MONA Geoservices
Monitoring and assessment

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Offers of VisioTerra

➢ Hosting of MONA geoservices
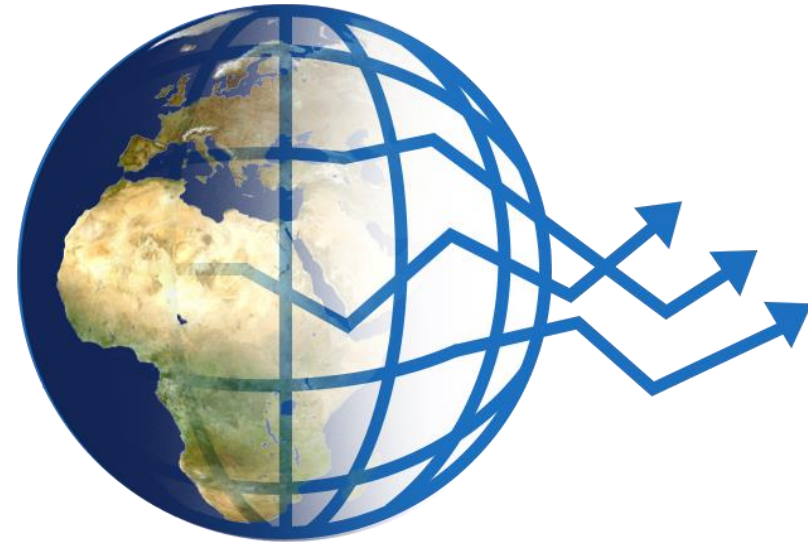
- ❏ VtWeb Data Processing Relay
- ❏ Domains of indicators
    - ▪ Agriculture & irrigation   (S2 optical + S1 radar)
    - ▪ Deforestation   (radar)
    - ▪ Active fires & burnt areas   (optical)
    - ▪ Flooding   (radar)
    - ▪ Oil spill monitoring   (radar)
    - ▪ Metocean variables   (Copernicus models)
- ❏ Services of one geoservice
    - ▪ Dashboards (Web browsers & smartphones)
    - ▪ Periodic bulletins
    - ▪ Early warning (NRT observation out of nominal values)
    - ▪ Smartphone application for in-situ observations collection
    - ▪ Moderator (option)
- ❏ Based on the superficies of the sites to monitor
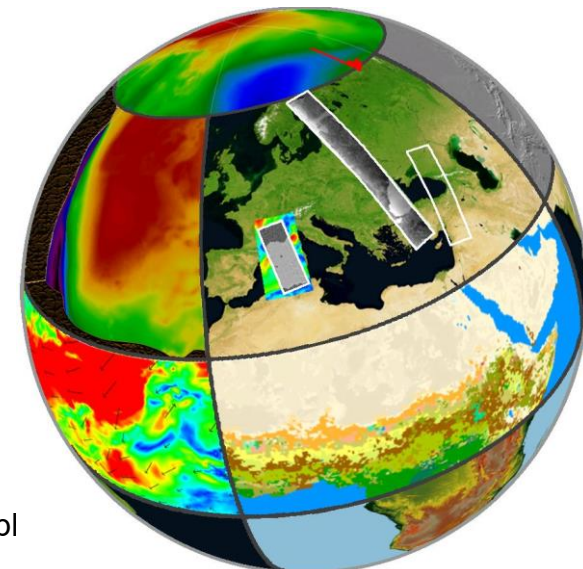
➢ Support to infrastructure building

- ❏ Experience in Tunisia and in Gabon
- ❏ Support to installation & configuration
- ❏ Maintenance & operations training
- ❏ On-line support

➢ Training

- ❏ Copernicus Academy label
- ❏ Programme Copernicus: Sentinels & services
- ❏ Domains: remote sensing, data processing, geodesy, cartograpl
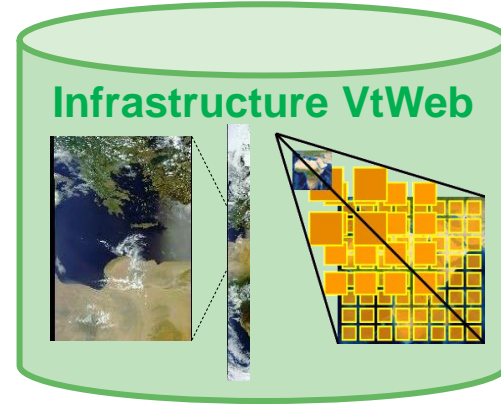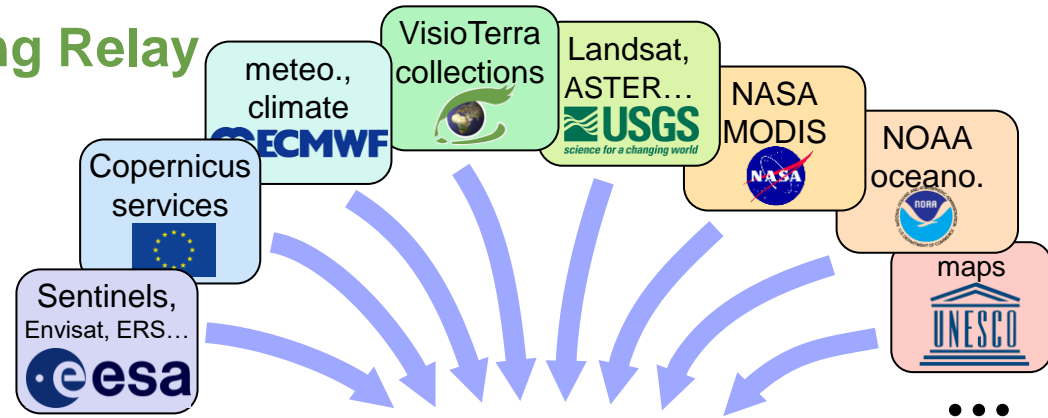
Principles and operations of geoservices

VtWeb – Data Processing Relay

- ➢ VtWeb infrastructure
  - ❑ 1 PB (1000 TB) available
  - ❑ 1 Gb/s symmetric fibre
  - ❑ 6 powerful servers

- ➢ DPR as a solution for Africa
- ➢ Enable to host geoservices

meteo., climate **ECMWF**

VisioTerra collections

Landsat, ASTER… **USGS** *science for a changing world*

NASA MODIS

NOAA oceano.

Copernicus services

Sentinels, Envisat, ERS… **esa**

maps UNESCO

• • •

Infrastructure VtWeb

Other infrastructures
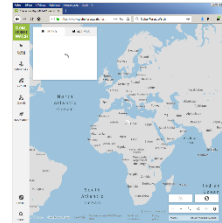
VtWeb client

Google Earth

KML KMZ
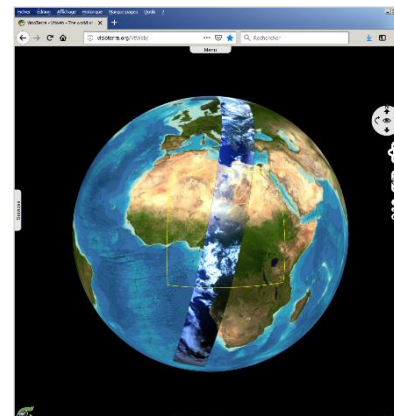
G.I.S.

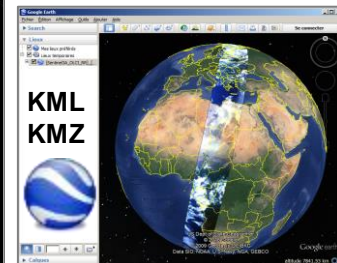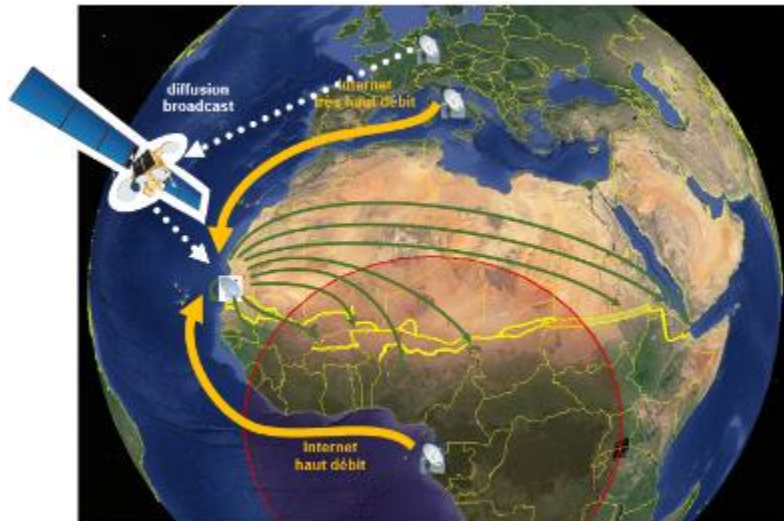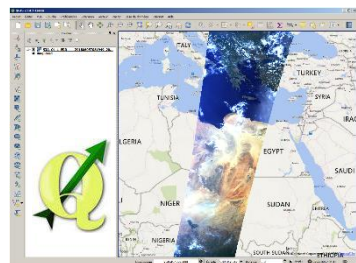# Geoservice principles

- ➤ Geoservice attributes:
  - ❑ Site
    - ▪ elementary
    - ▪ group
  - ❑ Indicator(s)
    - ▪ predefined
    - ▪ programmed by user in POF-ML
      (Processing On-the-Fly Macro-Language)
  - ❑ Period
    - ▪ monthly
    - ▪ trimestral
    - ▪ annual…
  - ❑ Alerts (option)
    - ▪ out nominal values
    - ▪ moderator
    - ▪ list of people to warn
  - ❑ Dashboards
    - ▪ spatial aggregation (graph)
    - ▪ temporal aggregation (map)
  - ❑ Periodic bulletin
    - ▪ template
    - ▪ visa
    - ▪ distribution list

- ➤ Geoservices are:
  - ❑ automated
  - ❑ controlled by its owner
  - ❑ a resource we may share

dashboard

periodic bulletin
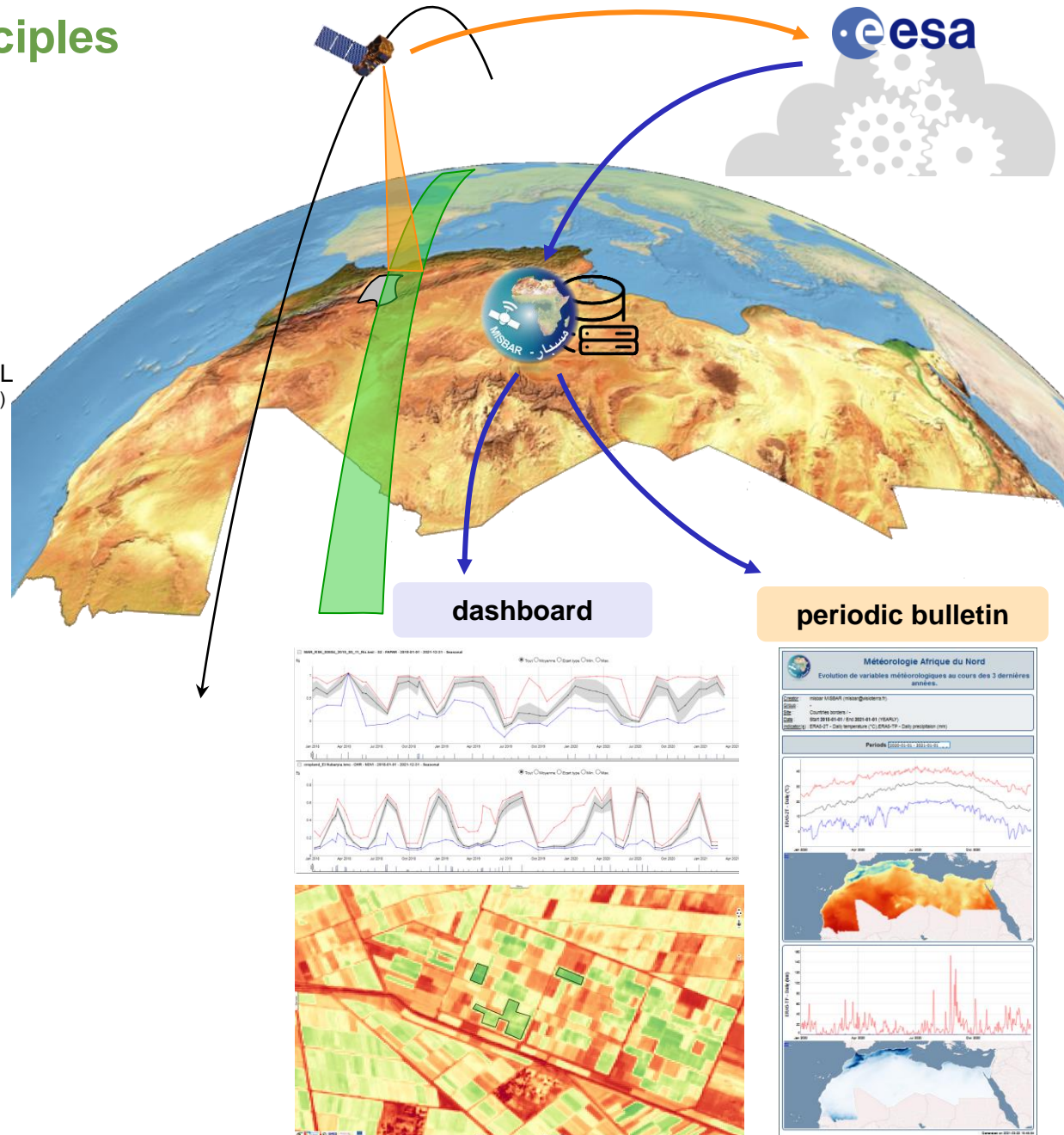
Geoservices operations

Hosting in VisioTerra infrastructure - The geoservices are hosted on the servers of the VtWeb infrastructure in the premises of VisioTerra. Very high bandwidth is guaranteed to capture heavy products in input and offer lightweight visualisation / analysis / output sharing services.
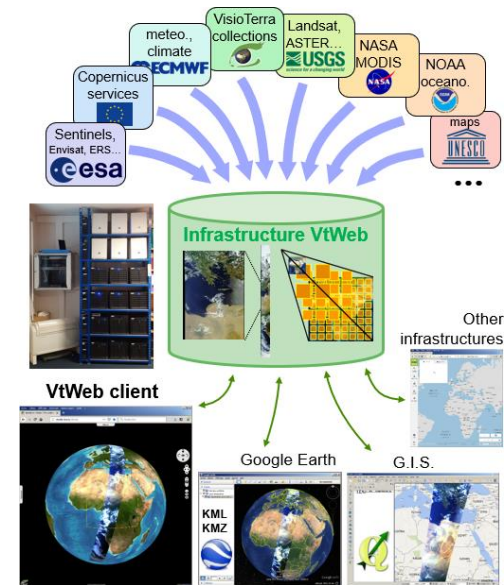
Hosting services - At least one server is allocated to run geoservices for each client. The persistence of geoservices is more than 99% guaranteed.

- ❑ Hosting operations based on the area and spread to monitor............ ≈30 K€ / Mha / year
- ❑ Six-monthly hosting report ……………………………………….………………………… *offered*
- ❑ On-site support…………………………………………………………………….…… *offered*
- ❑ Moderation to focus on the most important events, individual contact, GIS..... *Contact us*

Portfolio of geoservices

Geoservice 1 - Agriculture & irrigation

Precision farming
- ❑ Spatial information to reach optimum health and productivity

Early warning
- ❑ Near-Real-Time (NRT) observation shows values out of nominal ranges

Agricultural bulletin
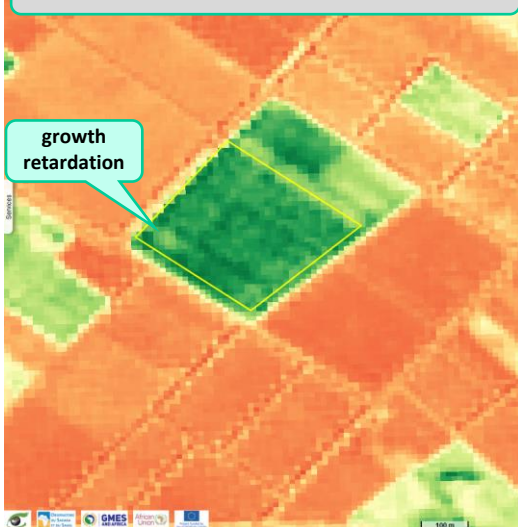- ❑ Edited periodically and automatically routed to a mailing list

Productivity
- ❑ Inter-annual comparison

RECI (Red-Edge Chlorophyll Index)

growth retardation

NDWI-SM (Soil moisture)

Irrigated parcels

DZA_WA01_01_Maraichage.kml - OHR - NDWI-SM - 2018-01-...

◯ Tout ◉ Moyenne ◯ Ecart type ◯ Min. ◯ Max.   100%

Q4 2020 Irrigation excess

Q1 2020 Irrigation deficit
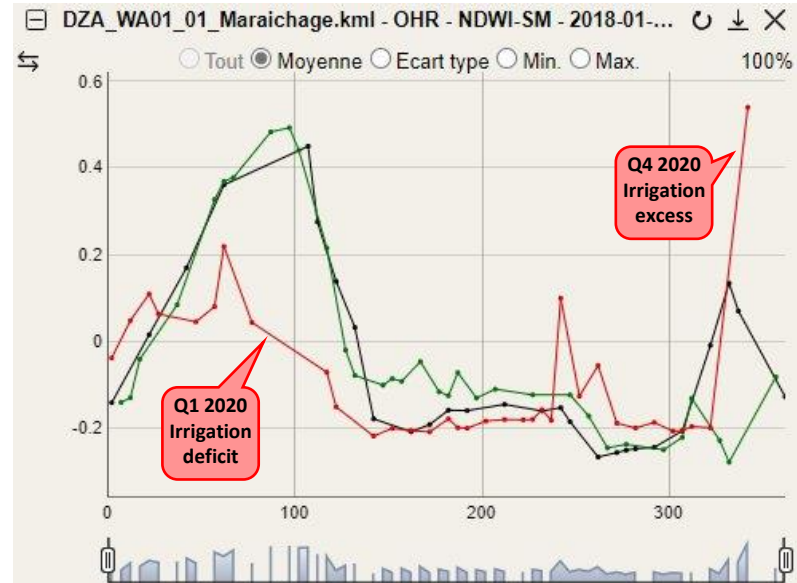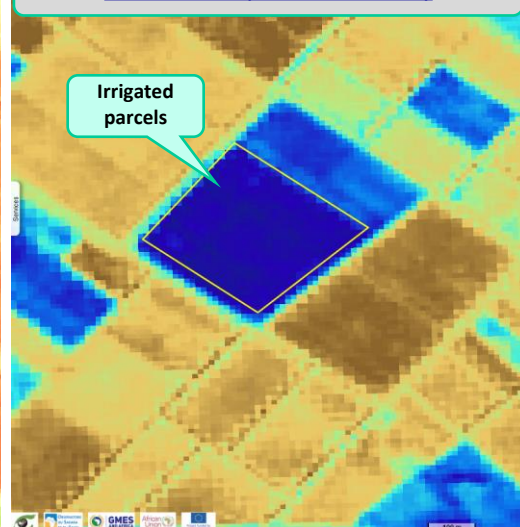
Geoservice 2 - Deforestation

Automatic NRT detection

❑ Near-real-time capture of the just observed Sentinel-1 radar image (10m pixel size)

Dashboards

❑ Log of deforestation occurrences and superficies

Smartphone App

❑ To perform field missions, verify on-site, collect observations (photos, videos, audio)

Mission reports

❑ Automatic edition of field mission reports

Sentinel-1 radar image
observed on 17 July 2020
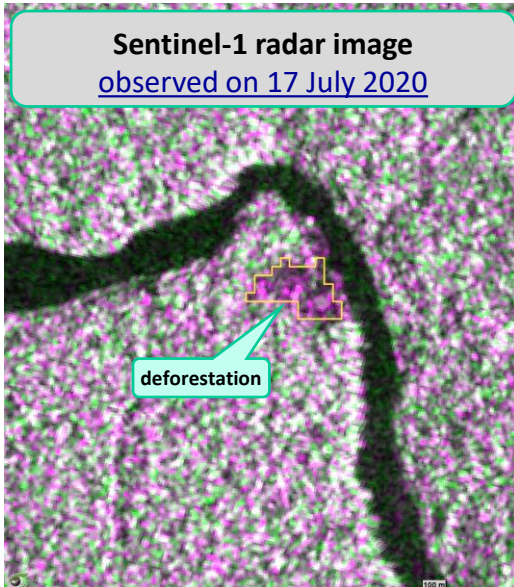
deforestation

Sentinel-2 optical image
observed on 18 July 2020
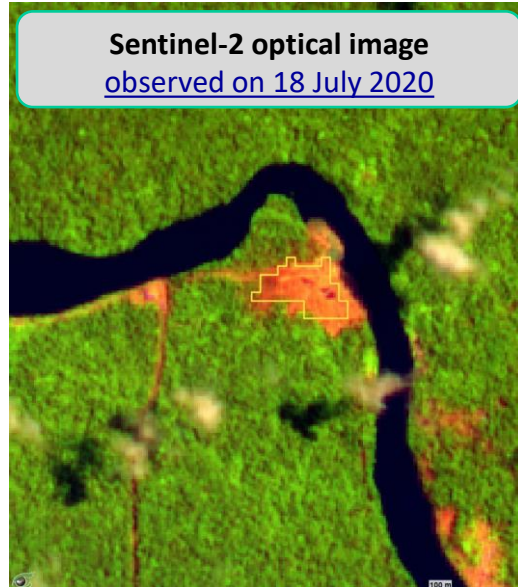
Rapport de mission
Mission Mont de Cristal - Serge RIAZANOFF / GAB BF12 - PN Minkebe

Auteur : FLEGTWatch VisioTerra (Root)
Pays : Gabon
Statut : Ouverte
Ouverte le : 30-01-2020
Fermée le : -

Feuille de route :
Déterminer la nature de la déforestation.

Liste des observations

Observation 1 (Photo) - Départ de Brainforest
Auteur : FLEGTWatch VisioTerra
Date : 30-01-2020 08:00:26
Localisation : 9.43752° / 0.44006°
Commentaires : Photo de groupe au départ.

Lien : https://visioterra.org/FlegtWatch/mission/download/65cb3fedcc1b479d9b48c50bf70400d0/IMG_20200130_090010_compressed.jpg

Observation 2 (Photo) - Entrée dans la zone de N'kok
Auteur : FLEGTWatch VisioTerra

Geoservice 3 - Active fires and burnt areas

NRT warning of active fires

❑ Near-Real-Time (NRT) detection and warning few minutes after the Sentinel edition

Burnt areas

❑ Automatic computation of occurrences and burnt areas superficies along the time

Early warning

❑ Prediction of risks according to surface temperature, winds and land use

Environmental bulletin

❑ Edited periodically to a mailing list

Active fires

Burnt areas
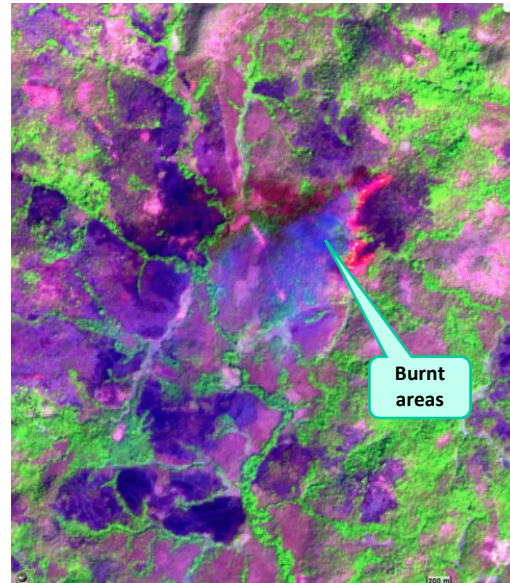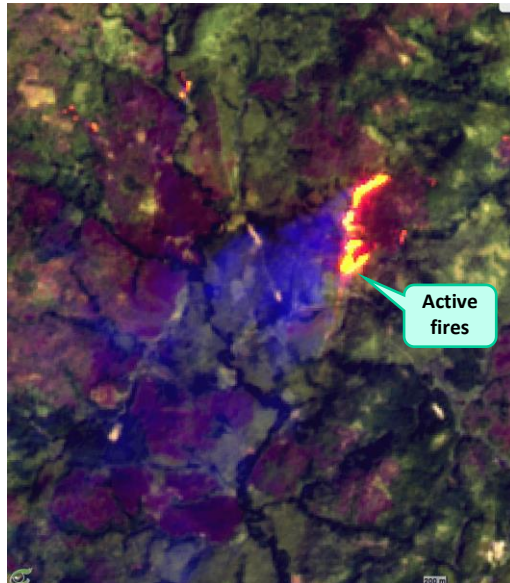
Sentinel-2 optical image - observed on 14 January 2020 Nord-east of Sierra-Leone

Diary precipitations (mm) and observation date

Fraction of burnt area in the area of interest
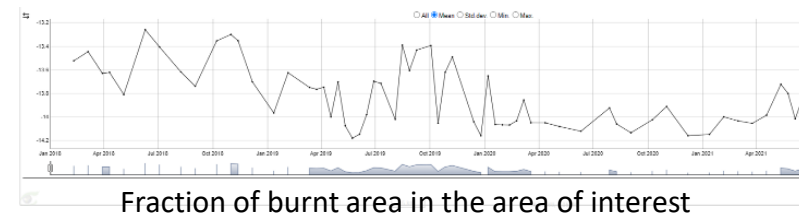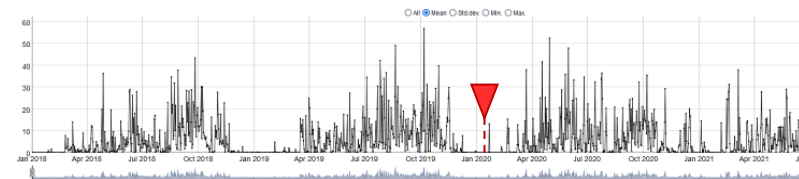
Geoservice 4 - Flooding

NRT detection

❑ Detection from Sentinel-1 radar data breaking through the clouds

Dashboards

❑ Graphs show the flooded superficies count and the spatial distribution of floodings

Predictions & early warning

❑ Based on risk cartography (flooding analysis since 2015) and precipitations in watershed

Modelling

❑ Use of DEMs and runoff simulations (video)

Sentinel-1 radar image
observed on 19 June 2021

Permanent waters
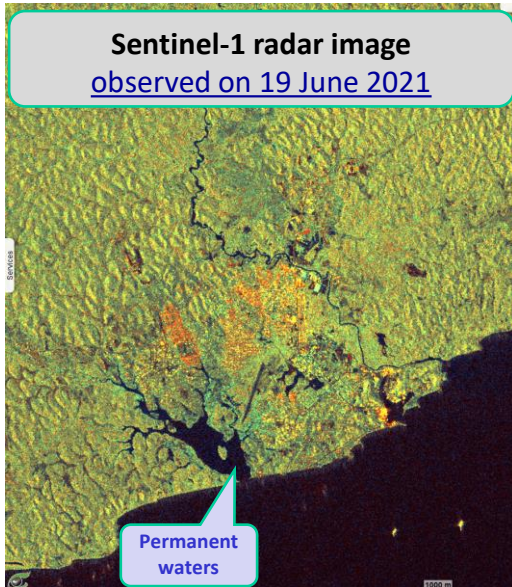
Sentinel-1 radar image
observed on 1st July 2021

New flooded areas
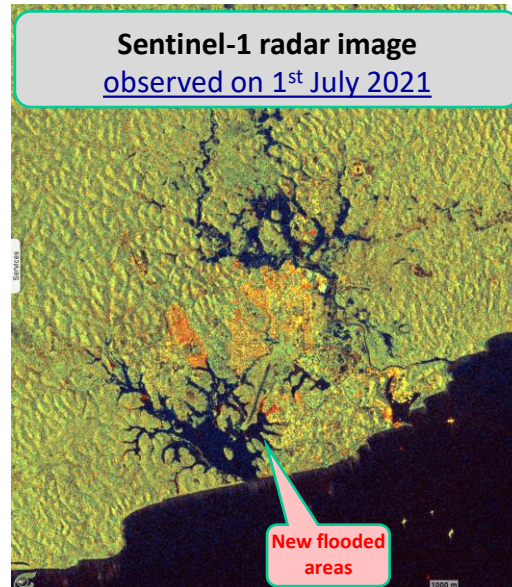
Inondation fluviale dans la sous préfecture de San-Pédro

San-Pédro

Poro

Kablaké

Baba

SAN PEDRO

Klou

Grand-Béréby

Taki

Inondation fluviale

Sous préfecture	Zone habitée	Faible
Plan d'eau	Réseau routier	Modérée
		Elevée

0 5 10 km

VisioTerra
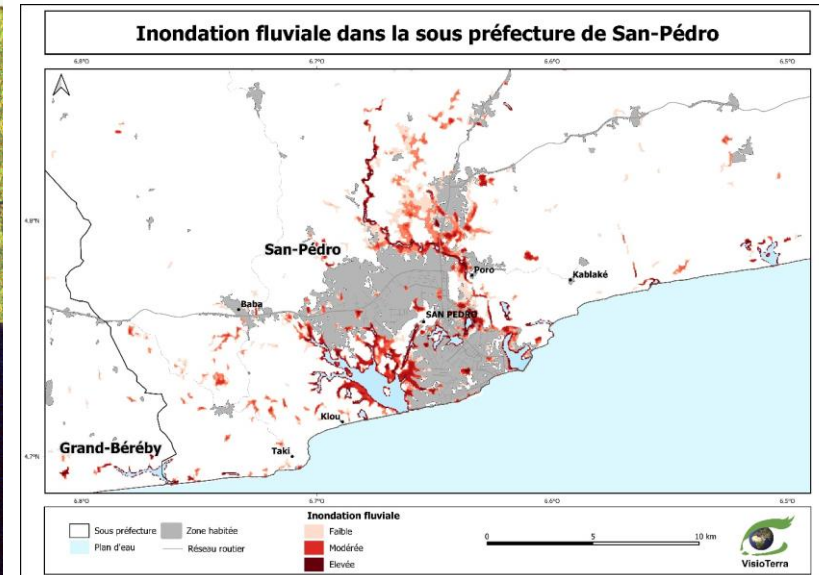
Geoservice 5 - Oil spill monitoring

NRT detection and drift prediction

❑ Near-real-time detection from Sentinel-1 radar data and drift assessment from surface currents & winds

Oil spills from platforms

❑ Alarms and measurement of the extent of slicks escaping from platforms or deep water operations

Oil spills from ships

❑ Coupling of deballasting leaks with the AIS positioning of vessels crossing the EEZ

Oil slicks bulletin

❑ Oil seepages, oil spills from ships / from platforms

minimum
since 01.01.2021

USAN FPSO

Spatial distribution of oil slicks in the Gulf of Guinea between 2002 and 2012

Study area
Exclusive Economic Zones (EEZ)

Oil slicks
oil seepages
oil spill plateforms
oil spill ships

Copyright: VisioTerra (2022)
Data source : Envisat images
ASAR Wide Swath Mode, WSM
acquired between 2002 and 2012.
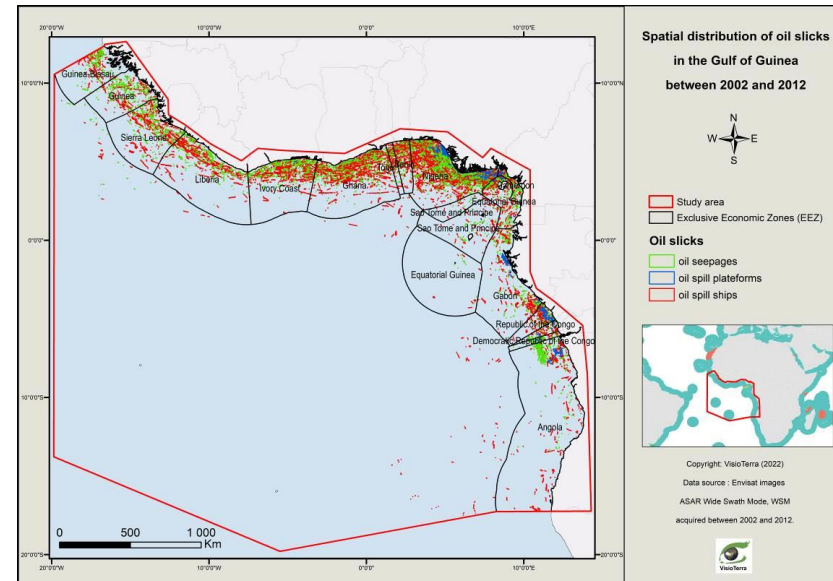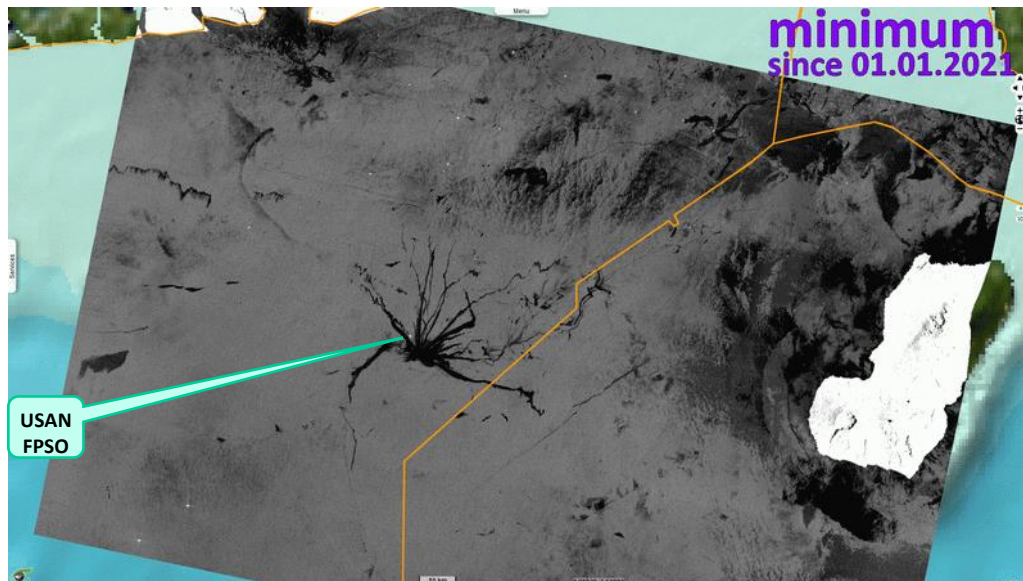
Geoservice 6 - Metocean

Meteorology and sea state

- Present, forecast & archives
- Winds, precipitation, pressure, air and ocean temperatures, currents, salinity, wave heights, phytoplankton, chlorophyll...
- Early warning
- Daily bulletin

Surveillance of vessels in the EEZ

- Checking that ships identified in the radar Sentinel-1 & optical Sentinel-2 free images have AIS record(s)

Water velocity

Illegal fishing?
A factory vessel 160 meters long brings a trawl just 8.7 km from the Beninese coast!

160 m

100 m

Support to infrastructure building
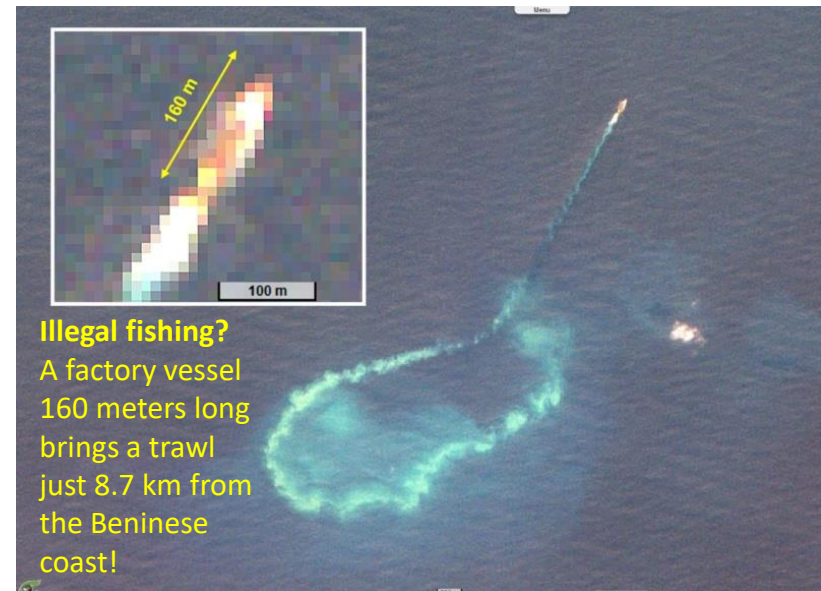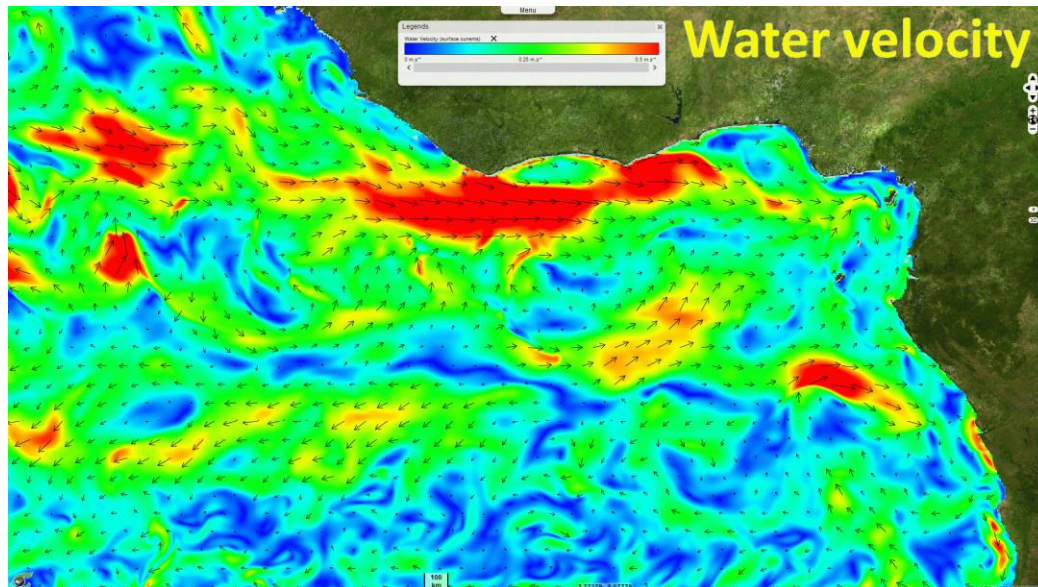
Geoservices infrastructure

CAFWS

Central Africa Forest Warning System
Système d'alerte des forêts d'Afrique centrale

MISBAR - Afrique du Nord

Monitoring Integrated Services
for Best Assessment for natural Resour...

Connexion

Français

AGEOS
Agence Gabonaise d'Etudes et d'Observations Spatiales

Datacentre: Synology RackStation RS4017xs+

CPU: Intel Xeon D-1541 8-core 2.1 GHz / 16 threads, RAM: 8 GB expandable up to 64 GB, Storage: 16 3.5'' drive bays expandable up to 2 units of 12 drive bays (total of 40 drive bays), LAN: 2 RJ45 LAN ports of 10 Gb/s (10GBase-T) + 4 RJ45 LAN ports of 1 Gb/s, SSD: Samsung 860 PRO SATA 2.5'' SSD 1 TB, RAM: 4 x 16 GB DDR4 ECC (Crucial), Disk:s: 11 x Seagate IronWolf Pro 14TB

Installation and maintenance manual

500 km   15.82747, 9.68427

12.72930, 9.59640

Geoservices infrastructure cost

Hardware - Datacentre is configured and tested at VisioTerra premisses and sent to the customer for on-site tests. Price below includes the datacentre hardware, 3 years warranty, shipping and customs fees:

- ❑ Datacentre + 3 years hardware warranty + shipping / customs.......................... 25 000 €
- ❑ Installation and maintenance manual……………………………………………… *offered*
- ❑ On-site support………………………………………………………………… *contact us*

Software - The geoservices infrastructure delivered by VisioTerra uses data provided by space agencies or institutes whose infrastructures, formats, products, content... may change. The maintenance offered makes it possible to guarantee the continuity of services. In addition, new data, new indicators, new geoservices improve the geoservices platform.

- ❑ Development of a dedicated software platform………………………… from 150 to 400 K€
- ❑ Software maintenance……………………………………………….…… 30 000 € / year
- ❑ On-line support……………………………………………………………….……... *offered*

Training

Training & Education

Since its creation, VisioTerra has carried out an intense training activity throughout the World and more particularly in Africa. Located on the Champs-sur-Marne Campus, its staff has taught since 1993 at the University of Paris-Est and ENSG (School of IGN Ordnance Survey). Free courses are available online on the **http://www-igm.univ-mlv.fr/~riazano/** portal. VisioTerra's competence has been recognized by the Copernicus Academy label and VisioTerra develops and operates platforms using Sentinel data and Copernicus services. Research is underway to participate in the modeling effort of the DestinE program of the European Union.

Training domains - In addition to training in the use of its own platforms (ex. FLEGT Watch), VisioTerra team offers sessions lasting several days or weeks in the following areas (a tailor-made course can be arranged):

- ❑ **Earth observation & models** - Copernicus & DestinE programmes, Sentinel satellites, Copernicus services, observations and models, panel of optical / radar / altimetry / atmosphere chemistry instruments, panel of biogeophysical (DEMs, LU/LC, soils, hydro-geology…) and socio-economic models, use of customized geoservices…

- ❑ **Data processing** - Free data access, observation physics (geometry and radiometry), elements of spatial mechanics, introduction to geodesy, orthorectification, processing levels, data formats, statistics, histogram transforms, local filtering, speckle reduction, multi-date / multi-sensor image fusion, POF-ML, creation & use of indicators, conception of customized geoservices…

- ❑ **Photo-interpretation and derived products** - Introduction to QGIS, management of a GIS projects, free layers across the Web, data classification, machine learning technics, time-series analysis, introduction to cartography, edition of spacemaps, edition of technical documents and scientific papers…

Training offer - Training may be performed on-site or via visioconference. On-site visits may lead to field missions to check the adequacy between element seen from space and those seen on-ground. Course supports, videos, data examples and bibliography documents are offered on a USB key.

Thank you for your attention

Merci de votre attention

Questions ?

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www.visioterra.fr