Ouadi Rimé - Ouadi Achim Wildlife Reserve (OROAWR) seen from space

Analysis of the nexus Transhumance / Conservation / Security

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Agenda

- ➢ **Presentation of OROAWR**

- ➢ **Climate**
  - ❑ Precipitations
  - ❑ Temperature

- ➢ **Vegetation and pasture**
  - ❑ Dry Matter Productivity (DMP)
  - ❑ Anomaly of DMP

- ➢ **Agriculture**

- ➢ **Water resources**

- ➢ **Transhumance**
  - ❑ Risk of conflict between farmers and transhumant
  - ❑ Optical images for the automatic detection

- ➢ **Fire breaks efficiency**

- ➢ **Automatic detection of active fires and burnt areas**

Ouadi Rimé-Ouadi Achim Wildlife Reserve (Chad)

Presentation

➢ **Creation and size**: Established in 1969, it spans approximately 78,000 km².

➢ **Climate**: Arid, typical of the Sahel, with rainy seasons that influence the availability of pastures.

➢ **Vegetation**: Primarily consists of shrubs and grasses adapted to the semi-arid climate.

➢ **Fauna**: Rich in wildlife, the reserve serves as a crucial refuge for endangered species, including antelopes, gazelles, and oryxes.

➢ **Transhumance**: The area experiences significant seasonal movements of pastoralists and their livestock with high concentrations of cattle during certain times of the year.

➢ **Agriculture**: Small-scale farming around the reserve edges, often leading to conflicts over land and water use.

➢ **Security**: The region faces challenges related to poaching and conflicts between herders and farmers, impacting both conservation and community safety.

➢ **Great Green Wall**: The reserve is crossed by the Great Green Wall project, a pan-African initiative aimed at combating desertification and promoting biodiversity through the planting of trees across thousands of kilometers across Africa.

Ouadi Rimé – Ouadi Achim Wildlife Reserve
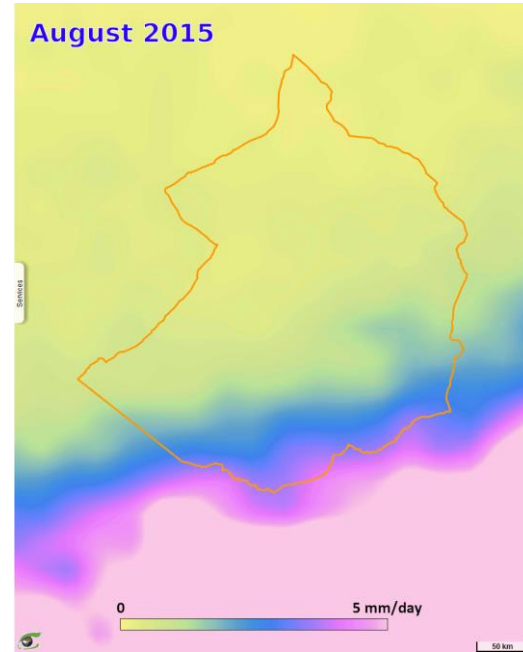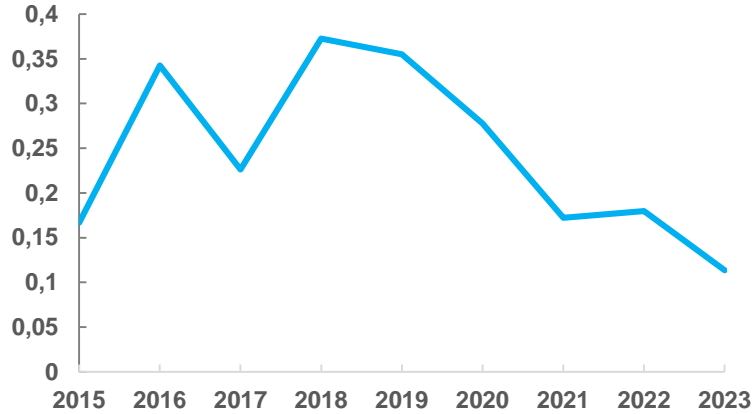Biodiversity and transhumance
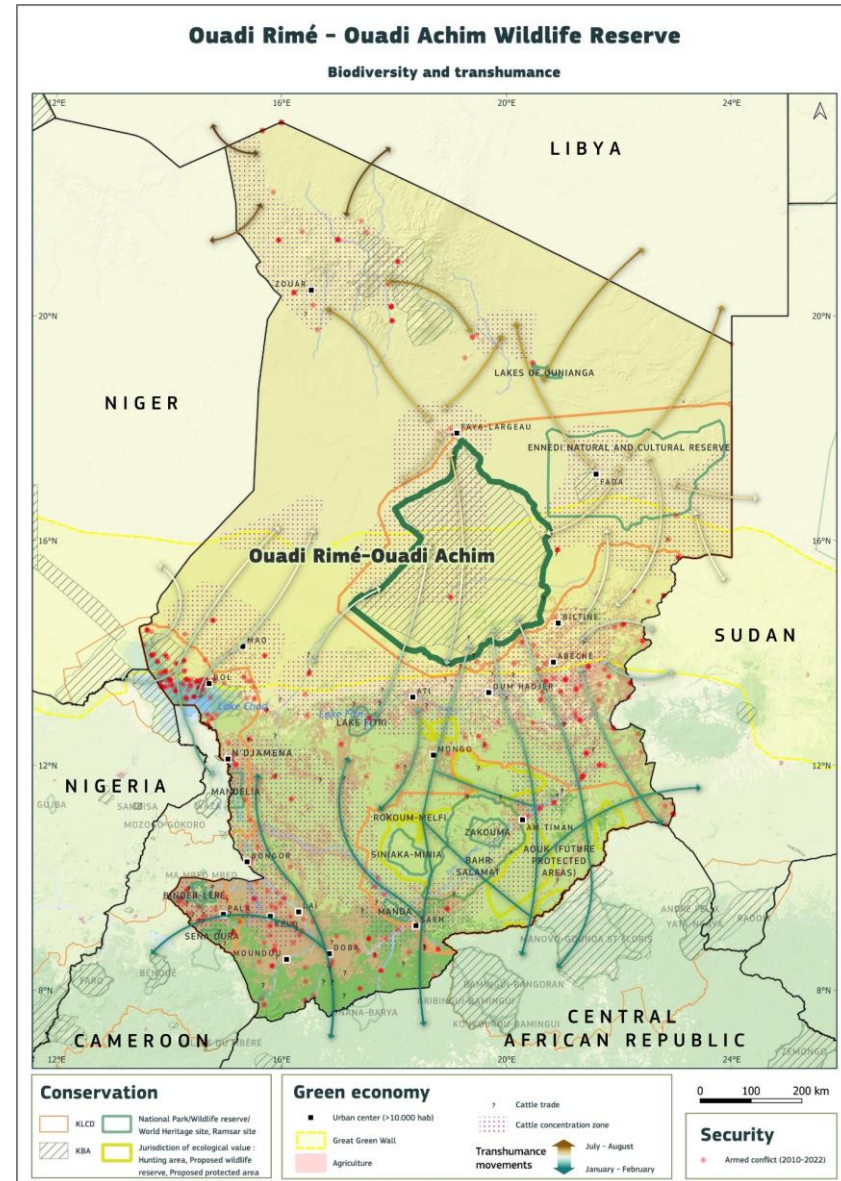
Climate

Precipitations

Annual mean precipitations (mm/day) ▶

August 2015

Animation of precipitations on August between 2015 and 2023 (mm/day)

0   5 mm/day

Monthly mean precipitations (mm/day) ▶

○ All ● Mean ○ Std.dev. ○ Min. ○ Max.   100%
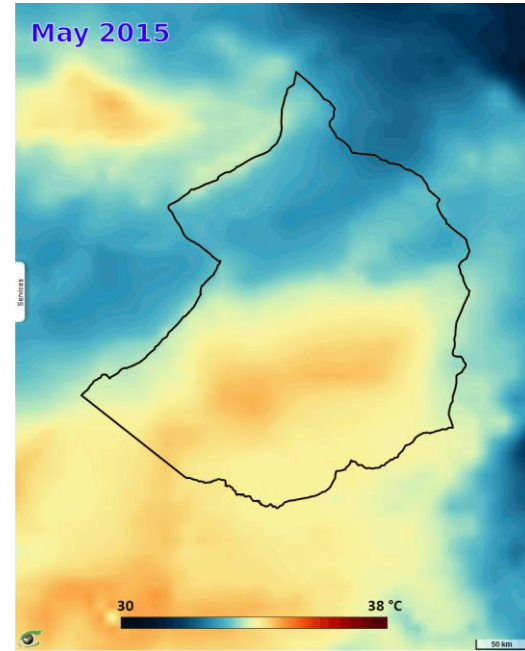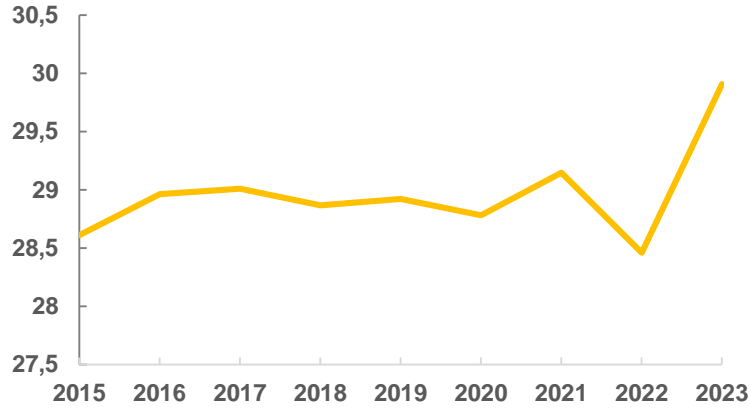

2019
2016
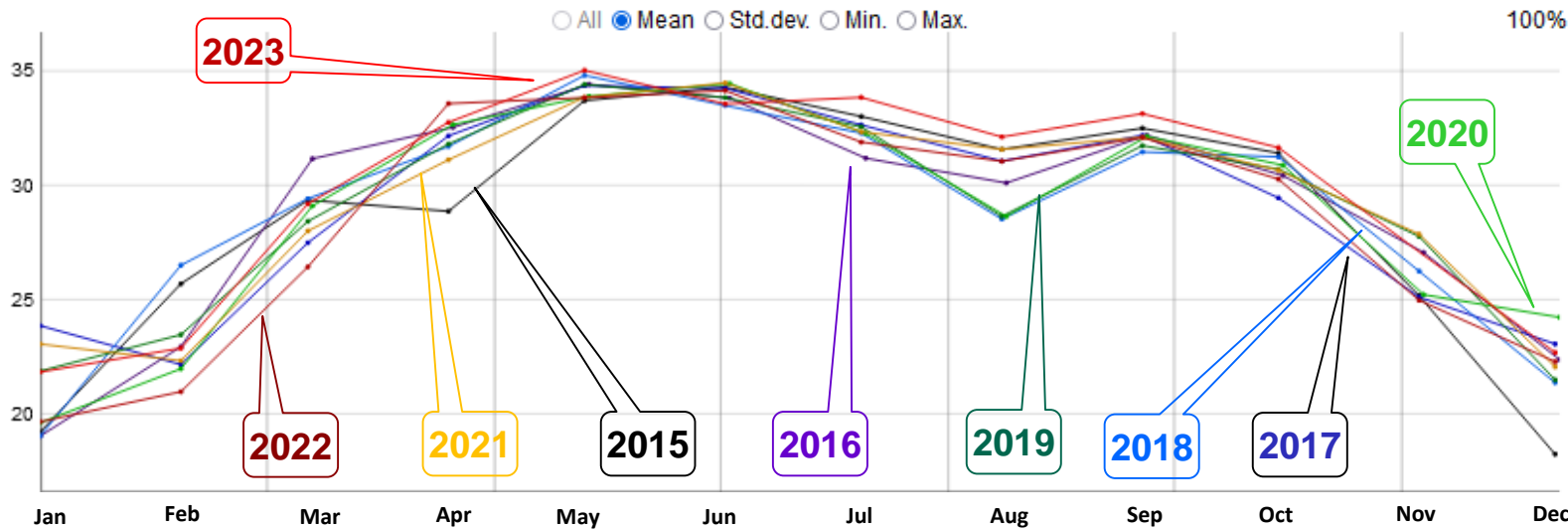2018
2022
2020
2021
2017
2023
2015
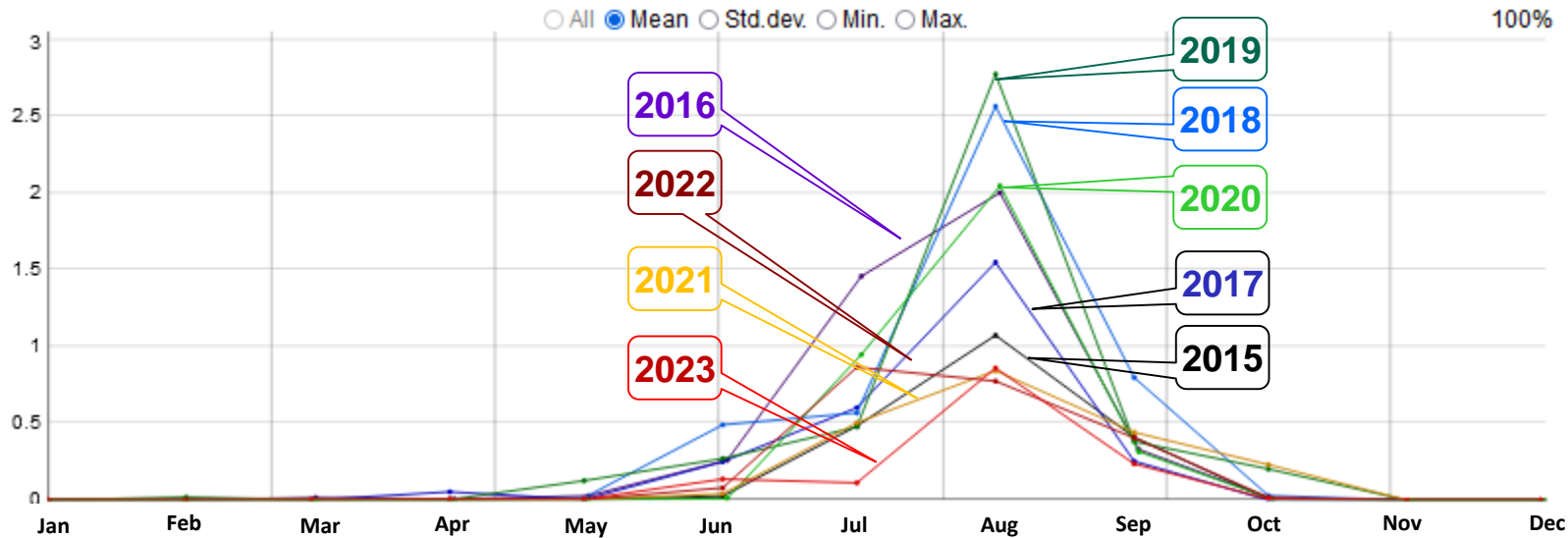
Climate

Temperature

Annual average temperature (°C) ▶

Animation of temperature on May between 2015 and 2023 (°C)
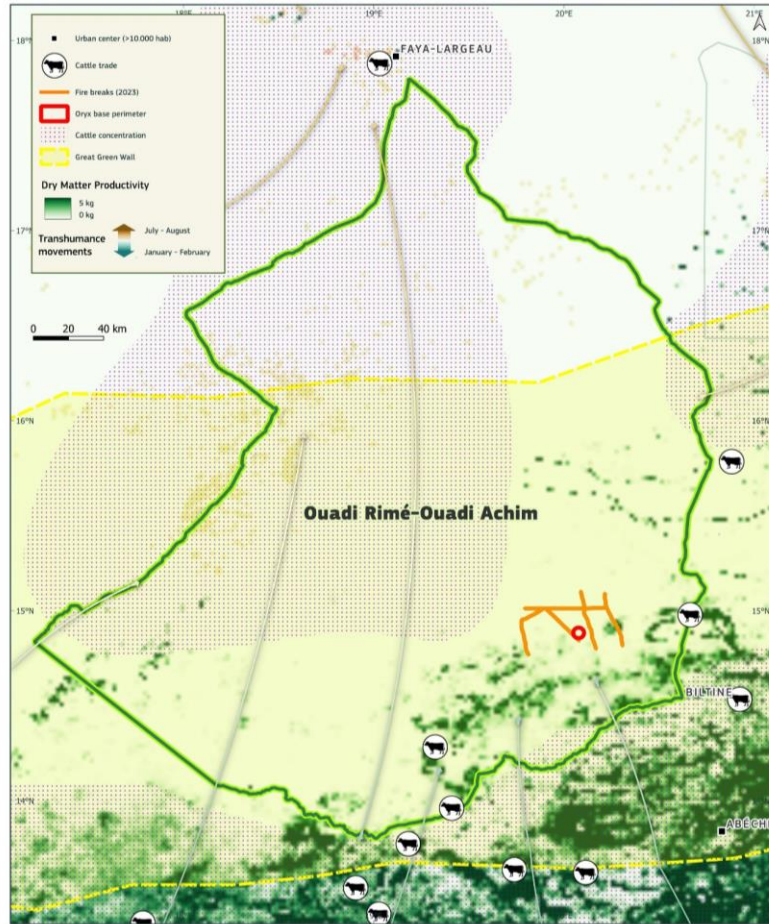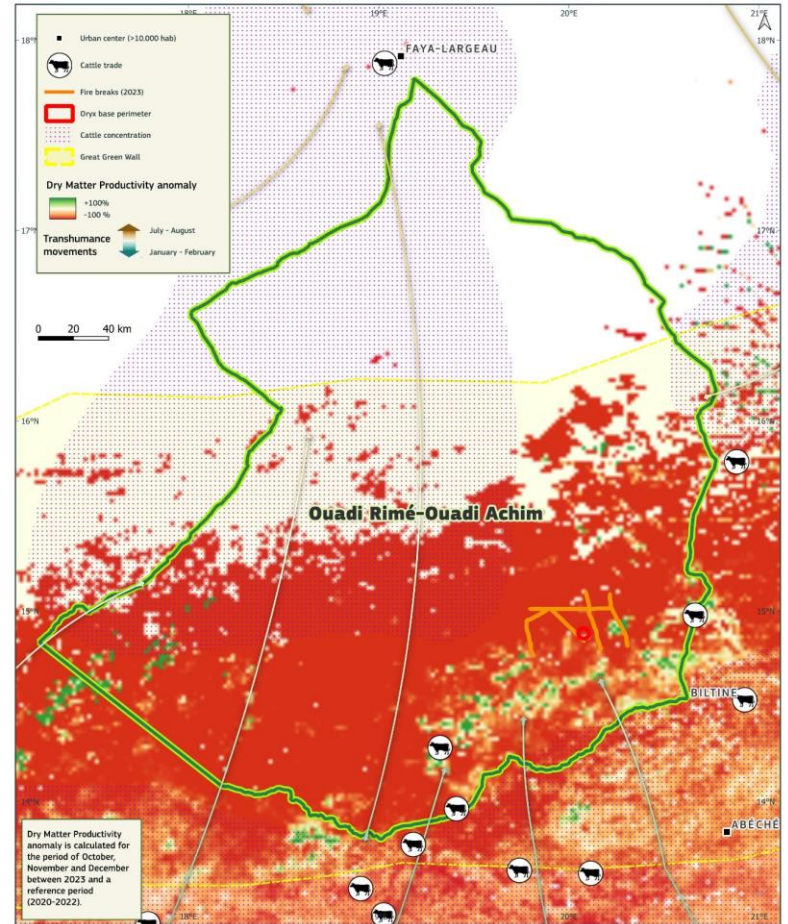
Monthly mean temperature (°C) ▶

Vegetation and pasture

Dry Matter productivity (DMP)

DMP represents the overall growth rate or the increase in dry biomass of vegetation, expressed in kg/ha/day at 300 m of spatial resolution ([Copernicus Land Service](#)) .
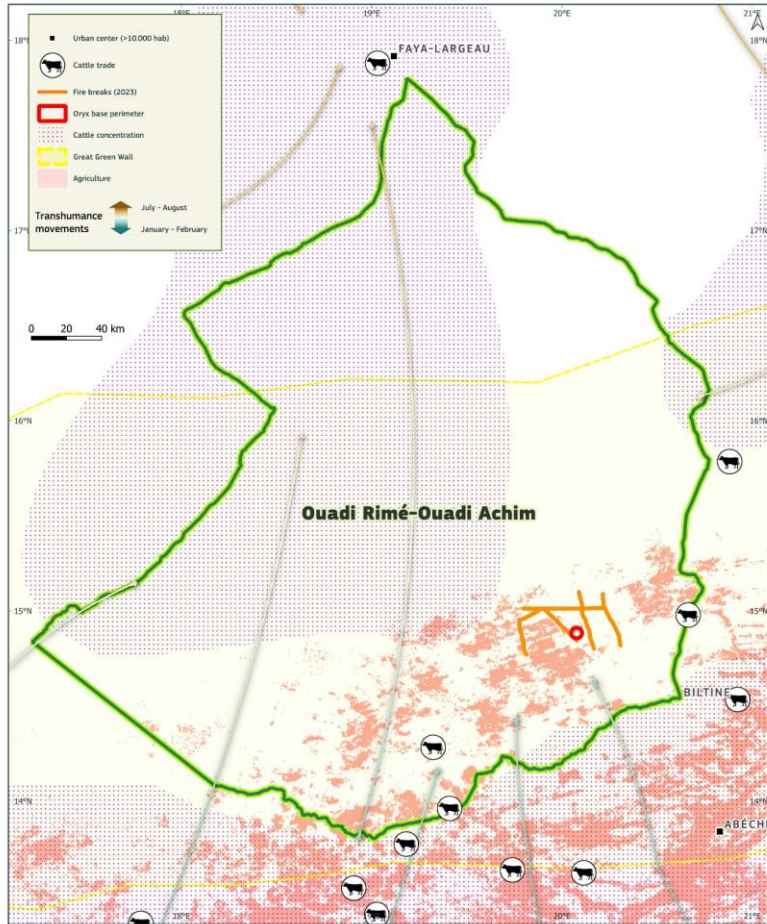

DMP for 2023 for the period October to December

DMP anomaly for the period of October to December between 2023 and a reference period (2020-2022).
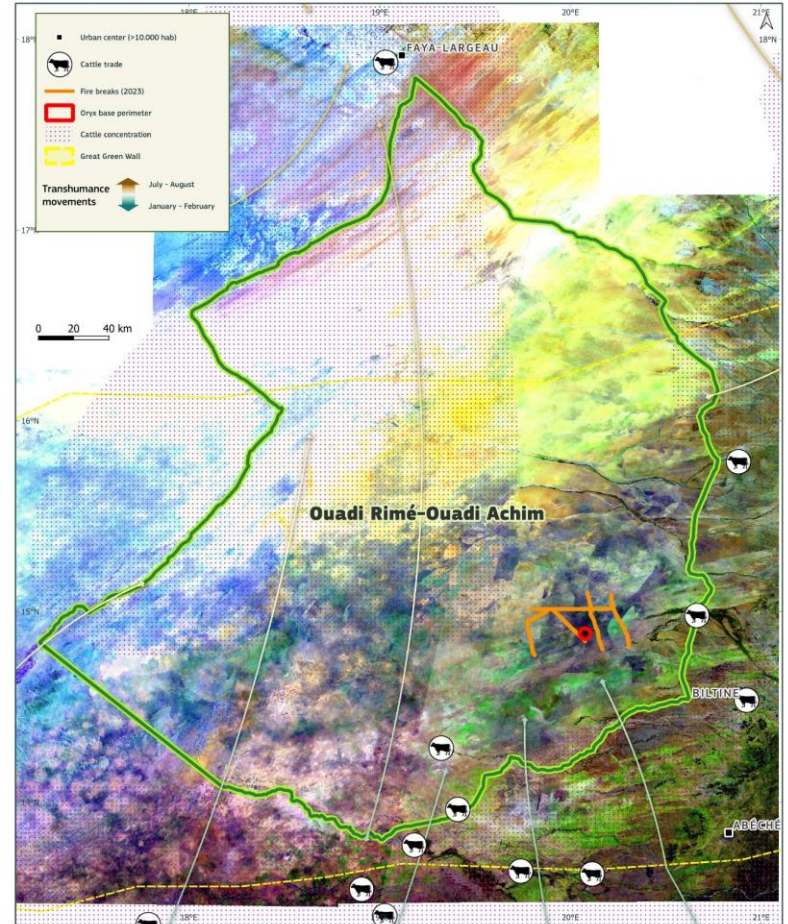
![Agriculture logo] **Agriculture**

Crop land

Data provided by the Join Research Center ([JRC](#)) at 500 m of spatial resolution.
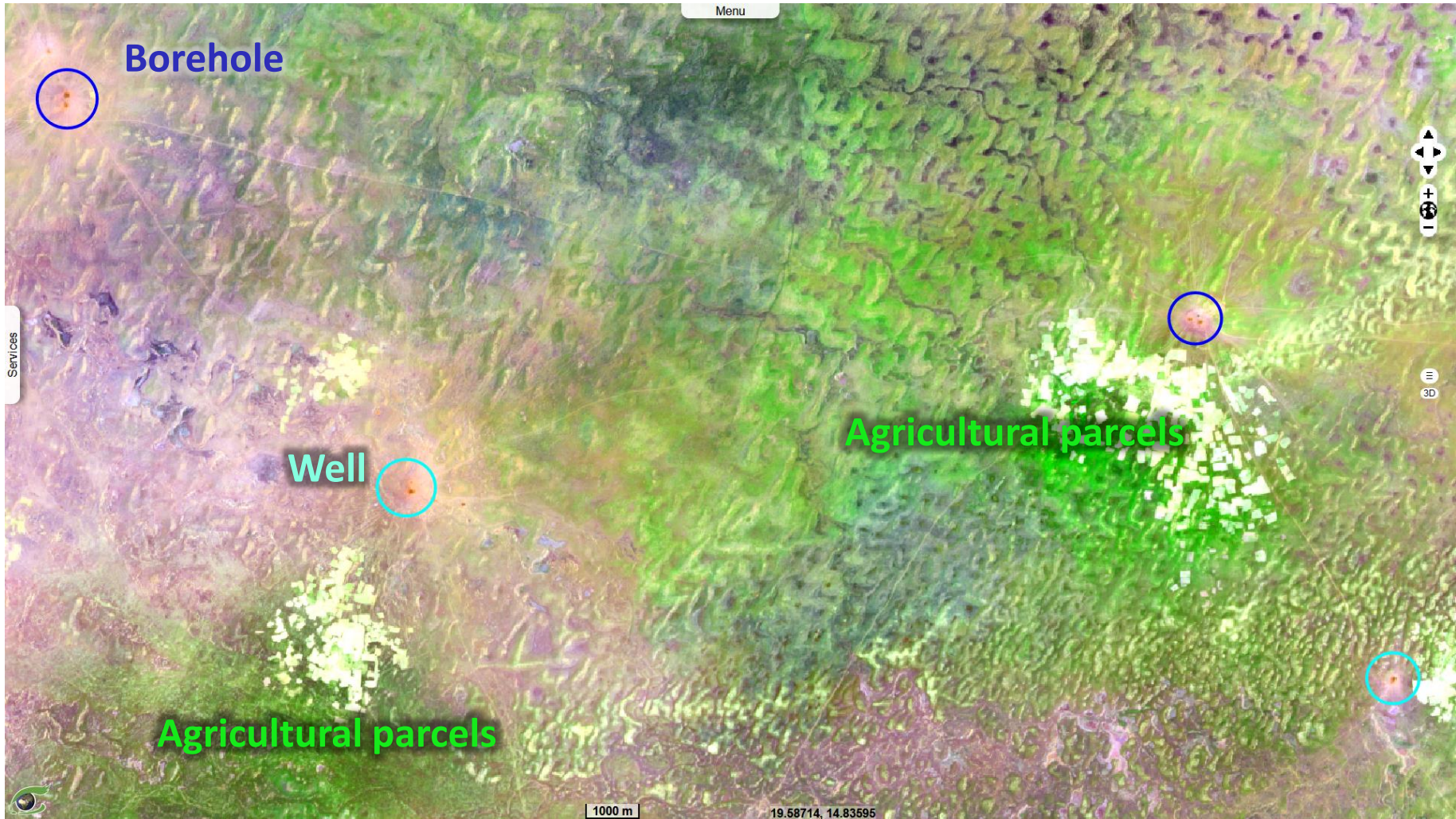

Crop land mask (2019)

Sentinel-2 view in SWIR-NIR-Blue colour composite (October 2023)

Water points

Sentinel-2 view in SWIR-NIR-Blue colour composite (October 2022) showing wells (cyan circles) and boreholes (blue circles)
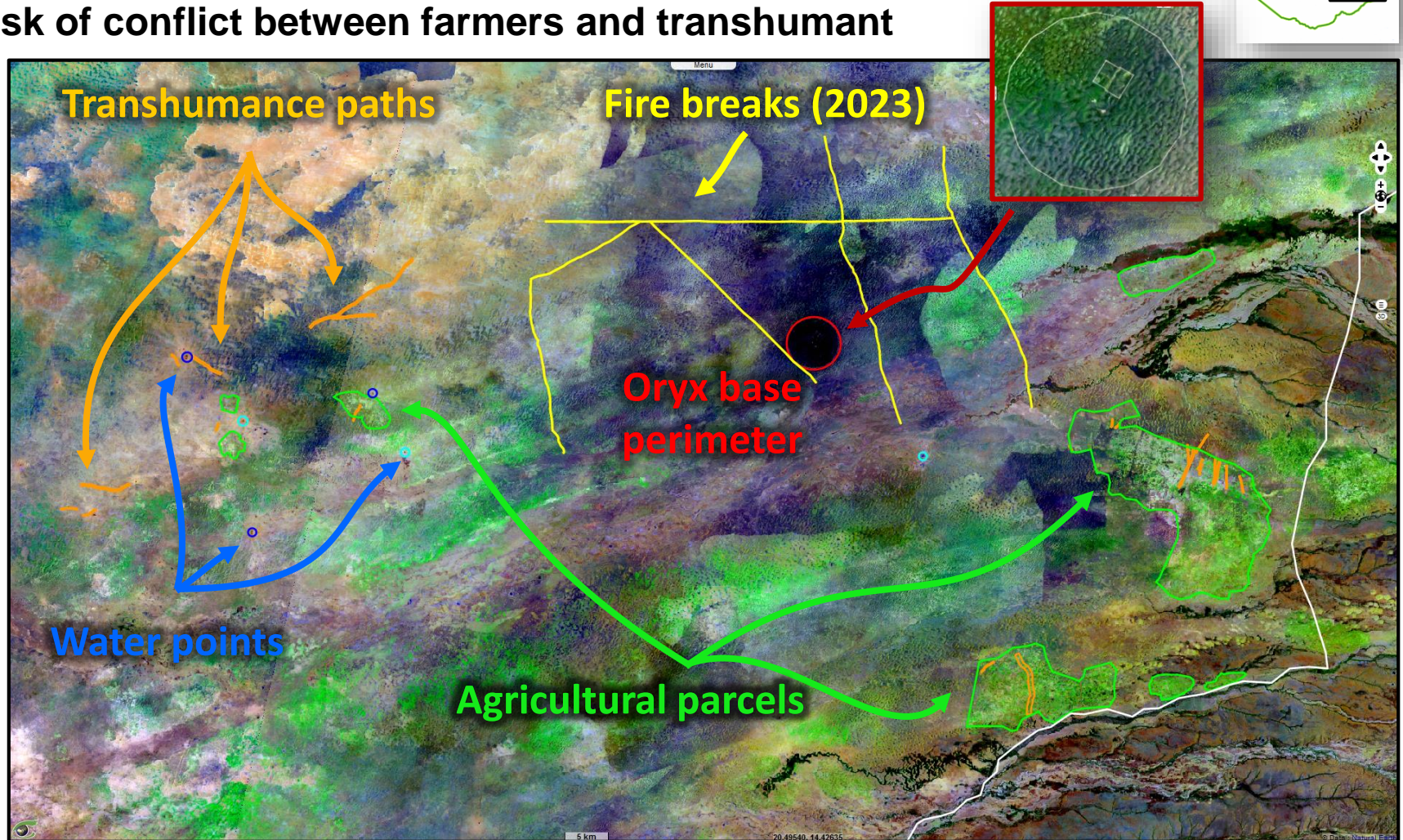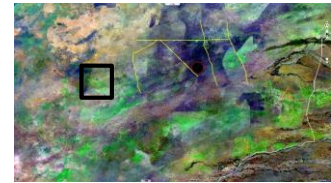
Transhumance

Risk of conflict between farmers and transhumant

Sentinel-2 optical images acquired between the 22 and 24 October 2023 with observed transhumance paths (orange corridors) coming from or heading towards water points (cyan and blue circles) and crossing agricultural parcels (green polygons) near the perimeter of the Oryx base (red circle) southeast of the reserve (white polygon). (hyperlook link)
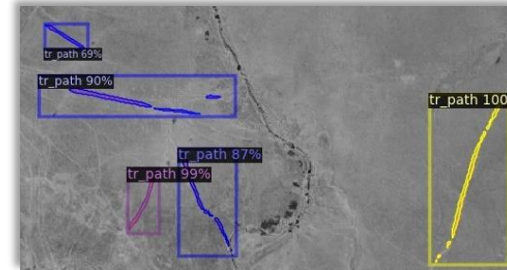
Transhumance

Sentinel-2 optical images for the automatic detection of transhumance paths

➤ Automated detection methods for transhumance routes using Sentinel-2 optical images and machine learning techniques are under development and improvement.

➤ The figures below show an example of transhumance paths observed on Sentinel-2 images in the southeast of the OROAWR.

Example of transhumance paths automatically detected in north Cameroon using Mask R-CNN algorithm
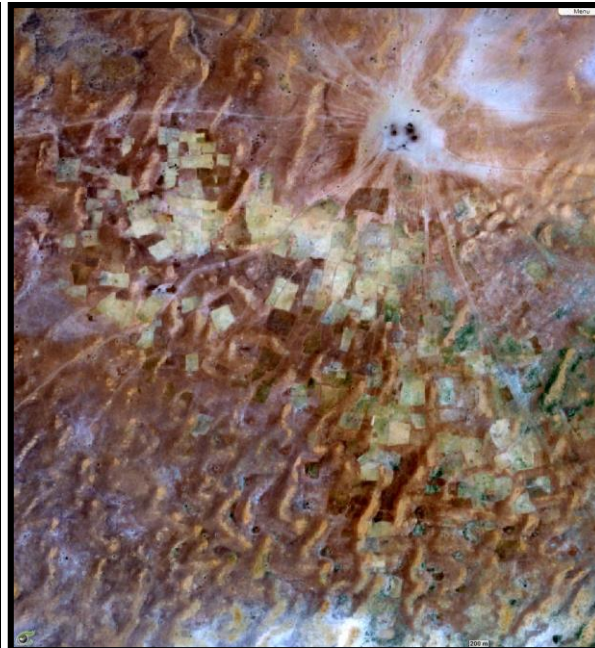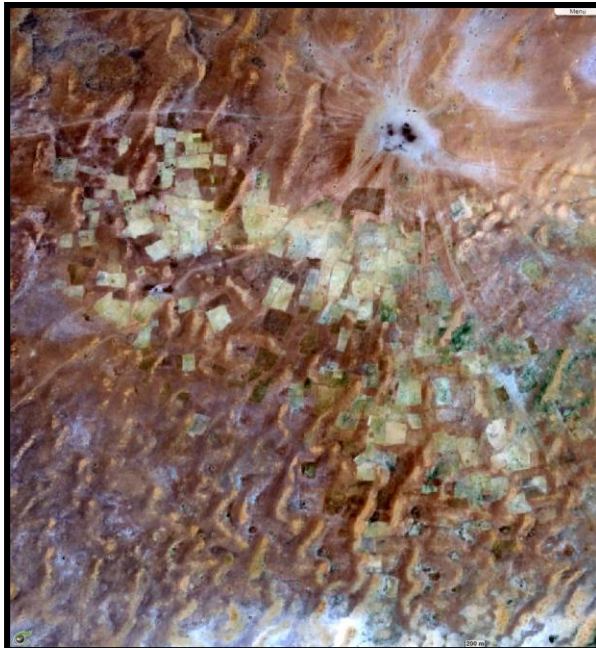
Natural colour composite (24.10.2023, previous)   *Natural colour composite (03.11.2023, current)*   *Ndi(8c,8p),8c,8p*

Where : -NDI = Normalised Difference Index, -8c = Bande 8 (Nar infrared) for the current Sentinel-2 acquisition, -8p = Bande 8 (Nar infrared) for the previous Sentinel-2 acquisition
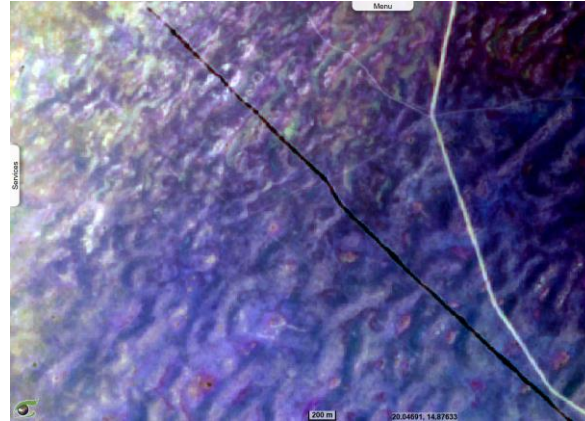
Fire breaks efficiency

➢ Fire breaks

*Aerial view of fire breaks (source :Sahara conservation).*

Sentinel-2 view of fire breaks in natural colour composite (https://visioterra.org/VtWeb/hyperlook/86e0b9d5cc1a42d49d4 fcac0d4bf6887).

Fire breaks = strips that are first harrowed on the outer edges using tractors provided by the Ministry of the Environment, before conducting a controlled burn between them (source :Sahara conservation).

➢ Burnt areas and the <u>efficiency</u> of fire breaks

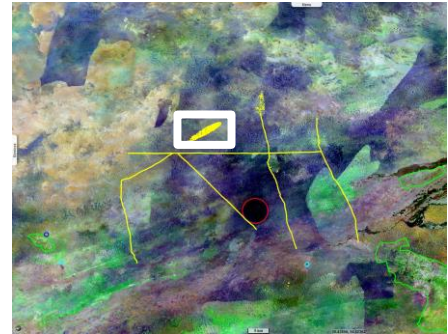**Example showing the apparition and the expansion of a fire and the variable efficiency of fire breaks.**
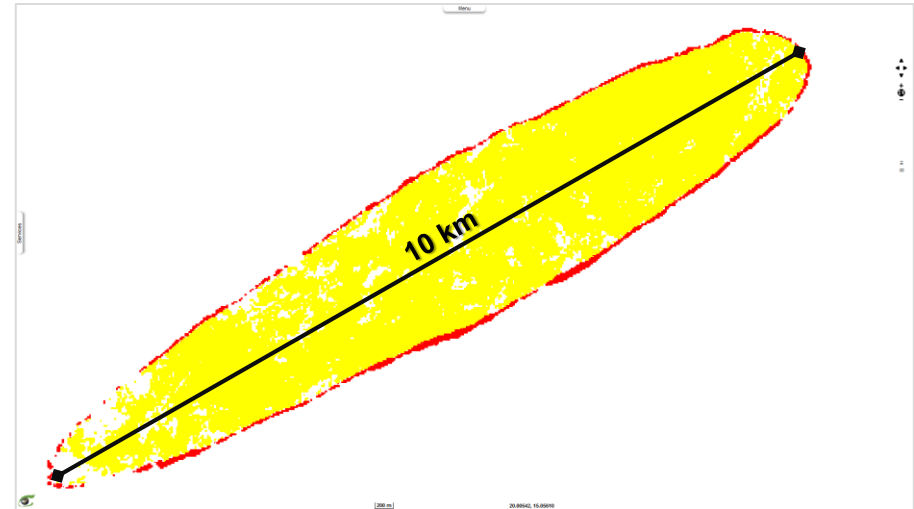

Animation : https://visioterra.org/VtWeb/hyperlook/17a90cdb200141daa055cad7cddc349f
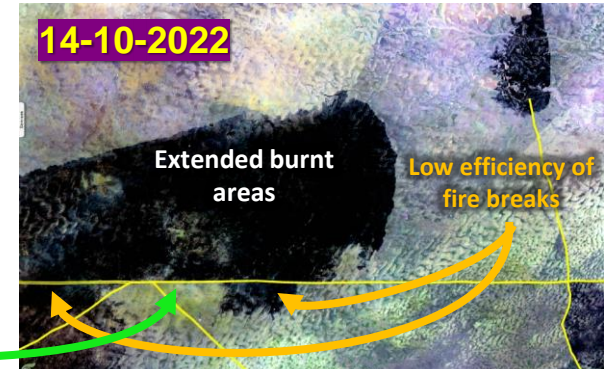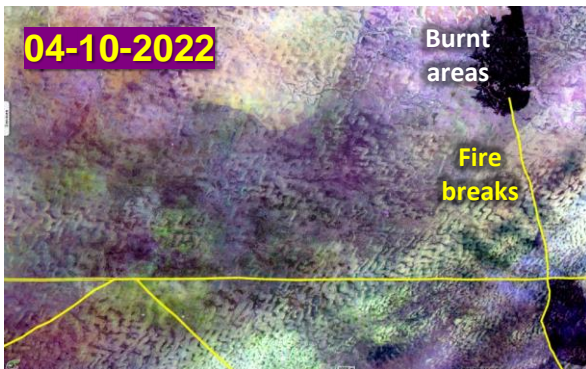
Active fires and burnt areas automatic detection

➢ **Indicators to automatically detect active fires and burnt areas**

Sentinel-2 view showing active fires and à large burnt area.

The result of the automatic detection of active fires (red) and à burnt areas (yellow).

https://visioterra.org/VtWeb/hyperlook/b9261a746cc24505a19f78afcb293c08