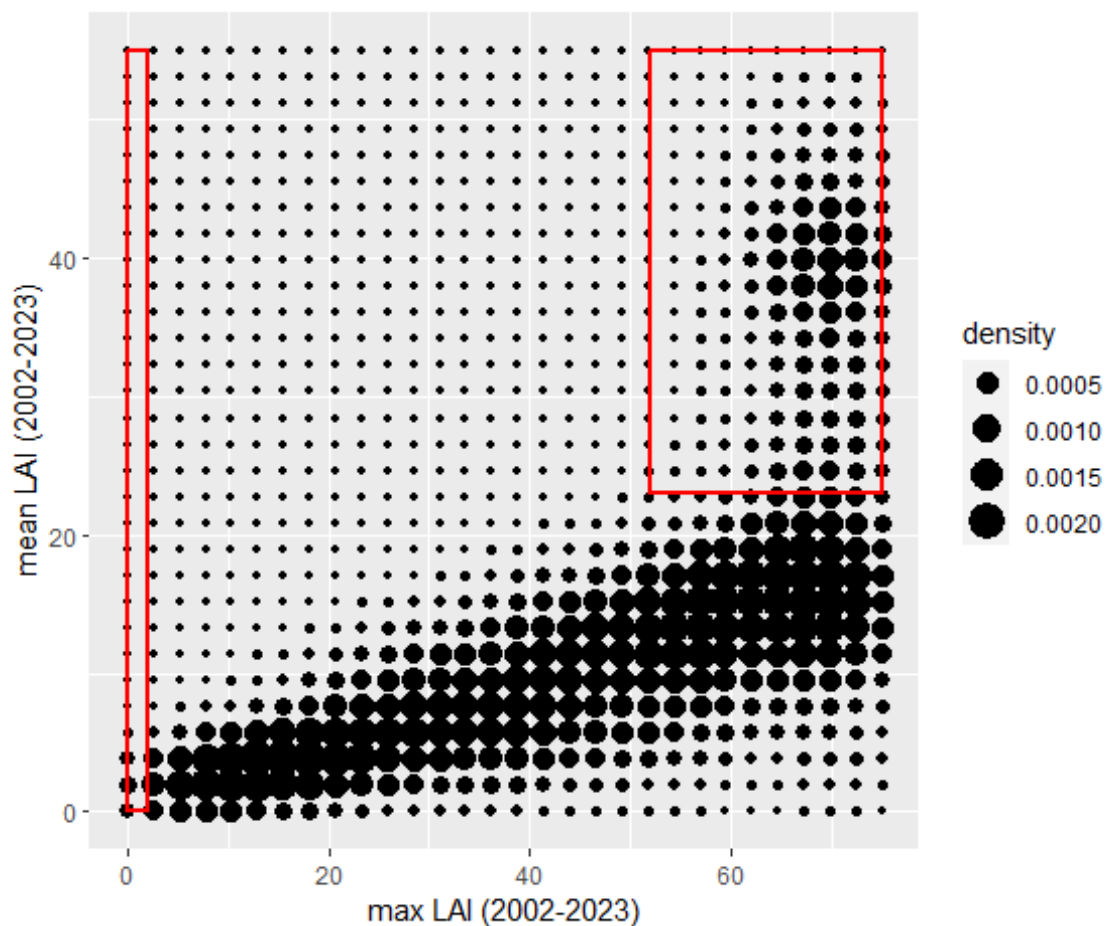
Output

- Smooth seasonal profiles – output at 5-day time steps
- Phenological parameters



3. Rangeland Extent

By utilizing the TIMESAT output data, the Rangeland extent map can be produced:

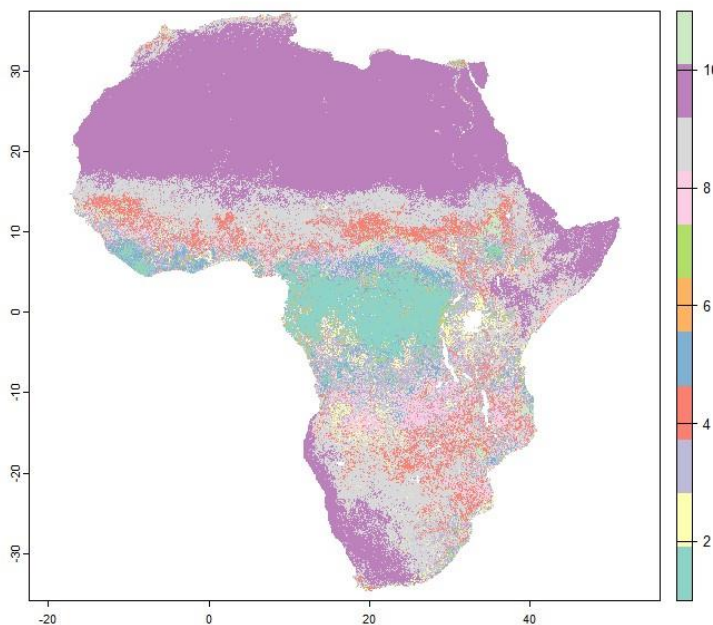


3. Rangeland Type

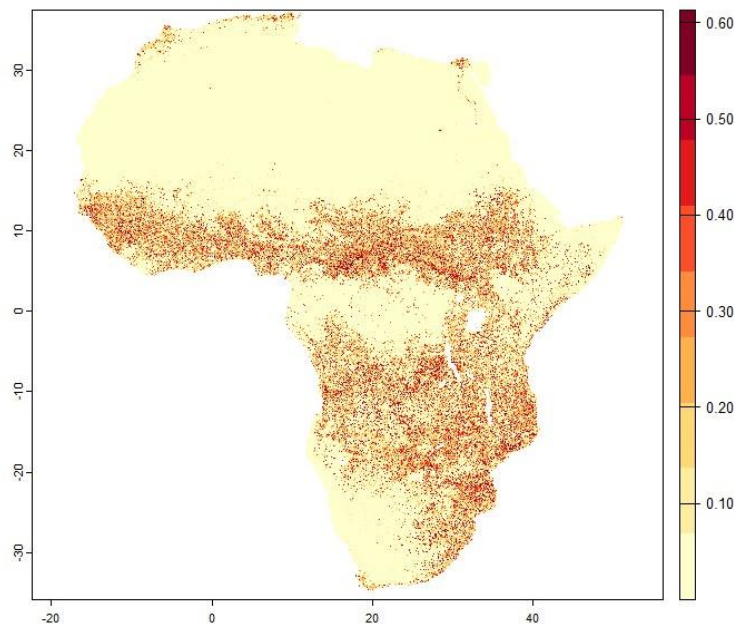
By utilizing the TIMESAT output data and additional ancillary data the Rangeland type can be produced, for this a Two-step approach is followed:

- Pre-clustering using kmeans (due to data size)
- Followed by further clustering small kmeans clusters using mixture model

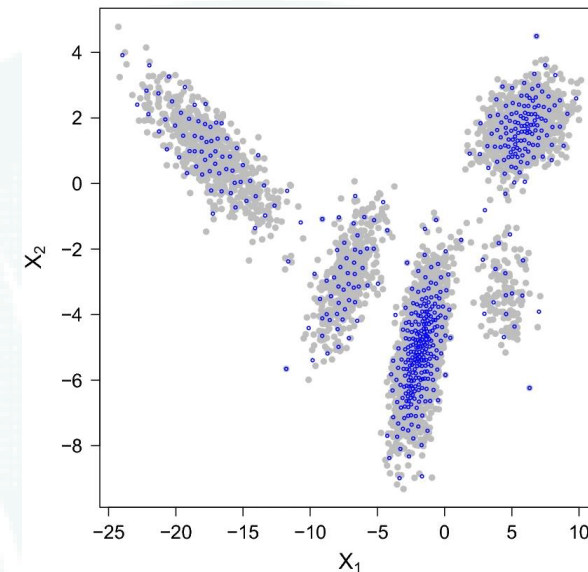
11 classes



Uncertainty

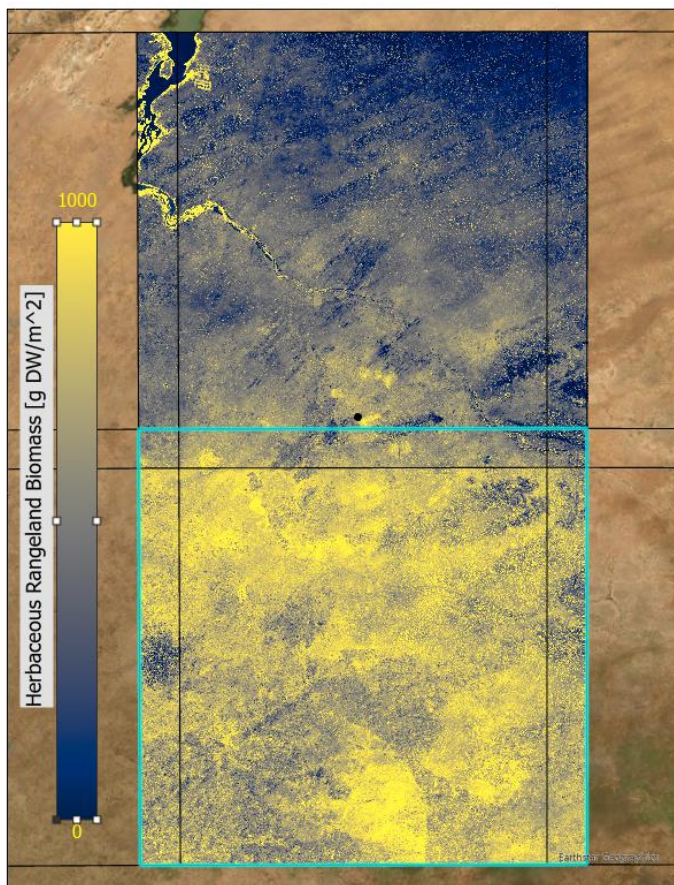


I. Ullah, K. Mengersen, *J Big Data*. 6, 29 (2019).

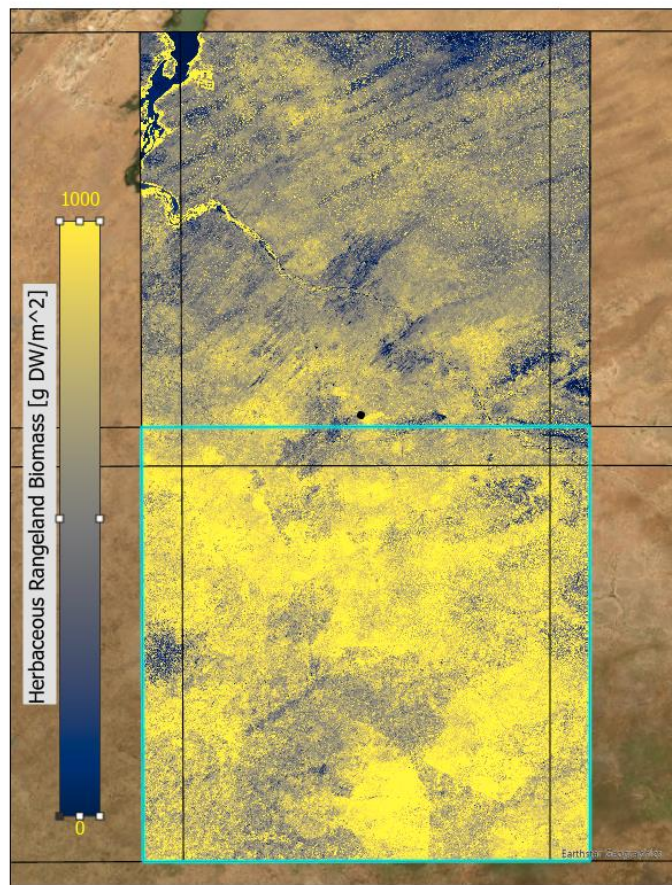


3. Herbaceous Rangeland Biomass (HRB)

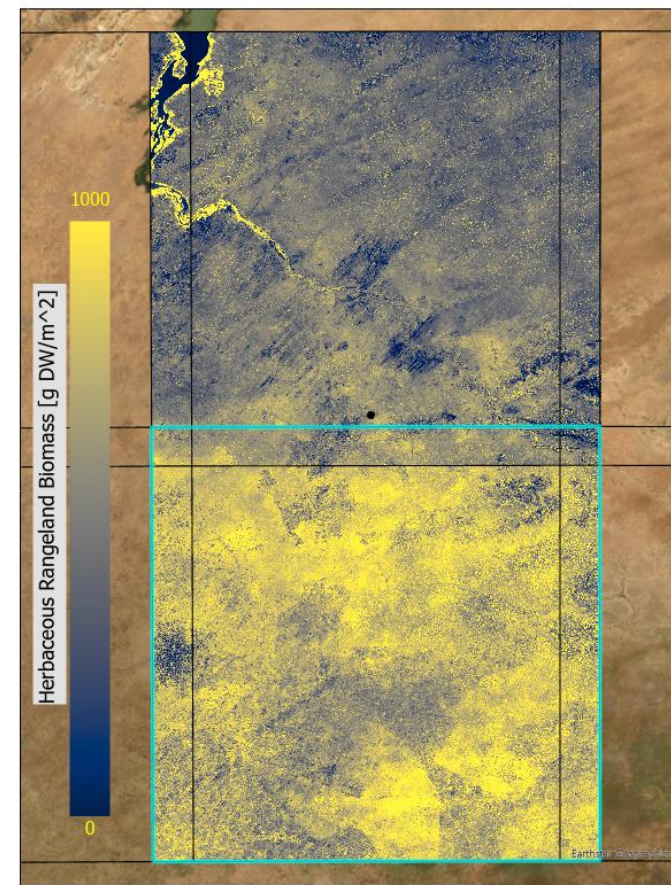
2019



2020



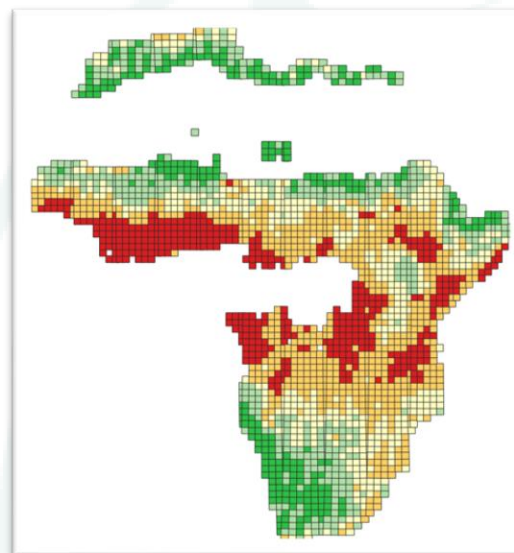
2021



Senegal, tile 28PDC and 28PDB using fAPAR from fused Sentinel-1 and Sentinel-2

4. Continental Scale Production

- All the products mentioned in this presentation are therefore being produced at 10m spatial resolution.
- The following Sentinel-2 tiles classifying as “Rangeland” will be produced:
- The products cover the period:
01.08.2021 – 31.01.2023
- The products will be made available on a project portal and will be accessible via the same address, currently used for the project brochure:
<https://www.ramona.earth/>



Thank you!