

# Applications of Radar remote sensing



**Mehrez Zribi**

# Téledétection spatiale pour l'observation des surfaces terrestres

Visible

Infra-rouge thermique

Hyperfréquences

$10^{-9}$  m

$10^{-6}$  m

$10^{-2}$  m

Longueur d'onde



## Radiomètres optique (Réflectance)

- Surface foliaire
- Surfaces enneigées
- Dynamique temporelle → occupation du sol

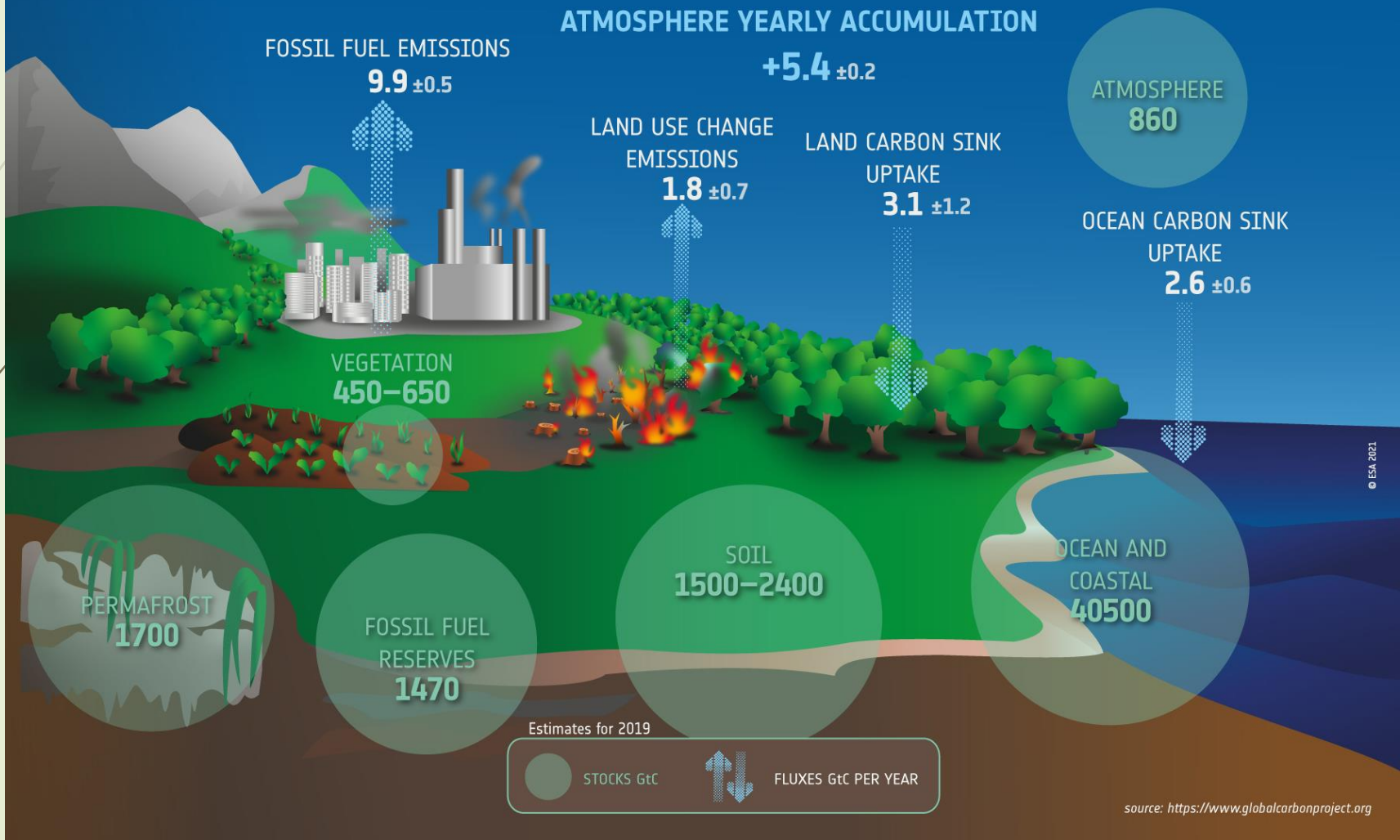
## Radiomètres thermique (Température de brillance)

- Température de surface → Evapotranspiration
- Température sommet nuage

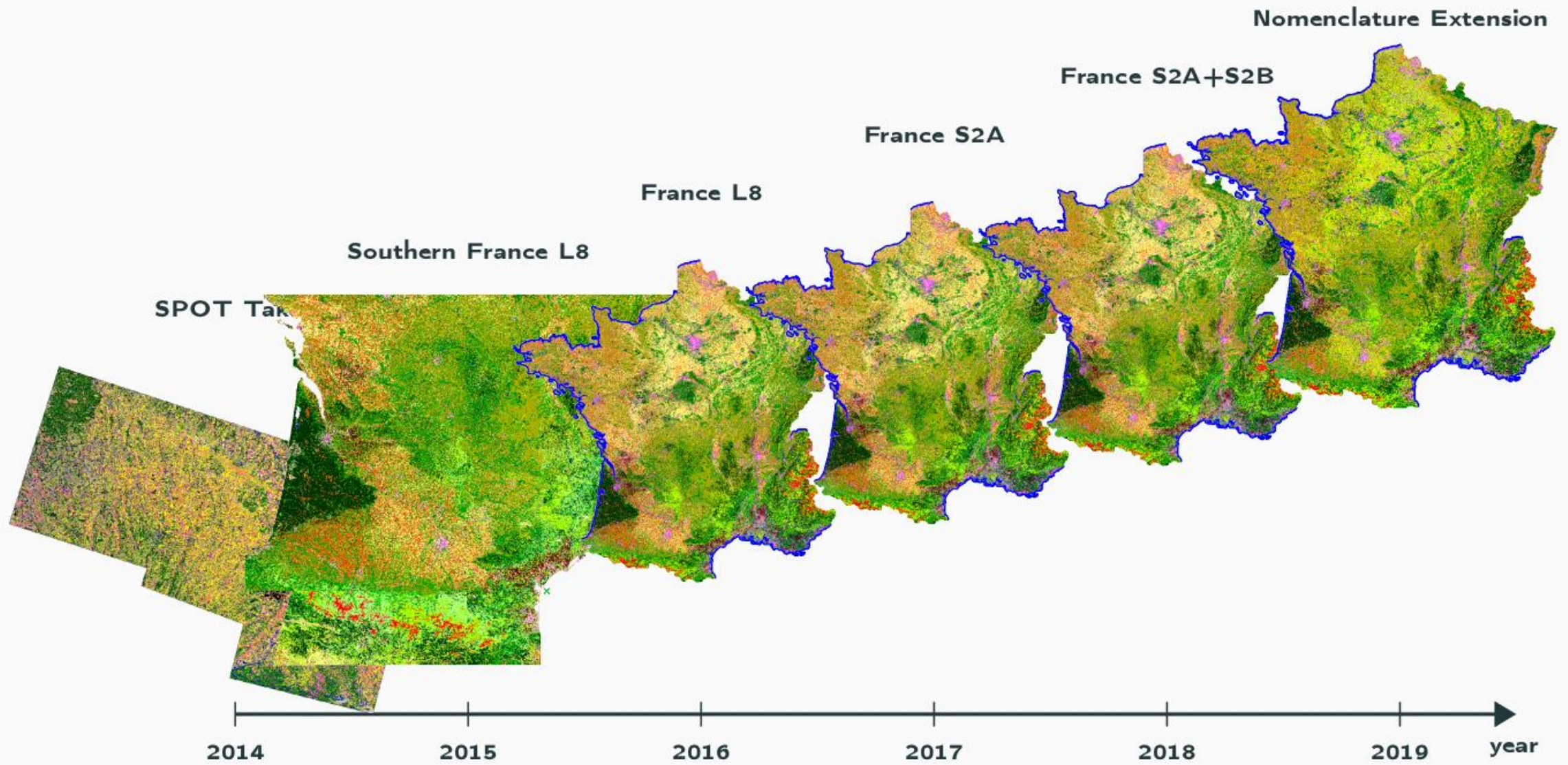
## Radiomètre micro-onde ou radar (Coefficient de rétrodiffusion)

- Humidité du sol
- Contenu en eau liquide du manteau neigeux
- Hauteur d'eau libre

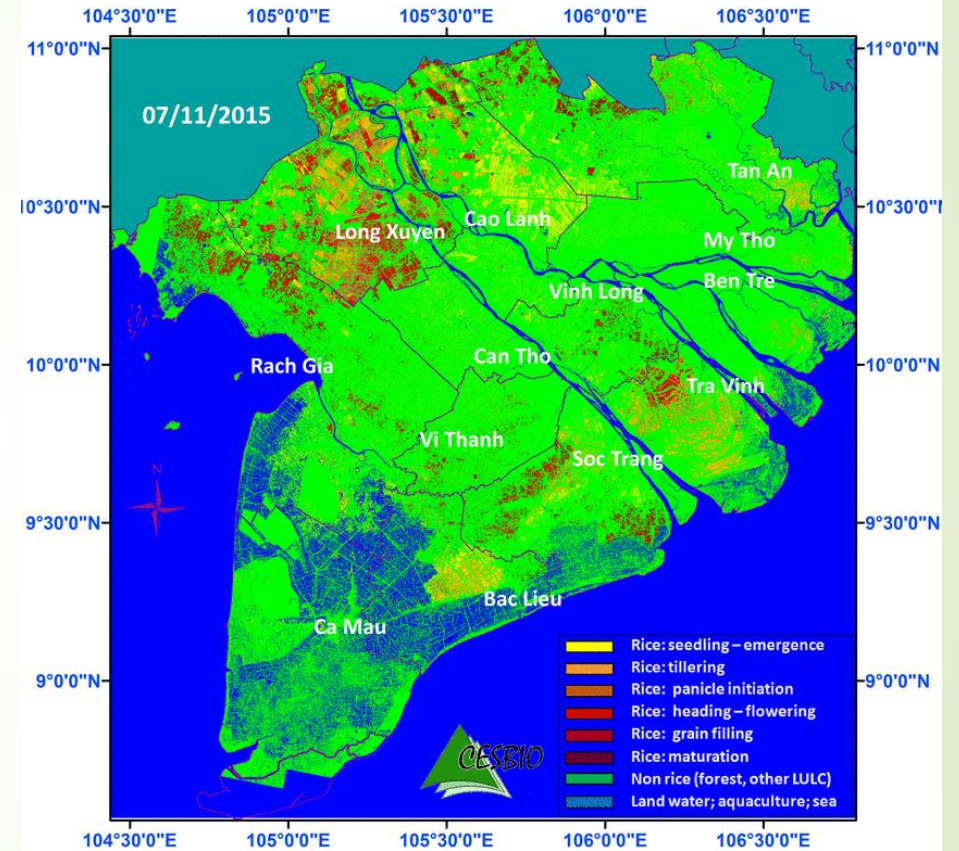
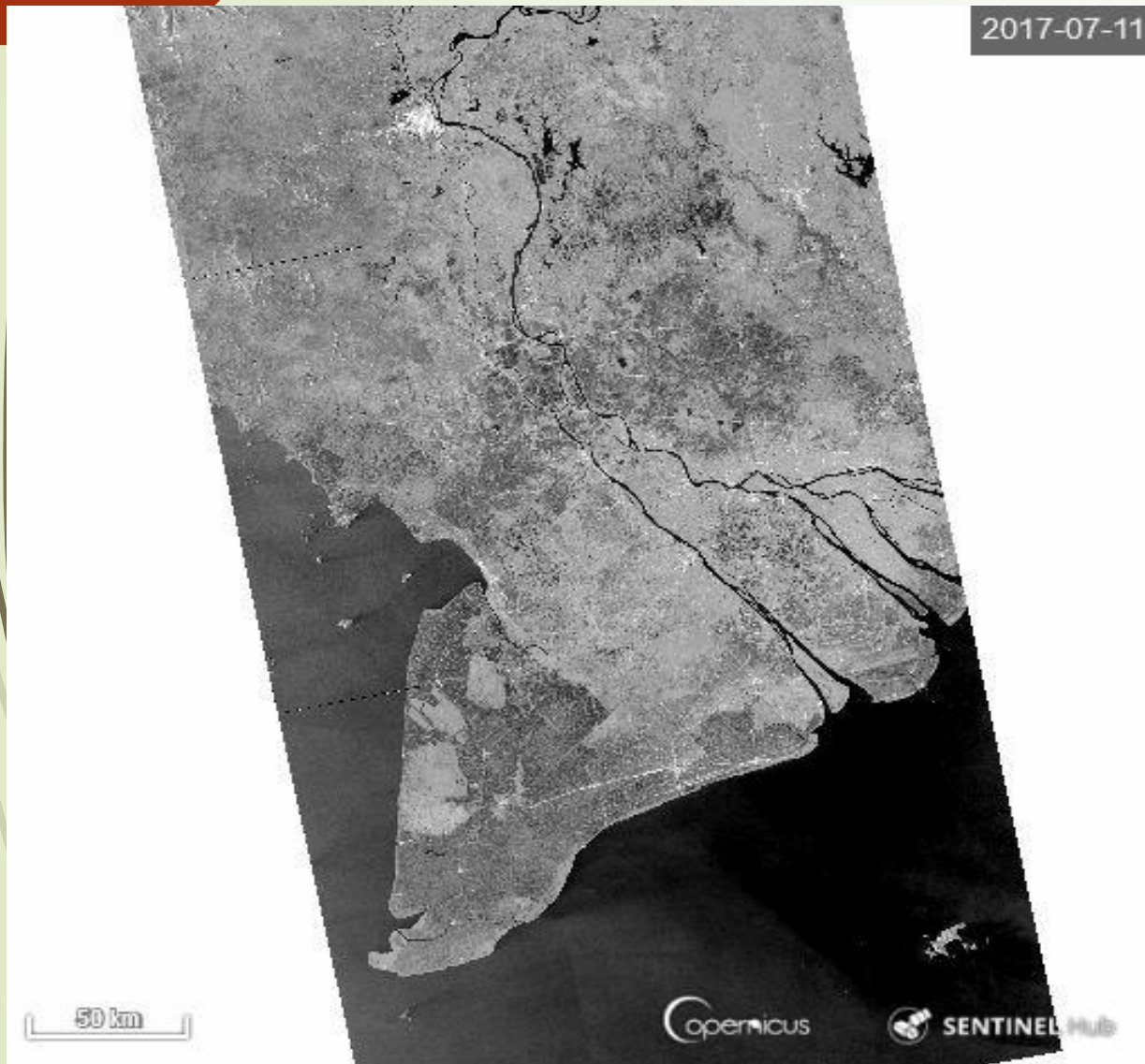
# GLOBAL CARBON BUDGET



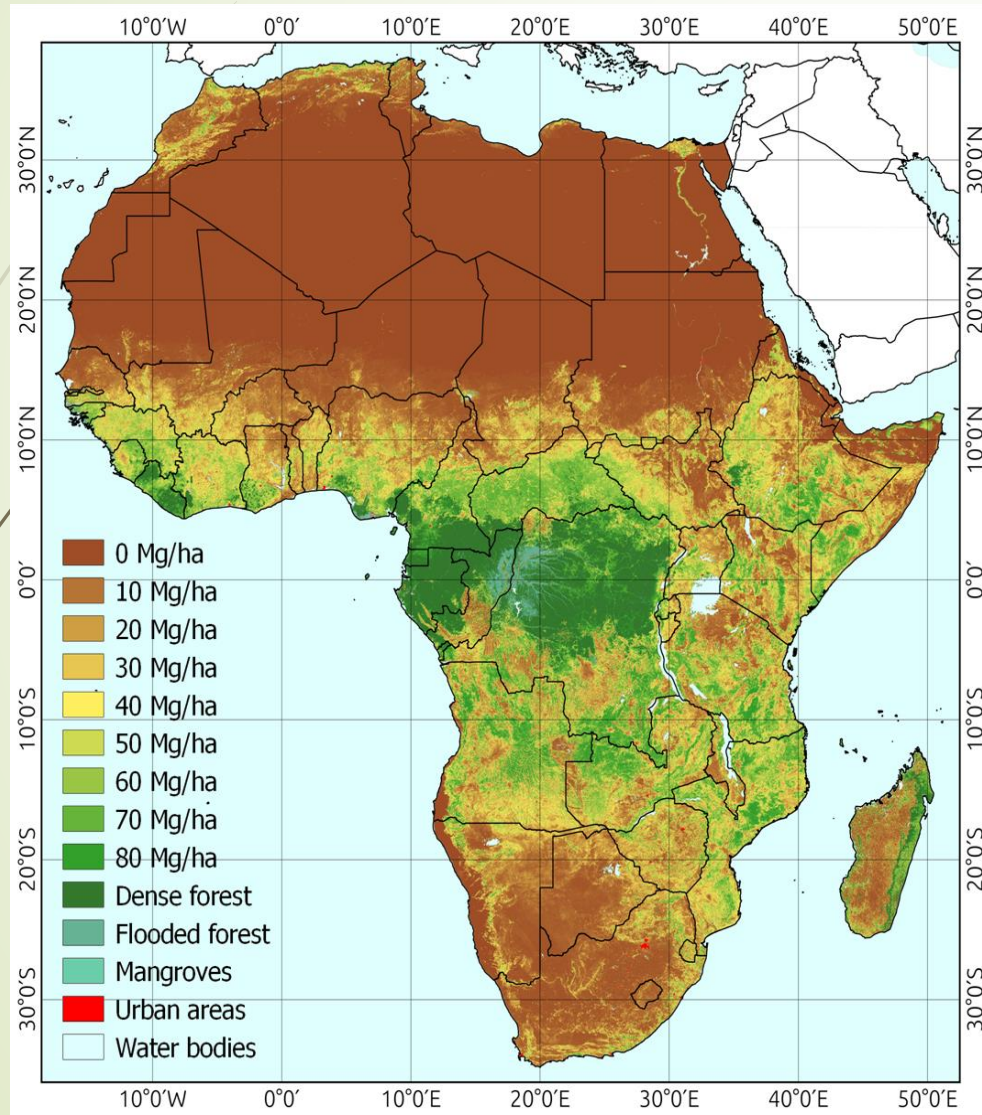
# Land use mapping



# Rice monitoring



# Biomass mapping of woodlands and savannahs



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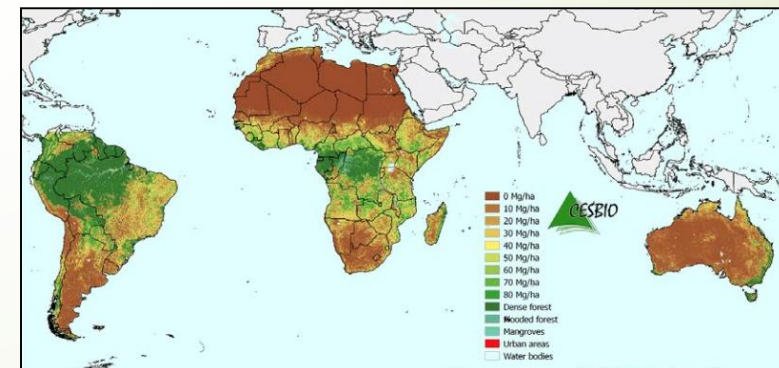
**Remote Sensing of Environment**

ELSEVIER journal homepage: [www.elsevier.com/locate/rse](http://www.elsevier.com/locate/rse)

An above-ground biomass map of African savannahs and woodlands at 25 m resolution derived from ALOS PALSAR

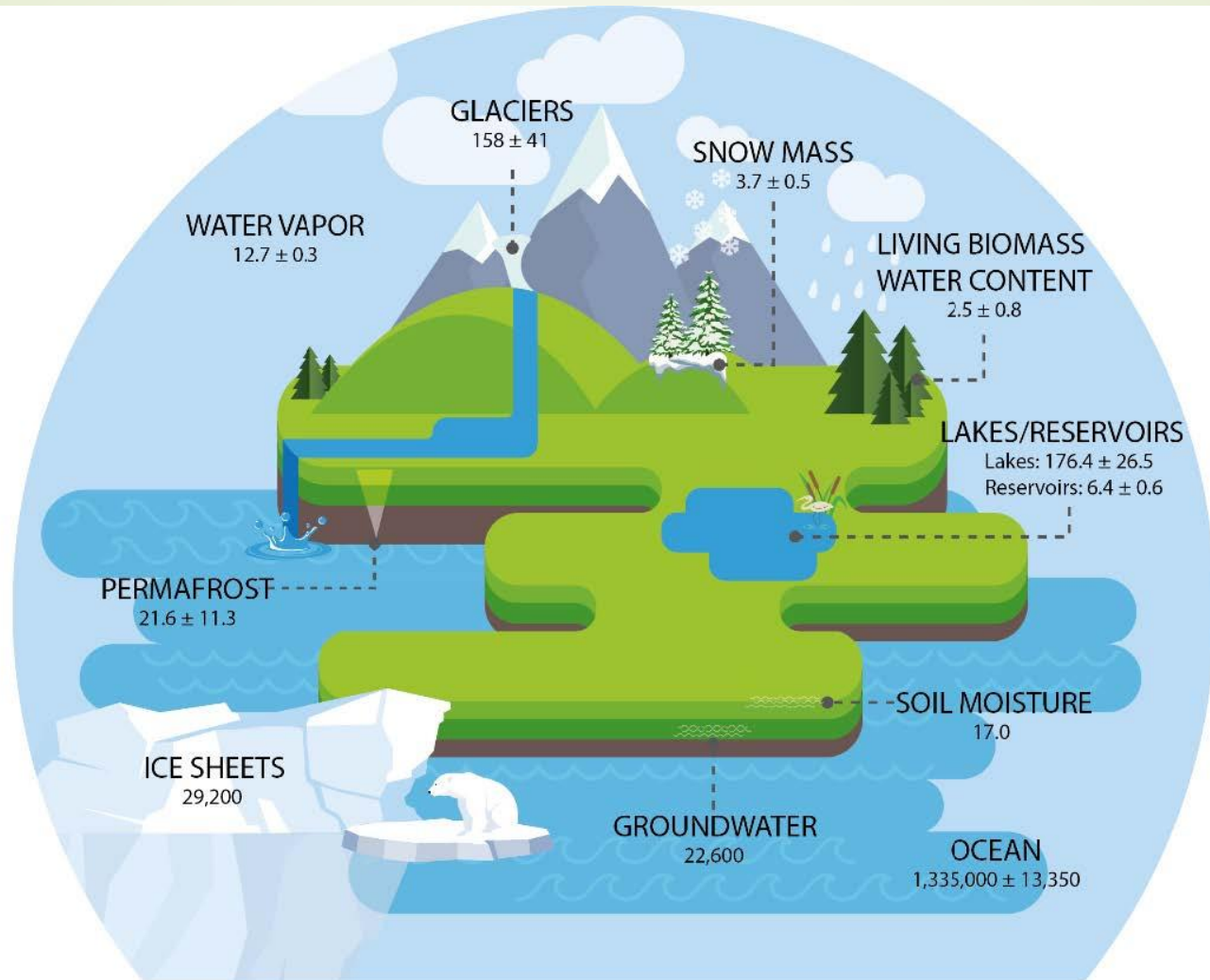
Alexandre Bouvet<sup>a,\*</sup>, Stéphane Mermoz<sup>a</sup>, Thuy Le Toan<sup>a</sup>, Ludovic Villard<sup>a</sup>, Renaud Mathieu<sup>b</sup>, Laven Naidoo<sup>b</sup>, Gregory P. Asner<sup>c</sup>

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<sup>b</sup> Ecosystems Earth Observation, Natural Resource and the Environment, CSIR, Pretoria, South Africa  
<sup>c</sup> Department of Global Ecology, Carnegie Institution for Science, Stanford, CA, USA



# Deforestation mapping





## GLOBAL WATER STORAGES

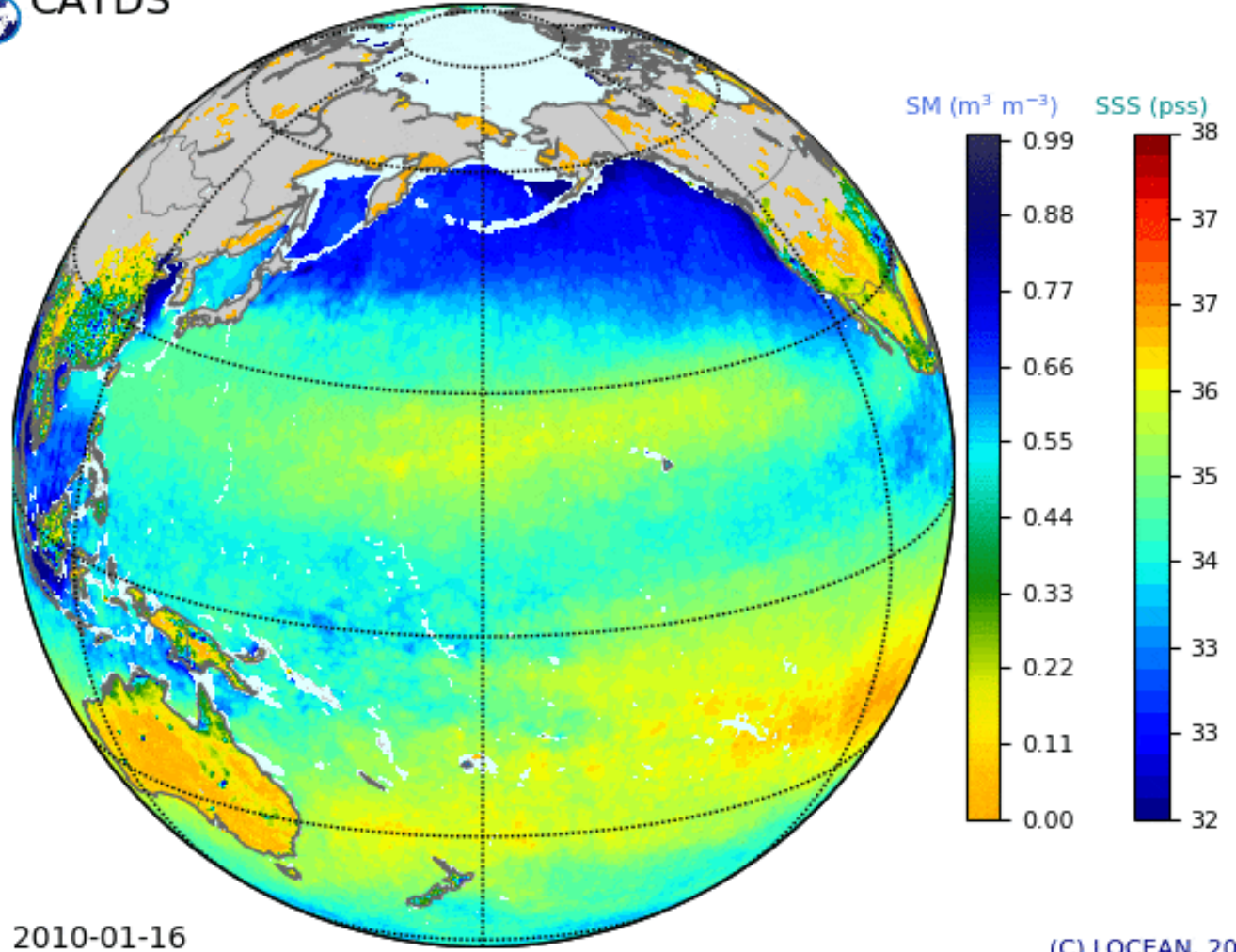




SMOS, © ESA

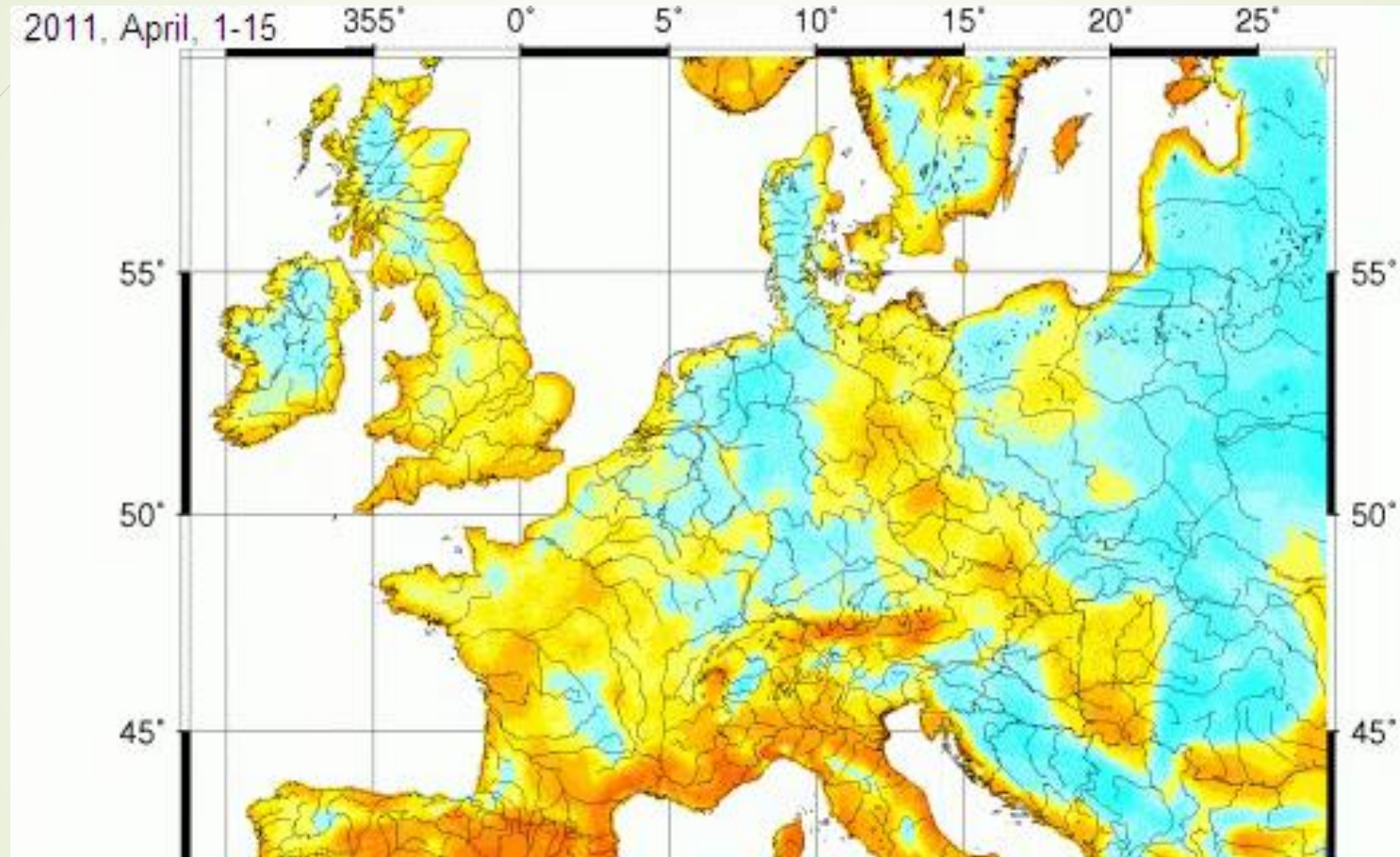


SMOS SSS CEC LOCEAN/ACRI-st Debiased v3, 18-day / SM CPDC MIR\_CLF33A



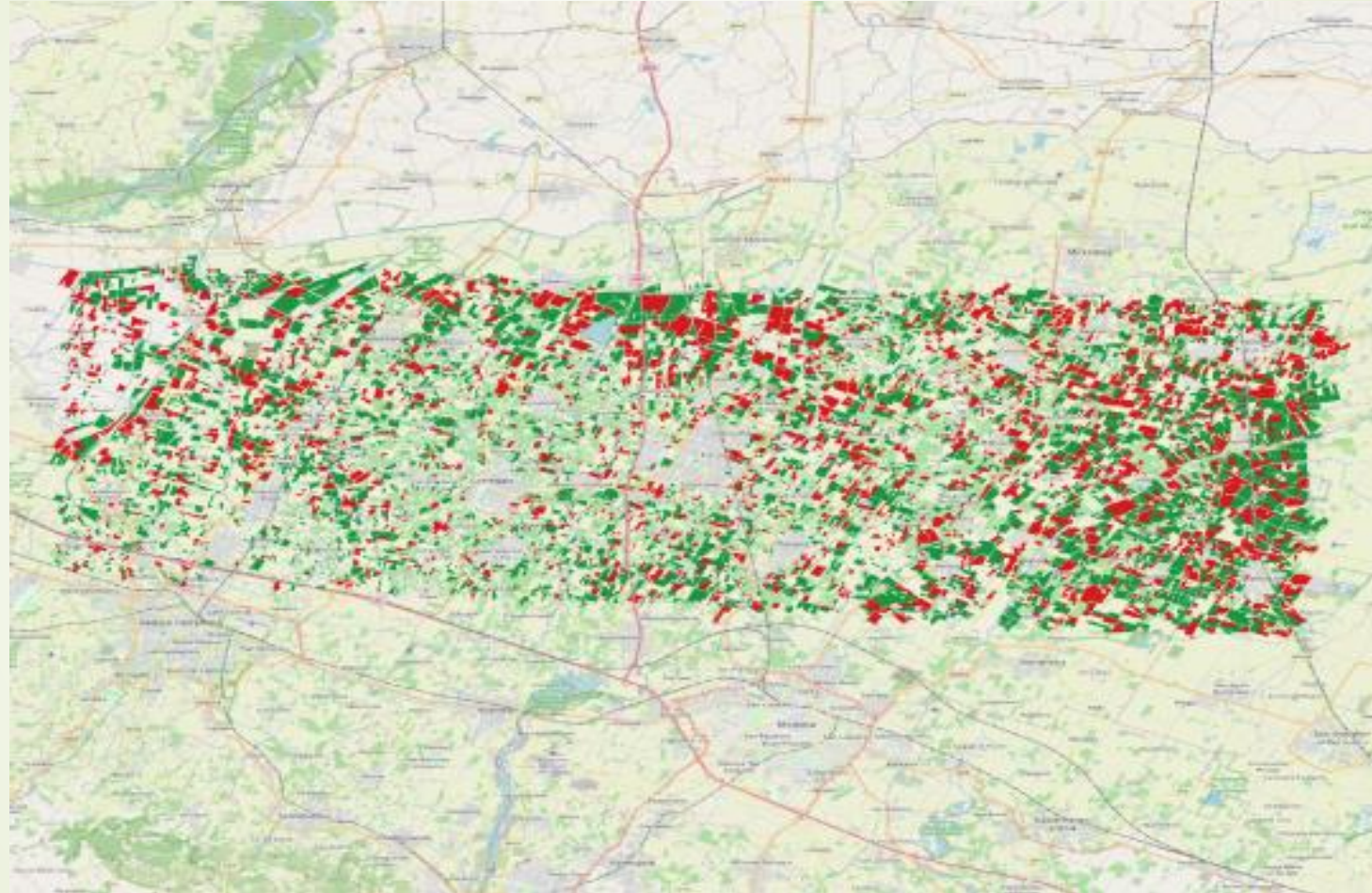
(C) LOCEAN, 2018

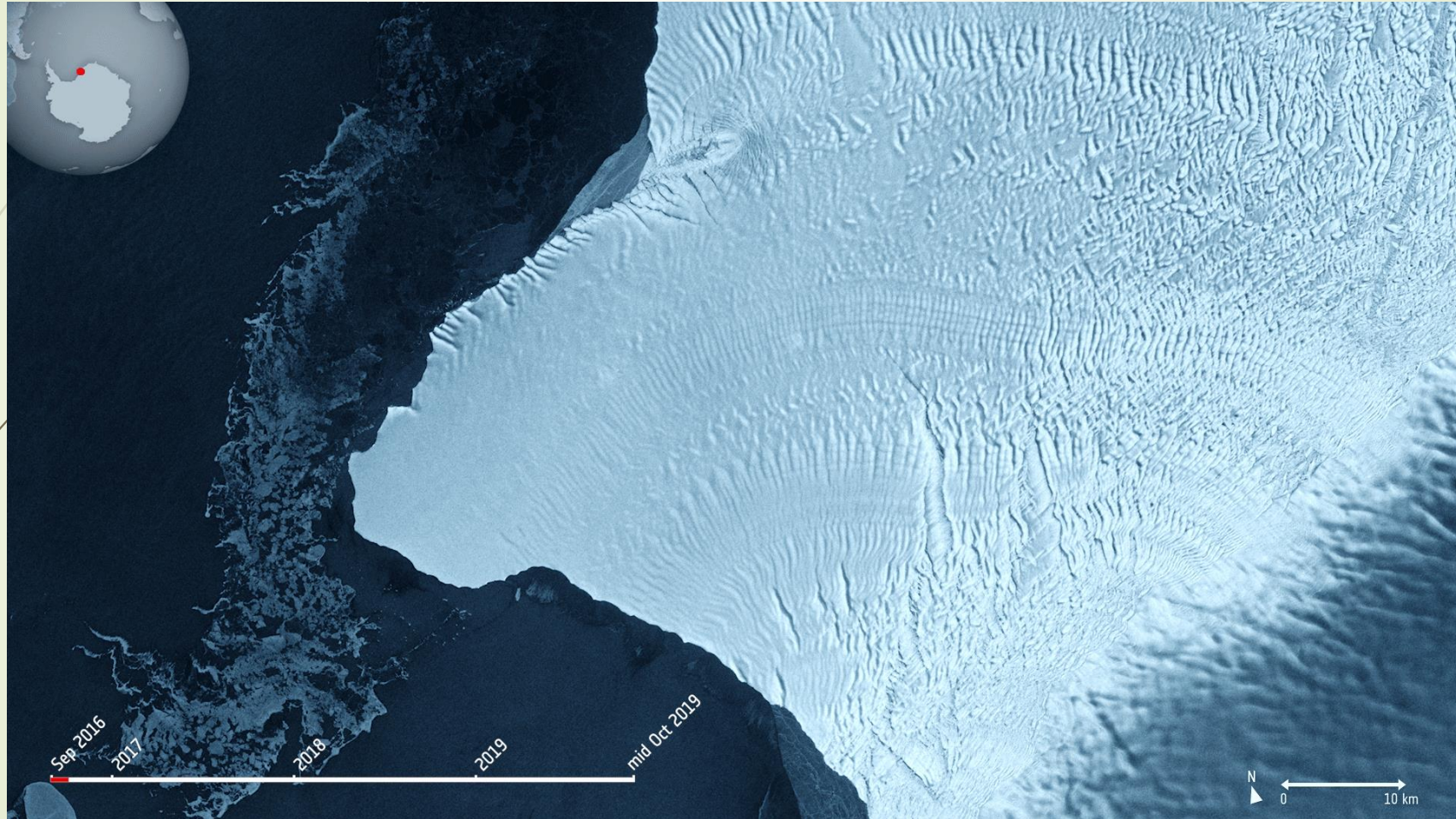
# Soil moisture mapping



*Humidité du sol en Europe, ASCAT/METOP*

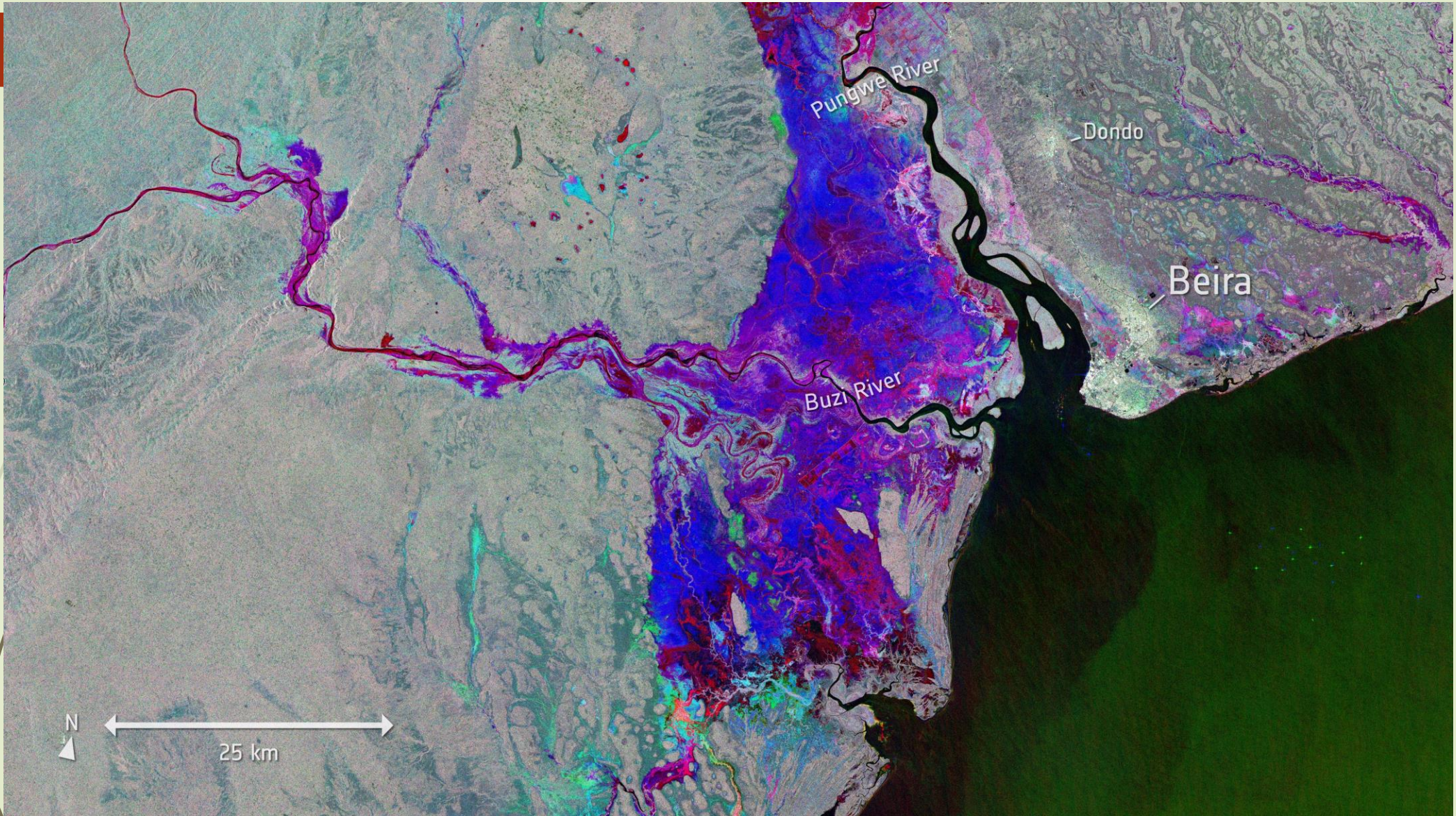
# Irrigated areas mapping



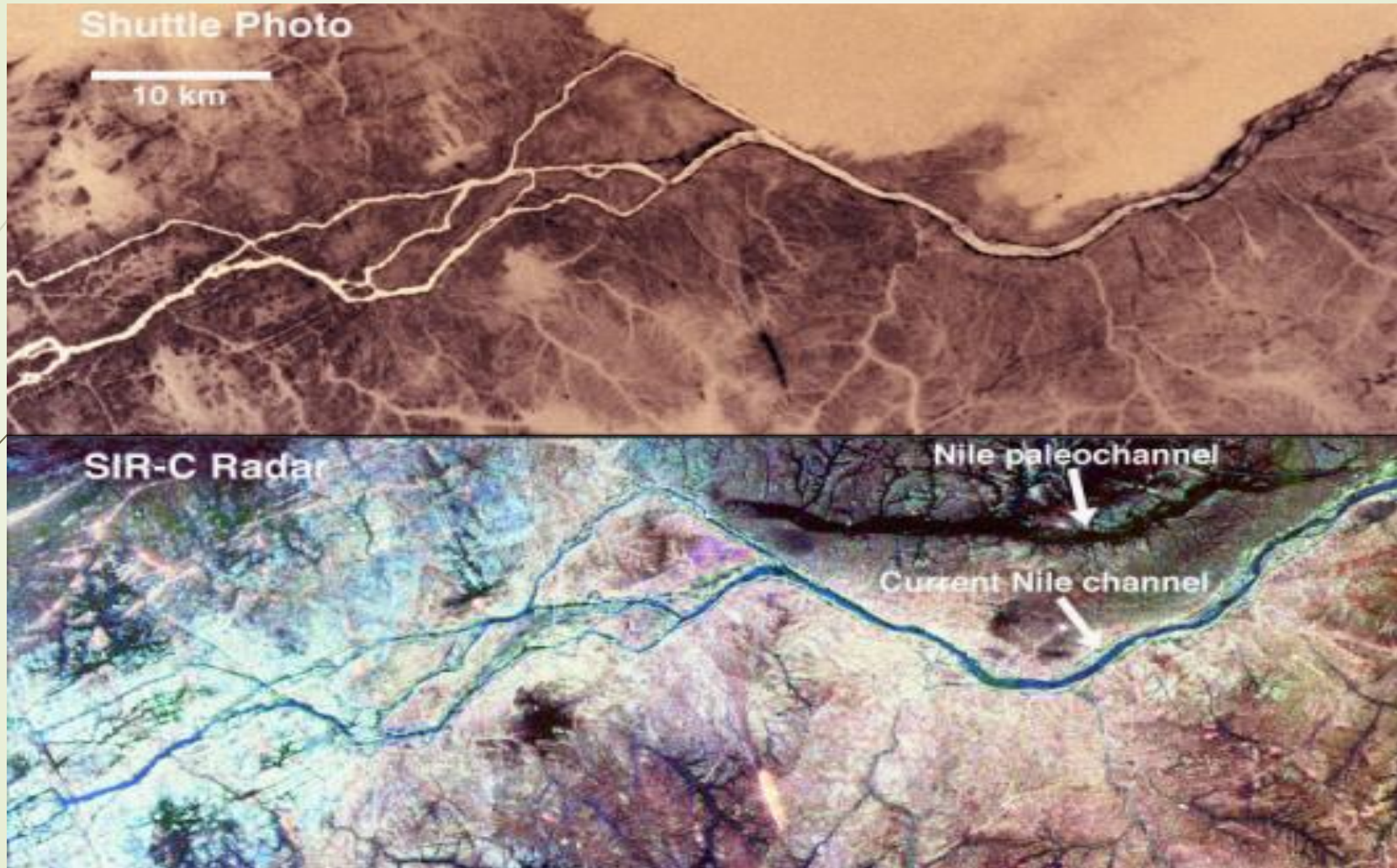


Halloween crack, Sentinel-1, © ESA

# Floods, Sentinel-1,

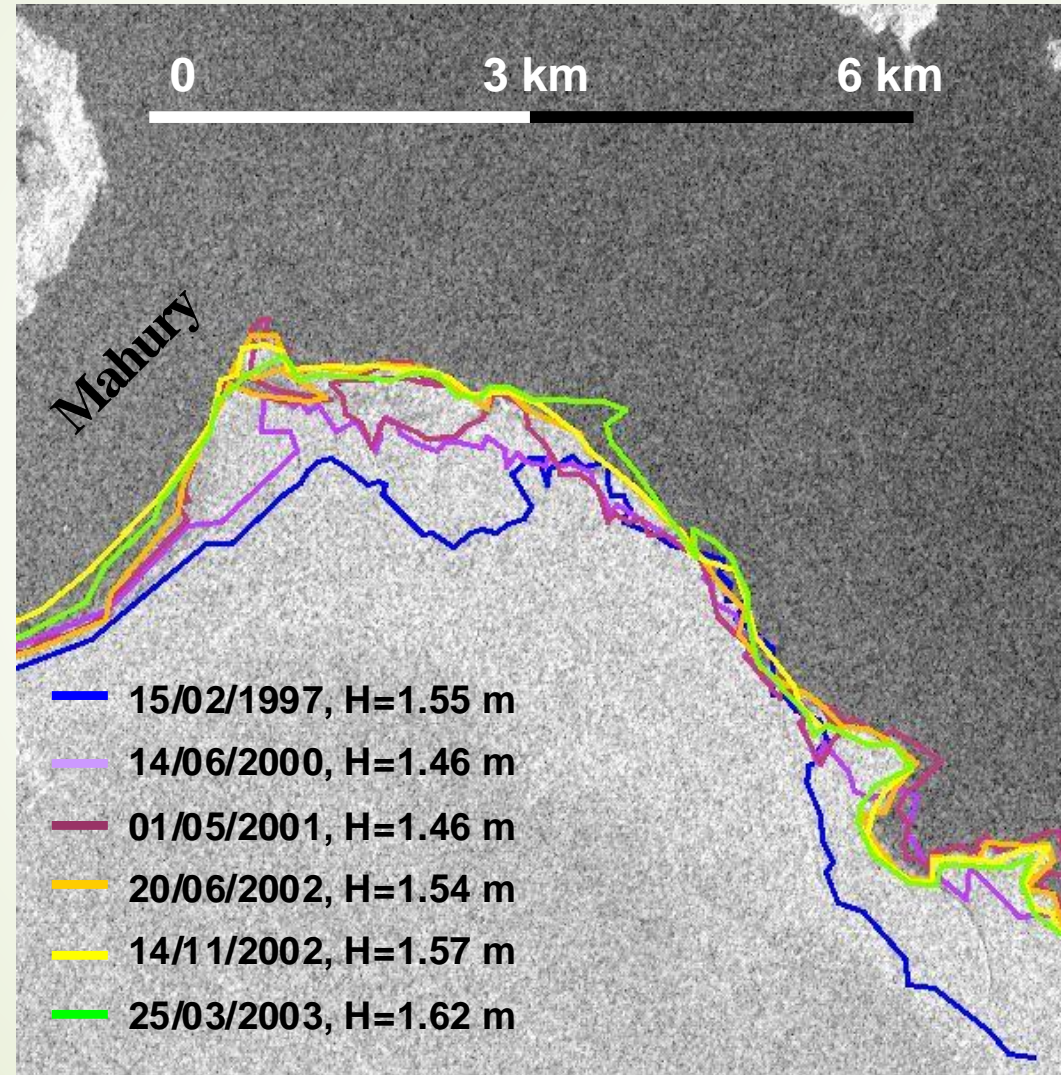


# Subsurface mapping

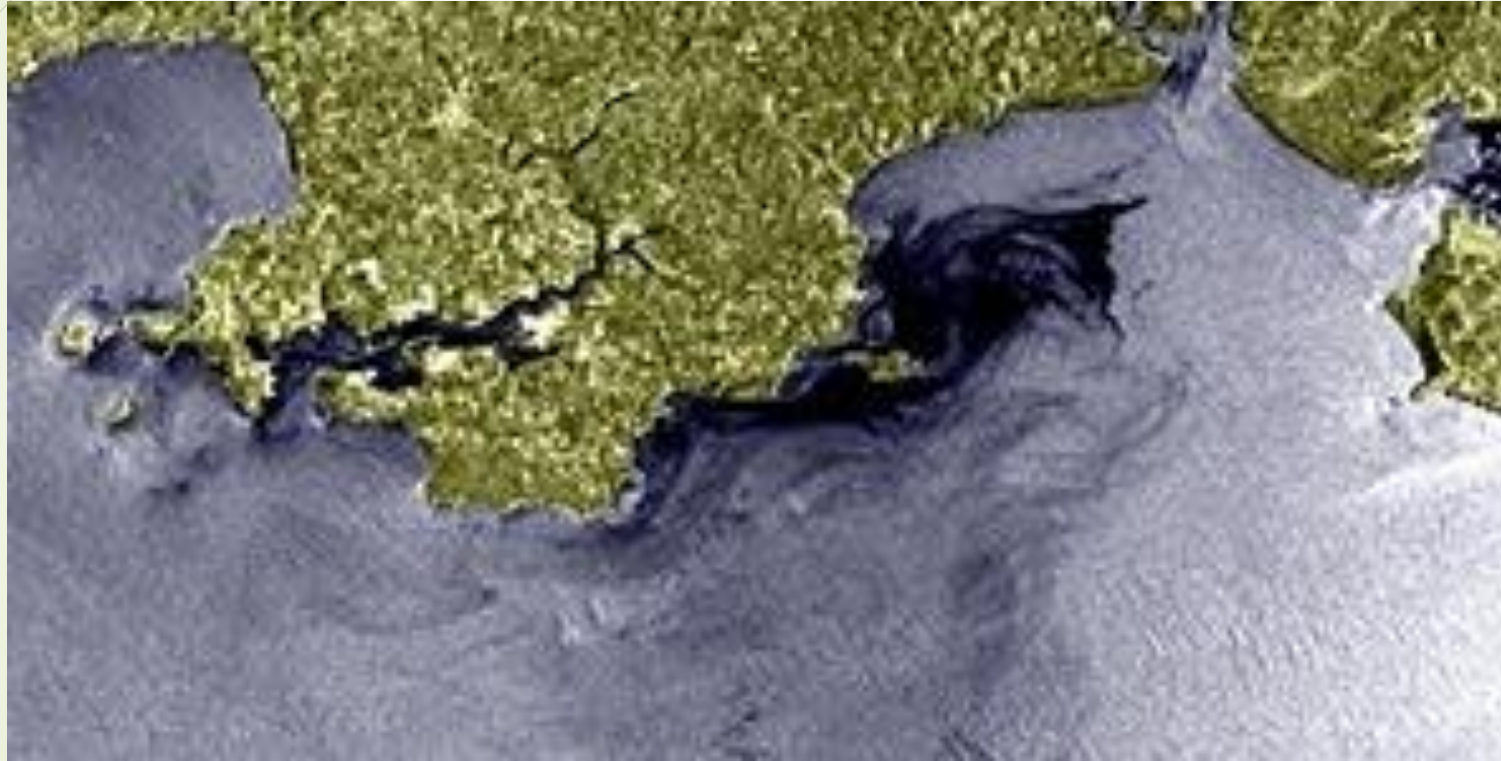


Sahara, SIR-C, © NASA

# Costal area monitoring



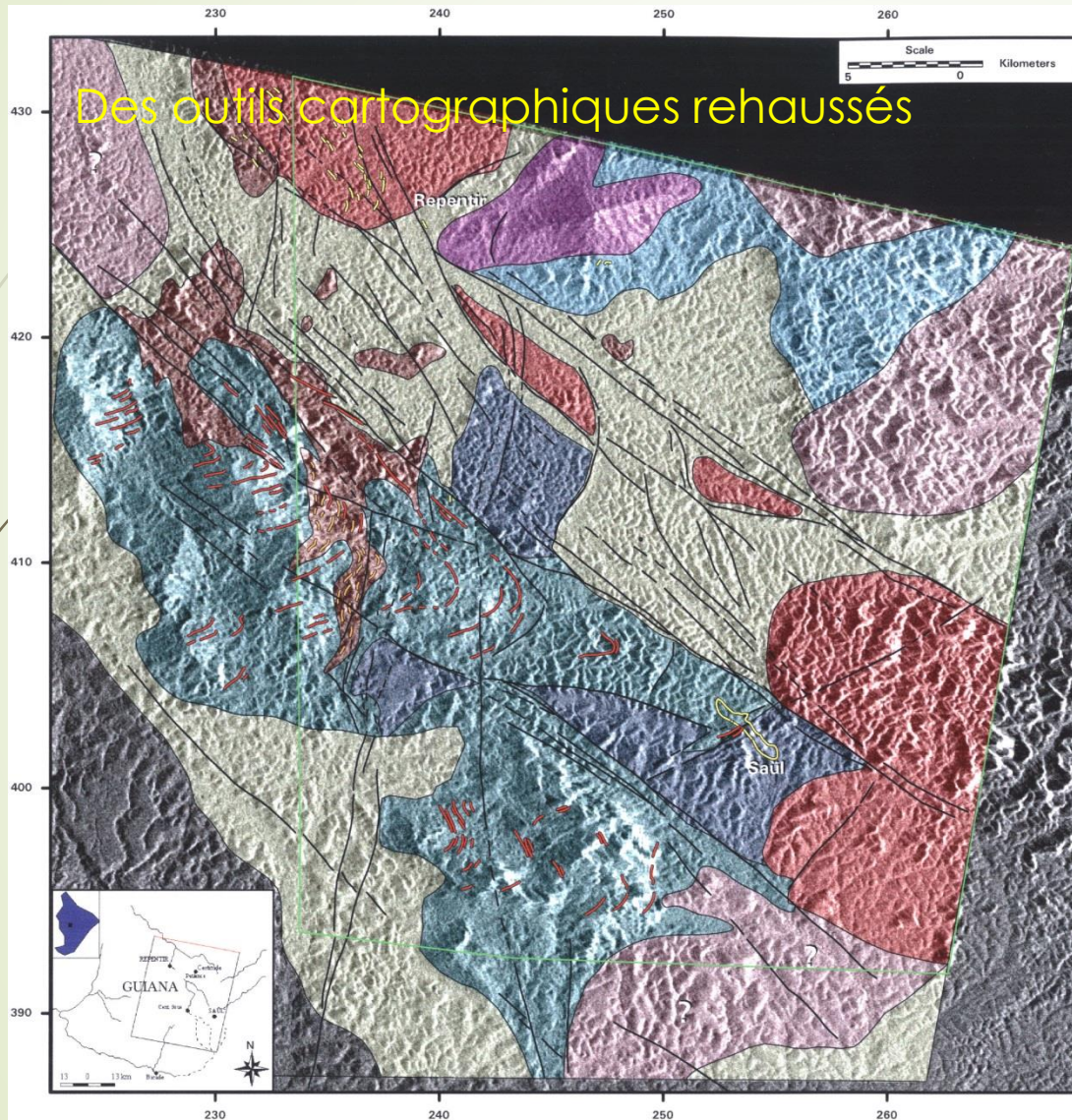
# Pollution detection





# Geological mapping

Des outils cartographiques rehaussés



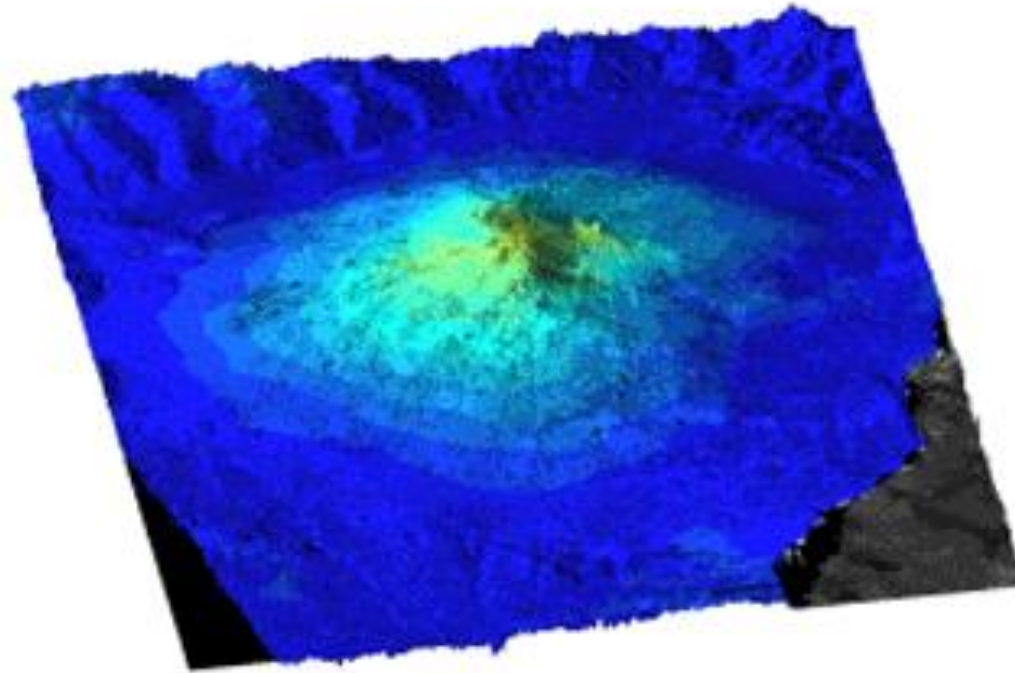
PROJECTION : UTM WGS84  
 SOURCES :  
 Altimétrie Ministère de l'Industrie,  
 de la Poste et des  
 Télécommunications  
 Images SAR ERS 1  
 copyright ESA 1991  
 geological map BRGM/DR  
 PROCESSING :  
 BRGM Direction de la Recherche

**Legend**

- Late Granites
- Indifferenciated Granitoïds
- Rhyolites
- Paramaca (poorly outcropping area)
- Paramaca
- Ultramafic rocks (Montagne Continent)
- Gabbros and Amphibolites
- Gabbros and Ultramafic rocks (Saül)
- Radar discontinuities
- Rhyolites bars
- SO-1 layers
- Auriferous quartz veins
- Boundary of gold anomalie
- Radarsat image boundary

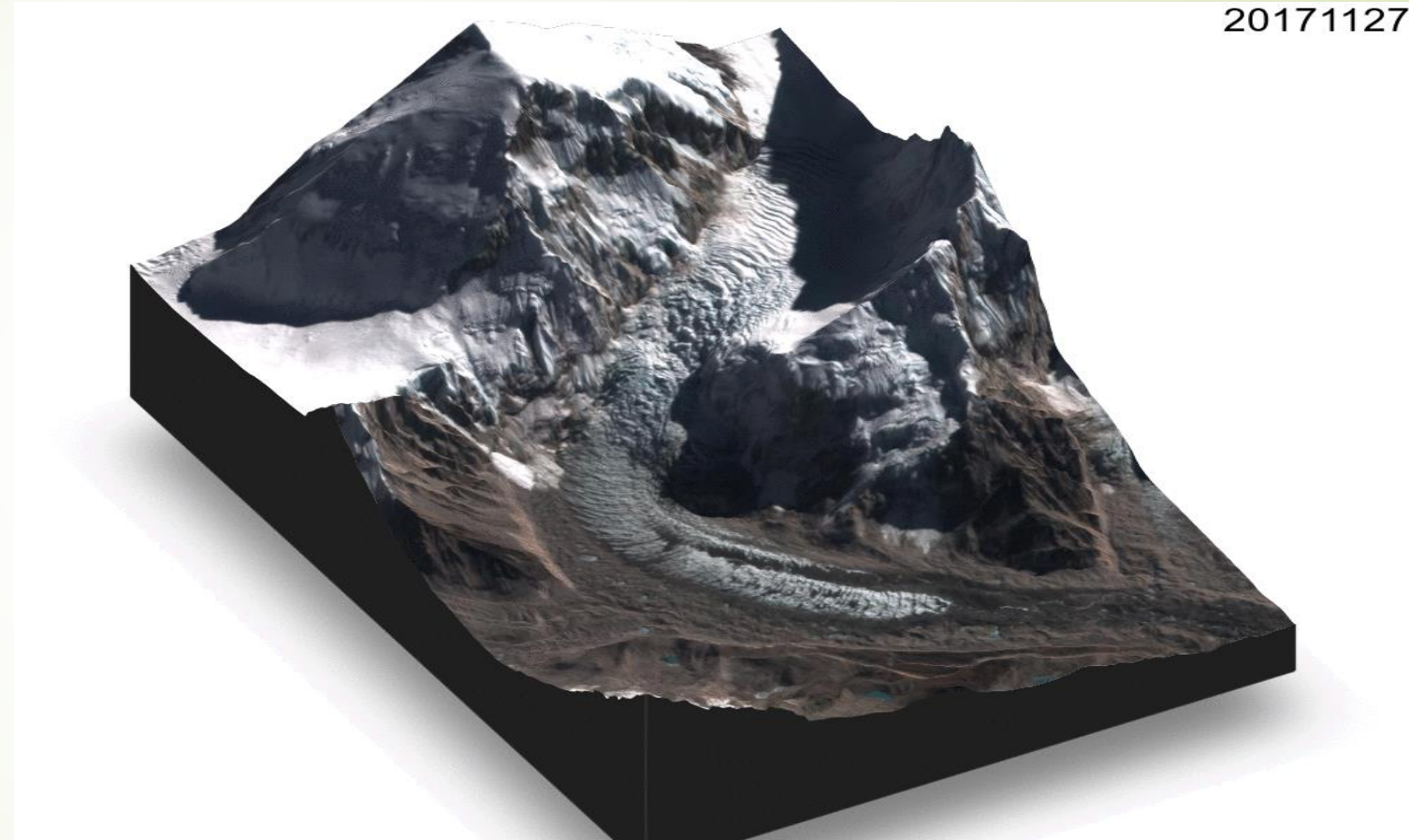
**Geological interprétation of radar imagery  
 (French - Guiana)**

# Volcano



*Etna, Sentinel-2 et ERS, © ESA*

20171127



Thank you for  
your attention

Glacier Khumbu, Himalaya, **Venus**  
*Animation: Simon Gascoin*