

United Nations/Austria

World Space Forum

13 - 15 December 2022



ORGANIZED JOINTLY BY:

 Federal Ministry
Republic of Austria
Climate Action, Environment,
Energy, Mobility,
Innovation and Technology



UNITED NATIONS
Office for Outer Space Affairs

 Federal Ministry
Republic of Austria
European and International
Affairs



TU WIEN
DEPARTMENT OF GEODESY
AND GEOINFORMATION
RESEARCH GROUP
MICROWAVE REMOTE SENSING



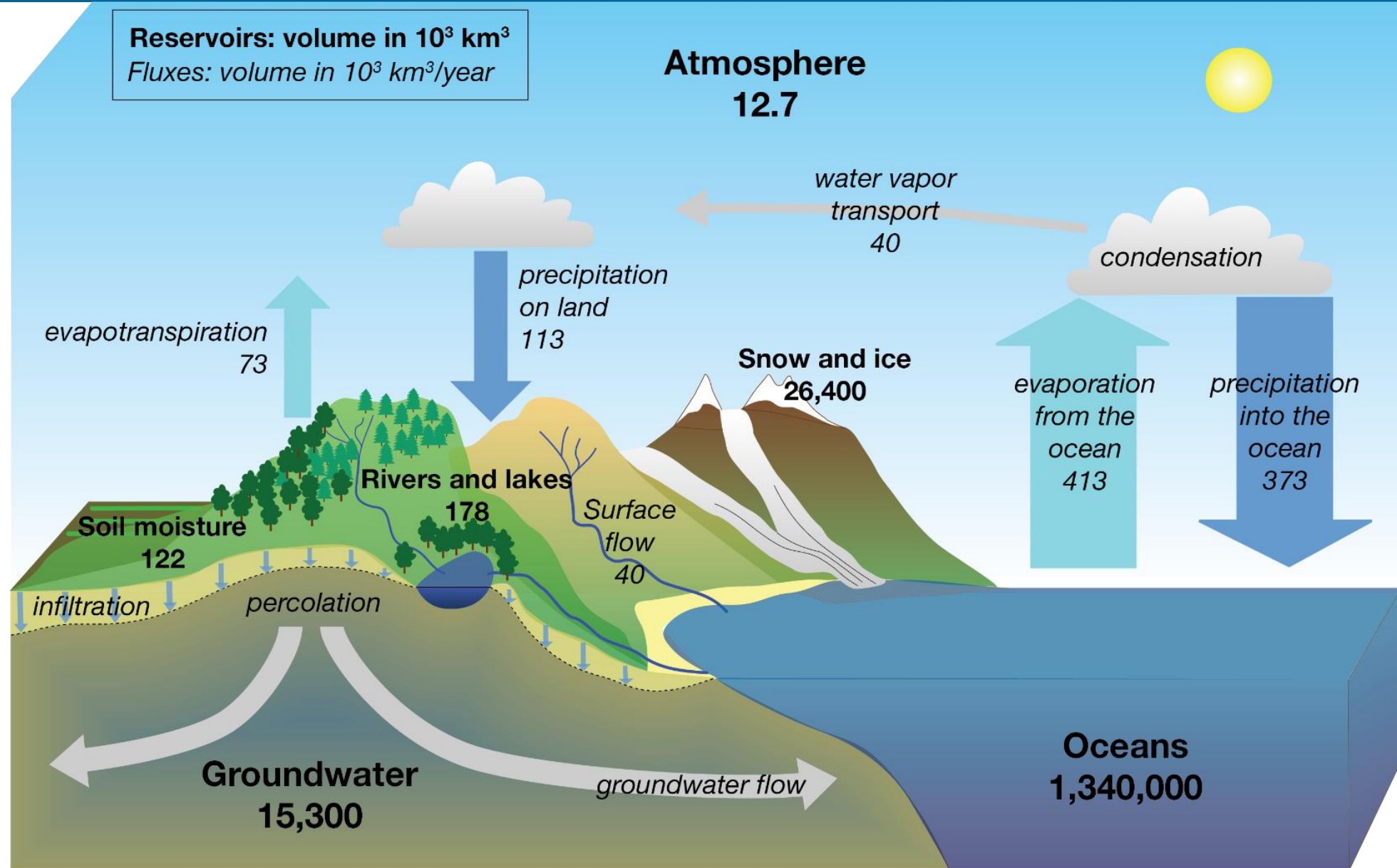
UNIVERSIDADE
EDUARDO
MONDLANE

Enhancing Drought Early Warning through Satellite Soil Moisture Data

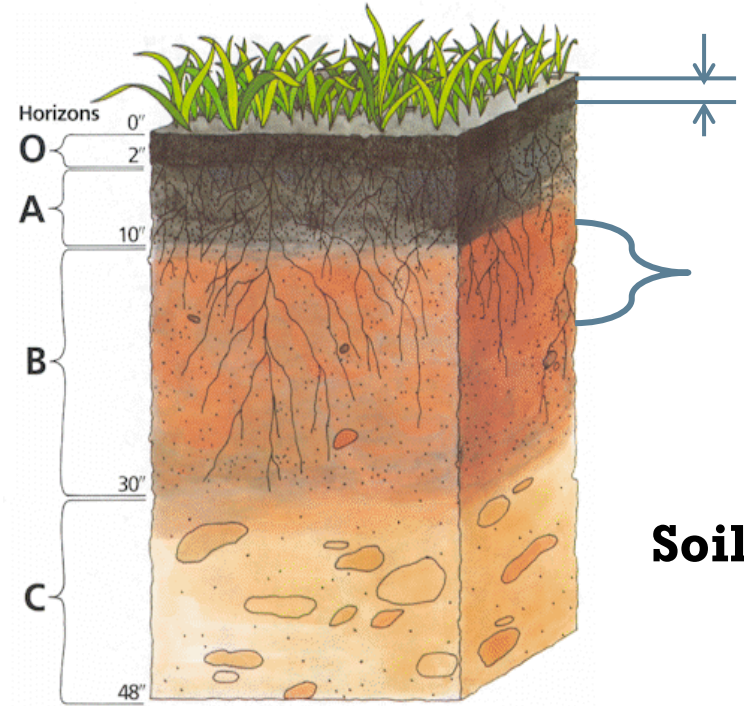
Dr. Mariette Vreugdenhil, Isabella Greimeister-Pfeil, Wolfgang Preimesberger, Luca Brocca, Stefania Camici, Markus Enenkel, Wolfgang Wagner, Luis Artur, Rogério Borguete Alves Rafael,

mariette.vreugdenhil@tuwien.ac.at

Water cycle



Microwave Remote Sensing of Soil Moisture

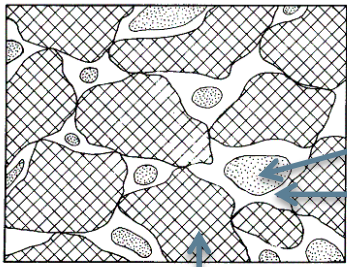


Thin, remotely sensed soil layer:
Surface Soil Moisture

Root zone: Soil Water Index

Soil profile

Cross-section of a soil

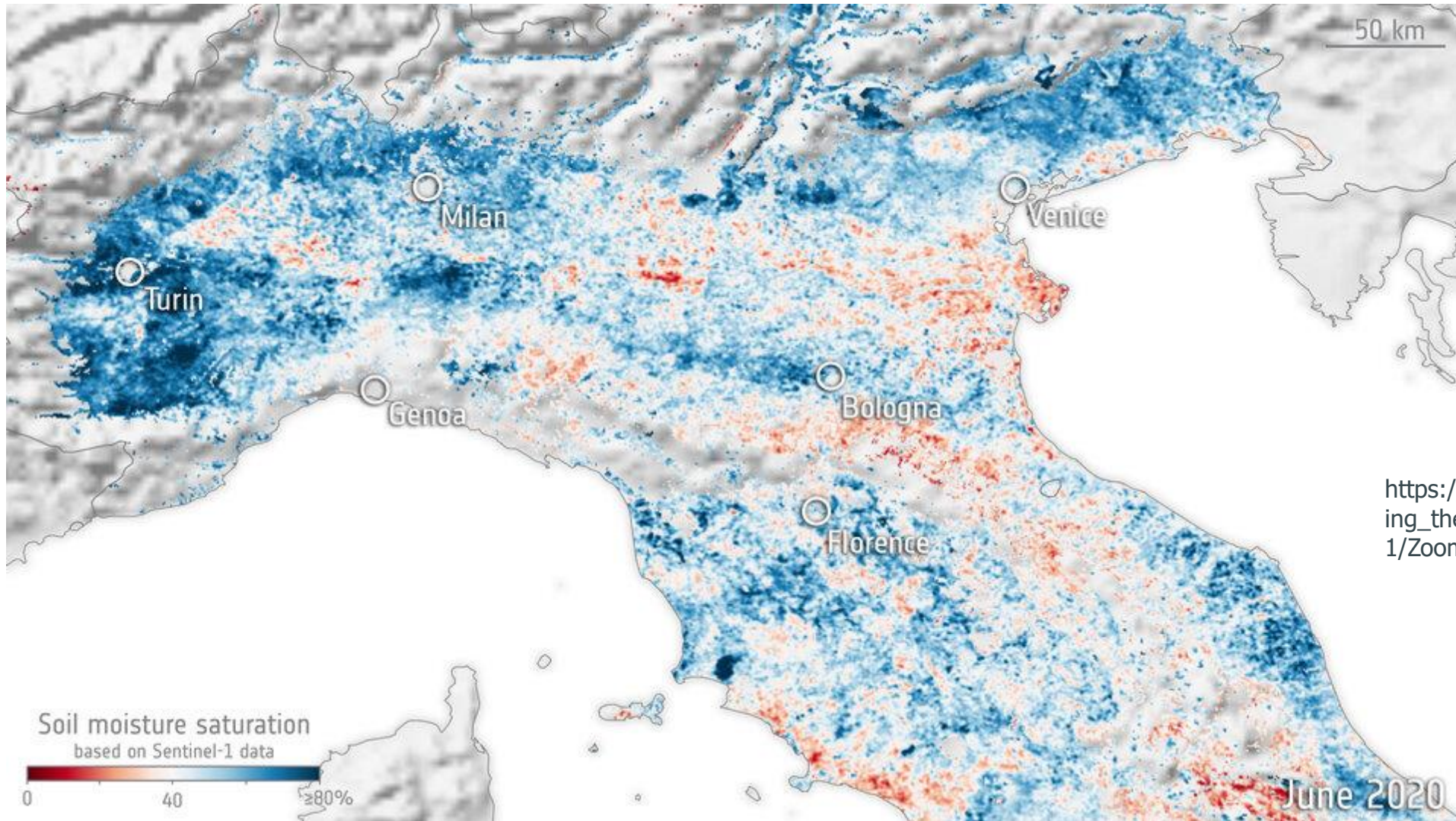


Air (V_a)

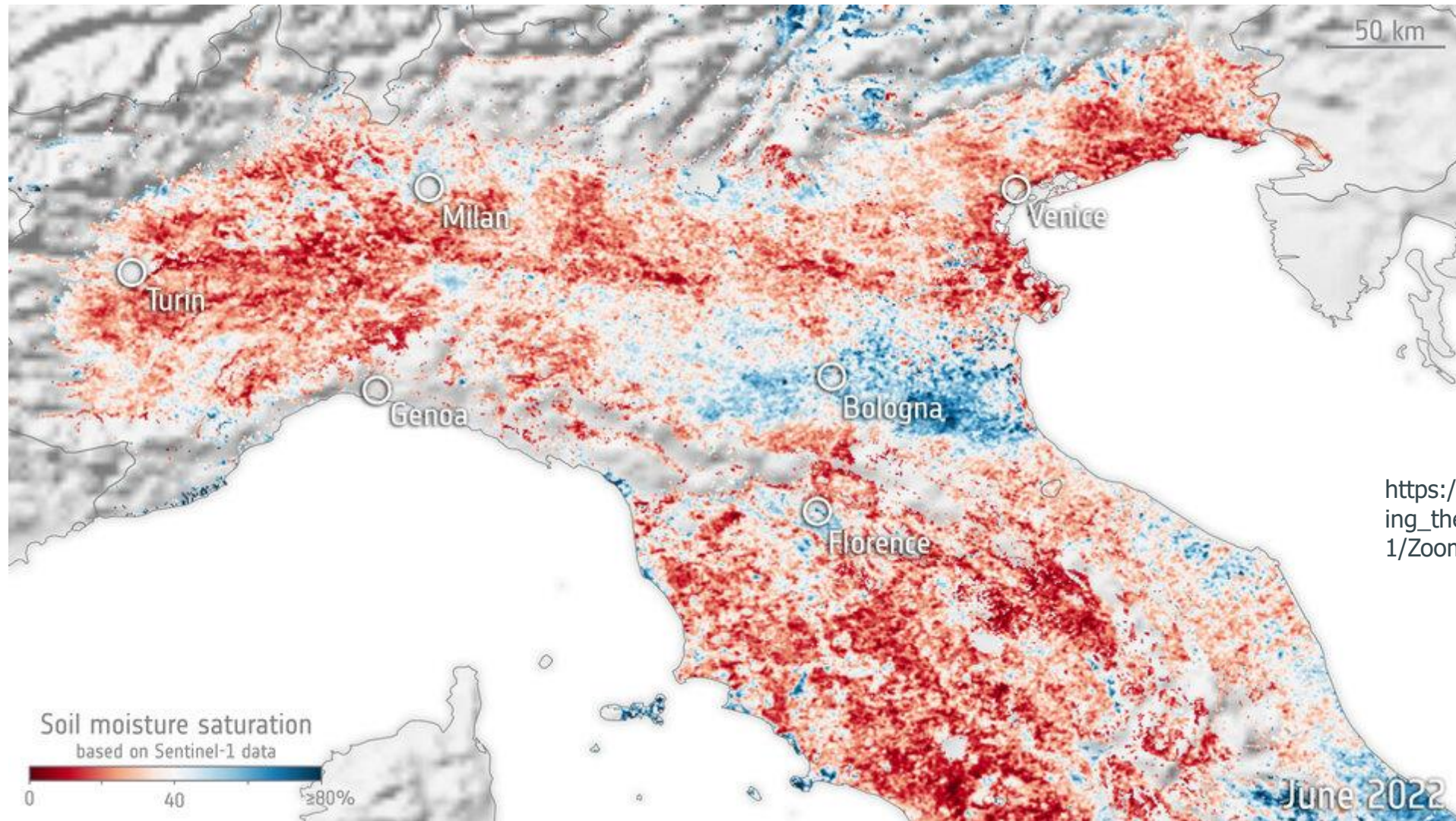
Water (V_w)

Solid Particles (V_s)

Drought monitoring



Drought monitoring

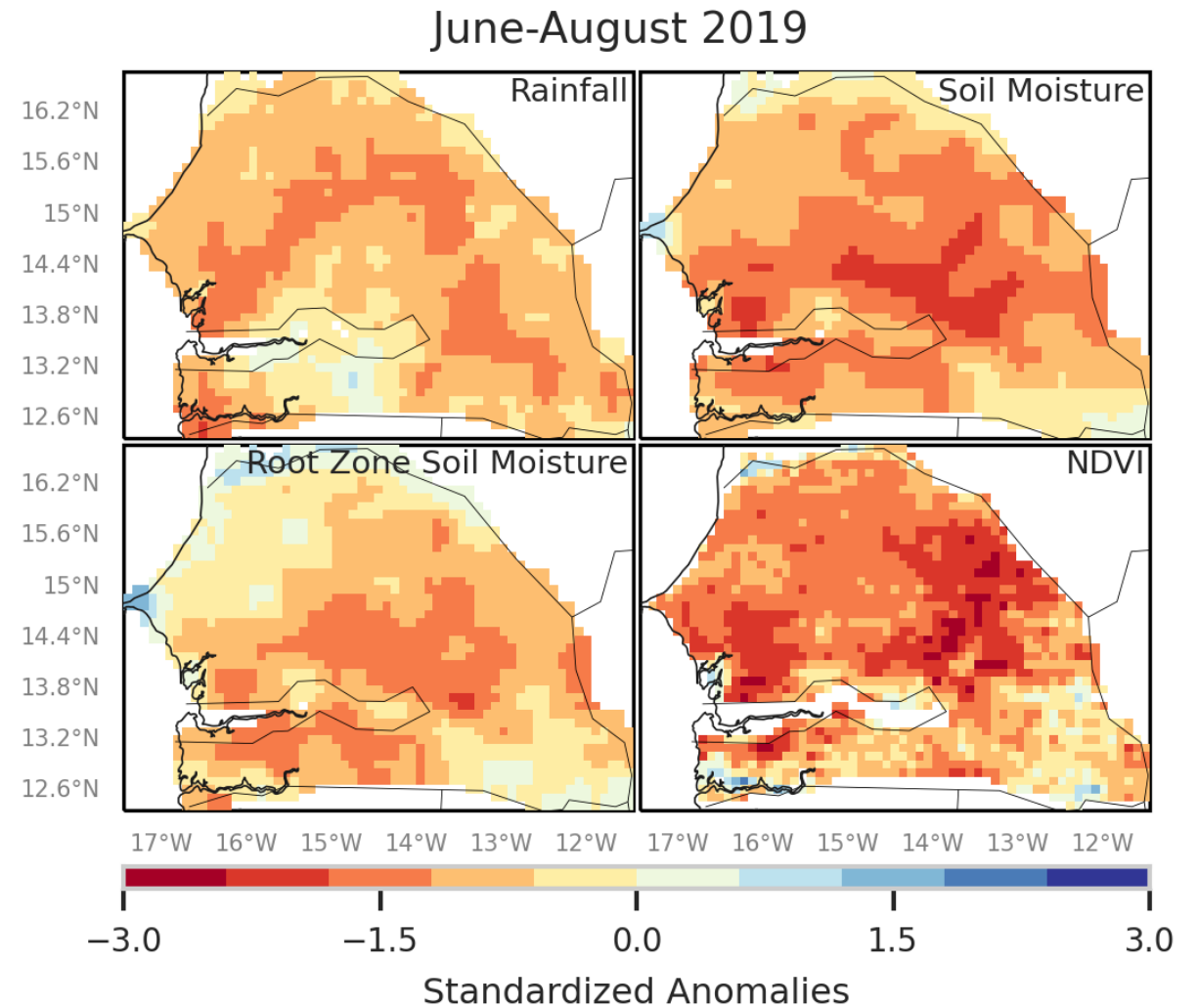


https://www.esa.int/Applications/Observing_the_Earth/Copernicus/Sentinel-1/Zooming_in_on_drought_from_space

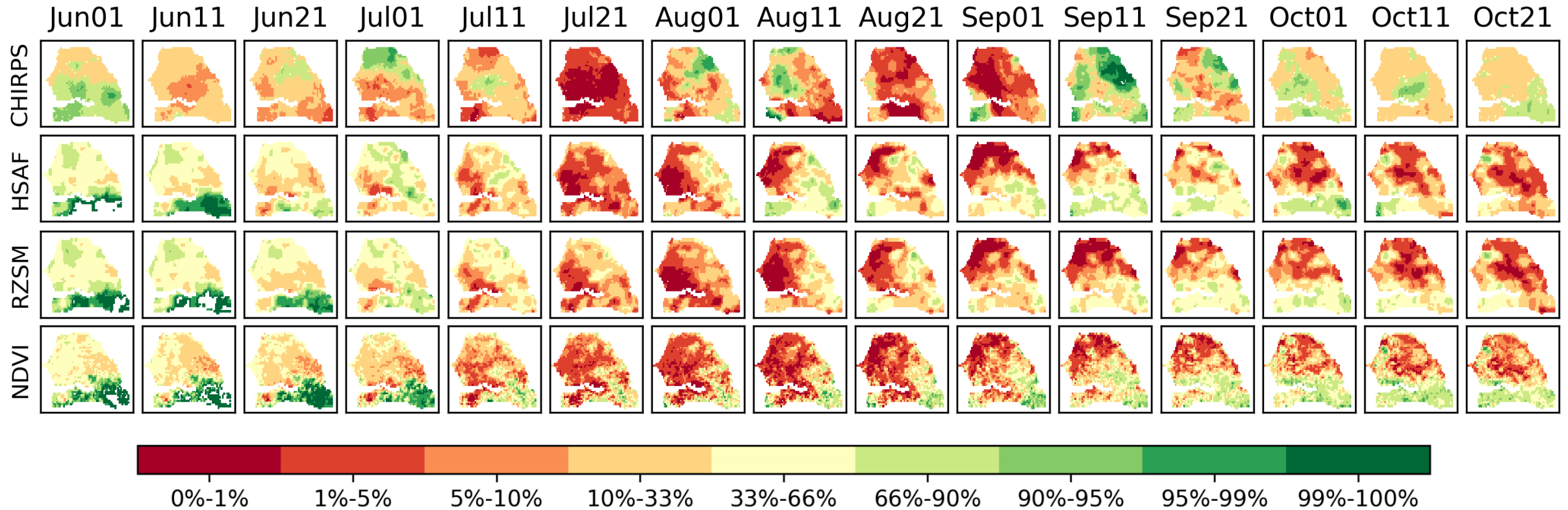
Datasets and pre-processing

Can we use satellite observations for drought assessment and early warning?

- Precipitation
- **Soil Moisture**
- **Root Zone Soil Moisture**
- Vegetation health



Drought development



Drought monitoring and vegetation impact

Monitoring and impact assessment often done with crop models and meteorological data



Rainfall

Driver of crop development
Excludes evaporation



Soil Moisture

Missing link...?

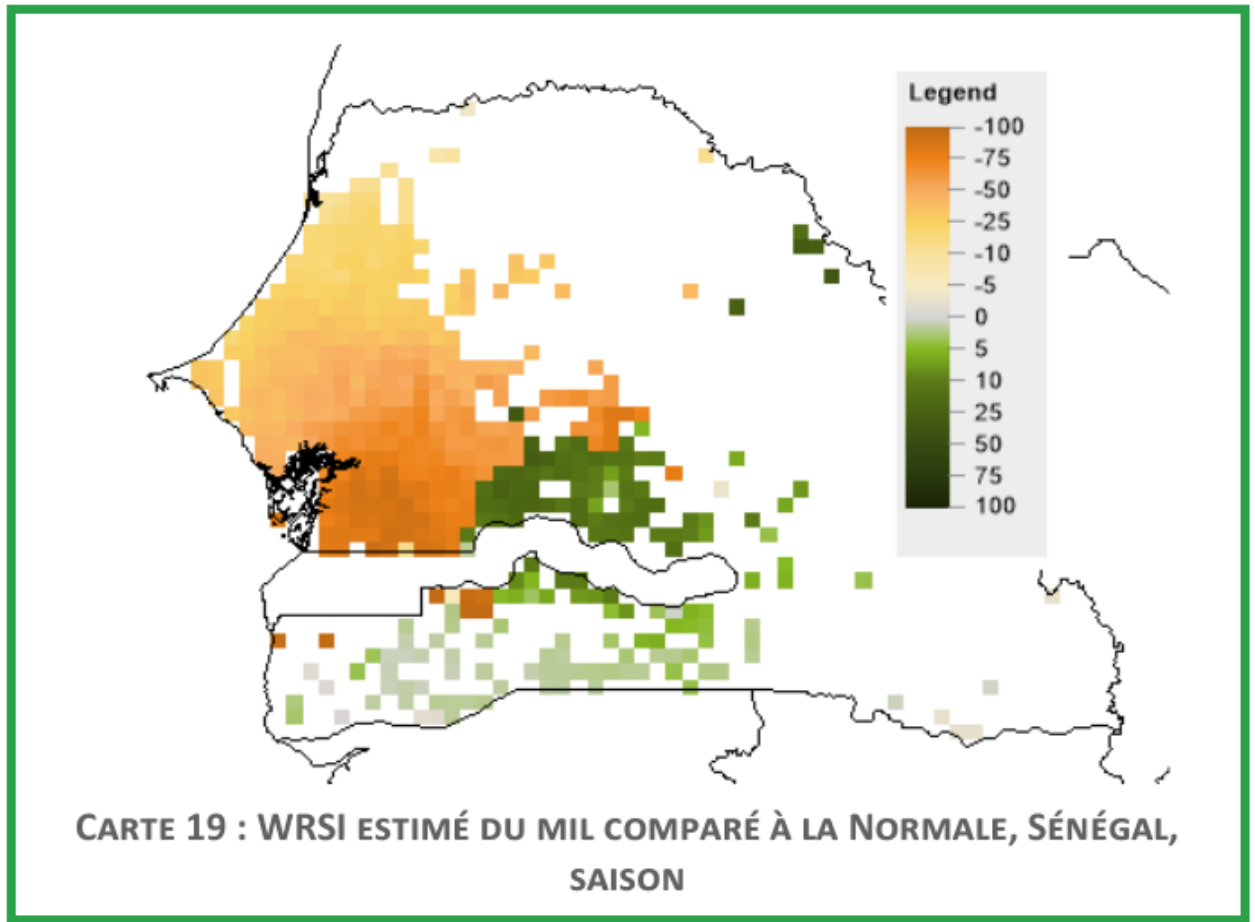
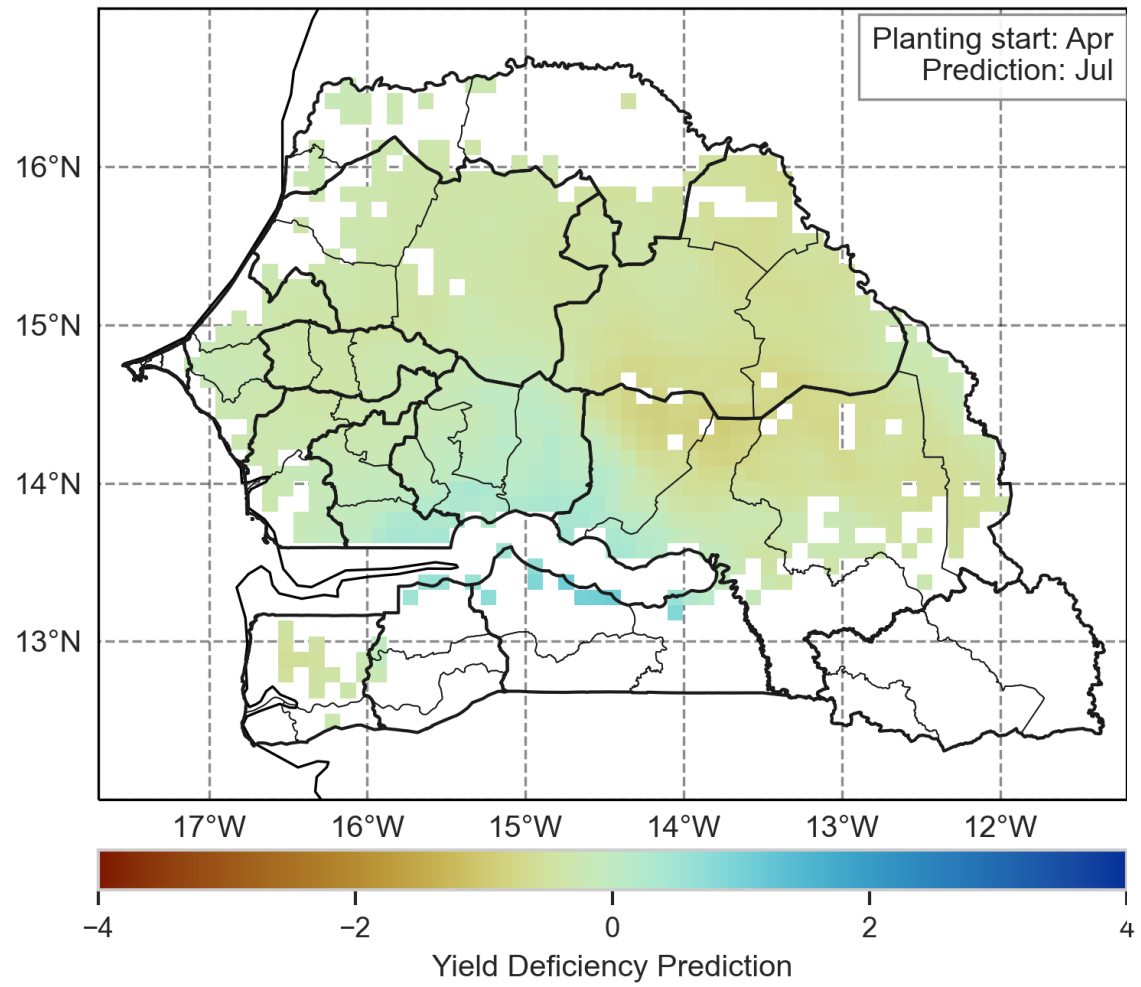


NDVI

Indicator of crop development
Late response

Spatial yield deficiency prediction made in July

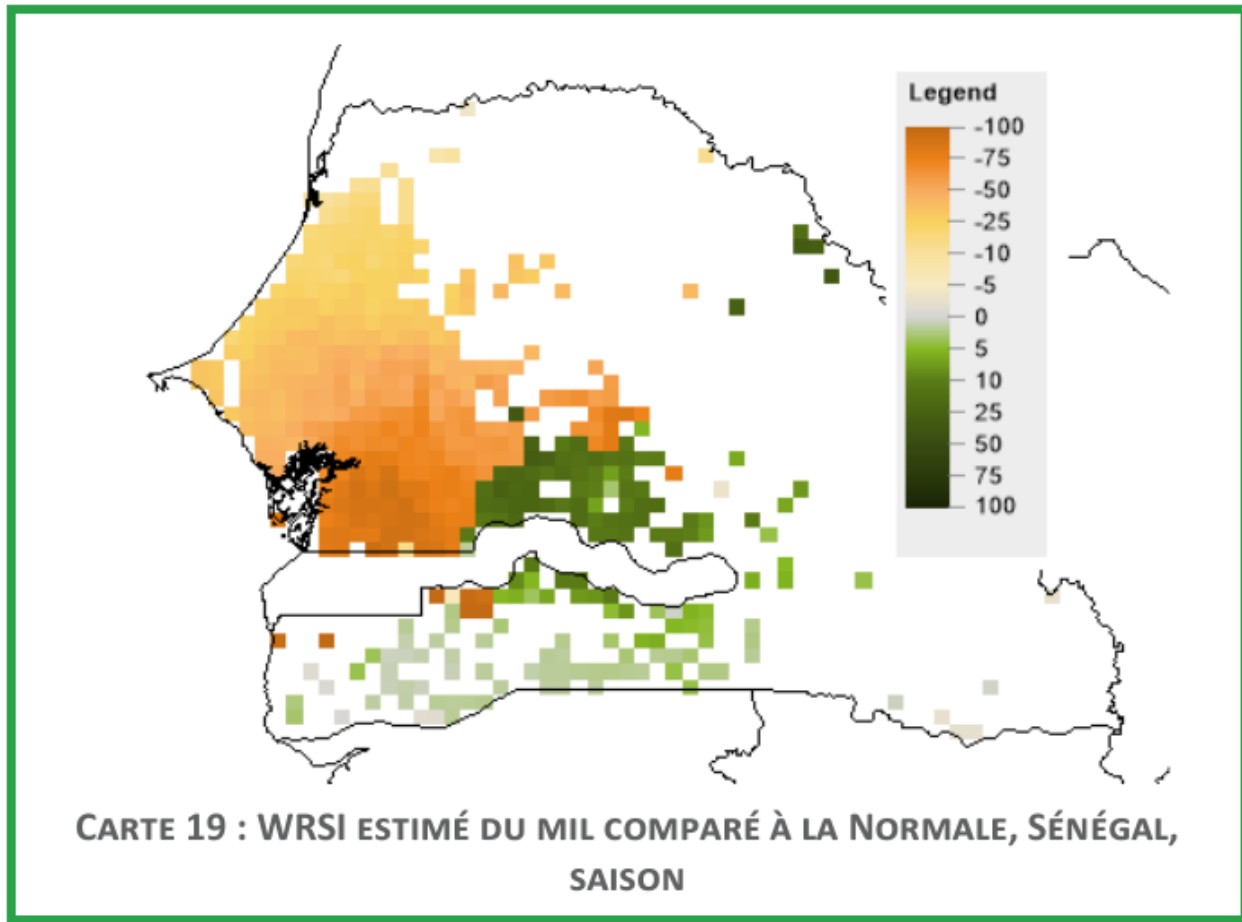
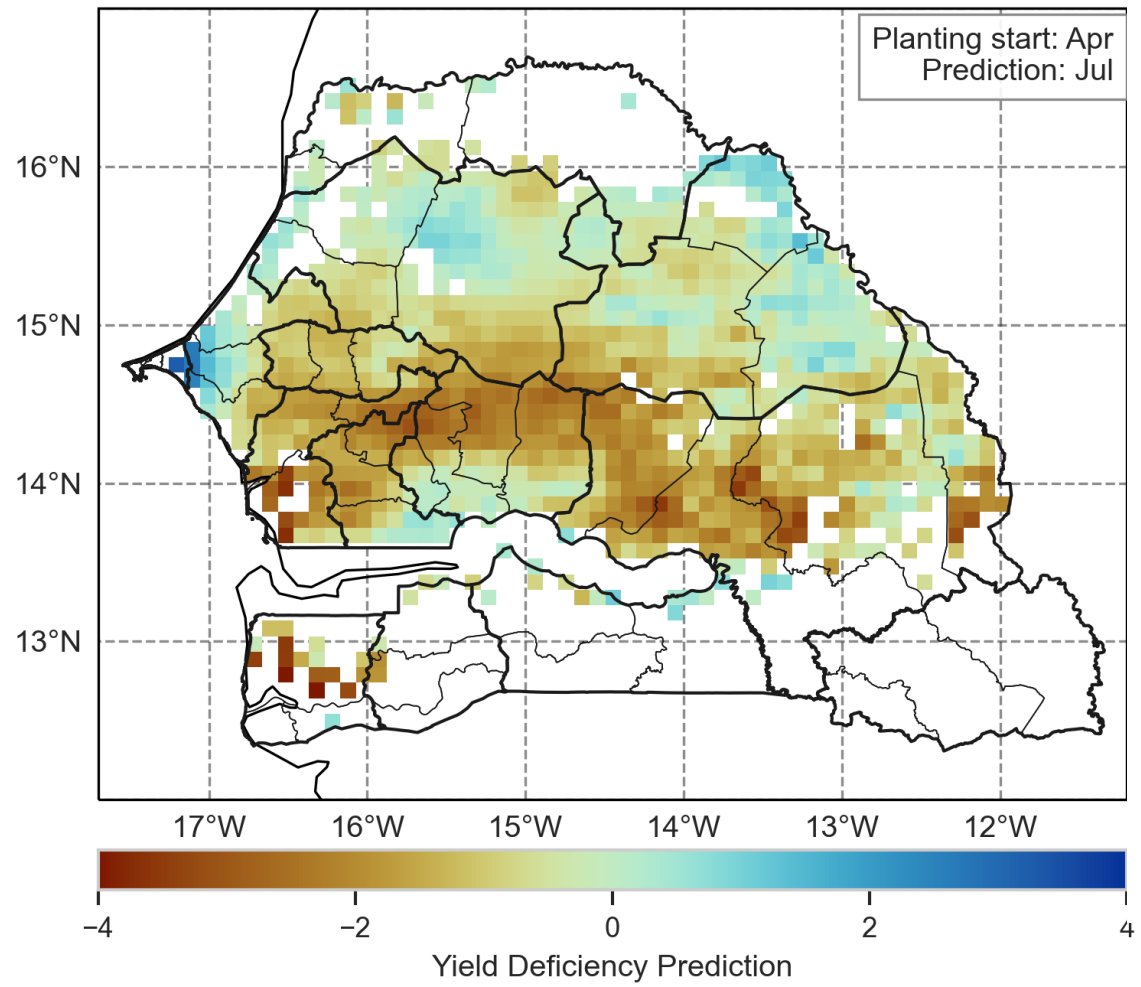
Rainfall and NDVI Millet 2019



Water Requirement Satisfaction Indicator from African Risk View end of season report 2019

Spatial yield deficiency prediction made in July

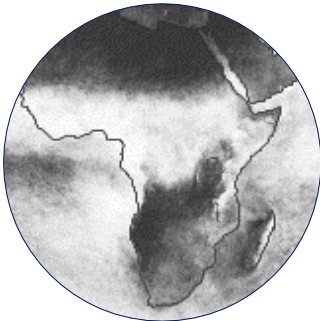
Soil moisture and NDVI Millet 2019



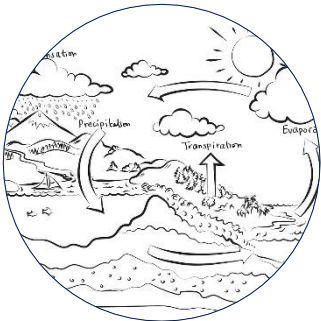
Water Requirement Satisfaction Indicator from African Risk View end of season report 2019

Benefits of using satellite soil moisture for drought monitoring?

Complementary to existing products such as NDVI



Continuous monitoring



Better capture droughts



Improved yield prediction

Enhancing Drought Early Warning in Mozambique through Satellite Soil Moisture Data to support food security in the context of climate change

High resolution soil moisture for improved drought monitoring and early warning

1. Improve agricultural practices and tools
2. Increased capacity for drought interventions and mitigation
3. Investment in people, education, science, technology on use of freely available remote sensing data