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TOULOUSE SPACE CENTER

NEWS SPACES & EARTH OBSERVATION

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SCO
SPACE FOR CLIMATE OBSERVATORY

CNES TOULOUSE
14/10/25

WELCOME AND INTRODUCTION

LAURENCE
MONNOYER-SMITH

Director of the Sustainable Development Delegation (CNES)

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NEW SPACES

SPACE CENTRAL TO THE KEY STAKES OF THE NEXT DECADE

OUR 4 STRATEGIC PRIORITIES

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STRENGTHEN

our strategic independence

© CNES/Thierry De Prada, 2022

SUSTAIN

a competitive space ecosystem

© CNES/Distribution Airbus DS, 2020

WORK

towards a sustainable world

© CNES/EmmanuelGrimault, 2021

EXTEND

our scientific excellence

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STRENGTHEN OUR STRATEGIC INDEPENDENCE

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MAINTAIN **INDEPENDENT ACCESS** TO SPACE

© ESA/ill/David Ducros, 2018

EXECUTE **MILITARY** SPACE STRATEGY

© CNES/PrédéricLancelo, 2024

ENSURE **SAFETY** OF **SPACE OPERATIONS**

© CNES/Mira Production, 2020

SUSTAIN A COMPETITIVE SPACE ECOSYSTEM

SUPPORT **NATIONAL INDUSTRY**

DEVELOP **DISRUPTIVE** TECHNOLOGIES

© CNES/Thierry De Prada, 2021

FOSTER NEW APPLICATIONS

ACCOMPANY **NEW ENTRANTS**

© CNES/E.Grimault 2022

PROMOTE UPTAKE OF **SATELLITE DATA**

© CNRS/Edward Salameh/Damien Desroches, 2024

WORK TOWARDS A SUSTAINABLE WORLD

IMPLEMENT AN AMBITIOUS **CSR** POLICY

SUPPORT REGIONAL **RESILIENCE**

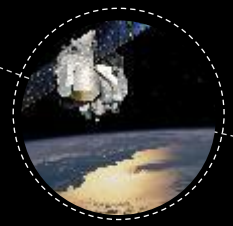
GAIN NEW INSIGHTS INTO **CLIMATE CHANGE**

© Copernicus Sentinel Data, 2022

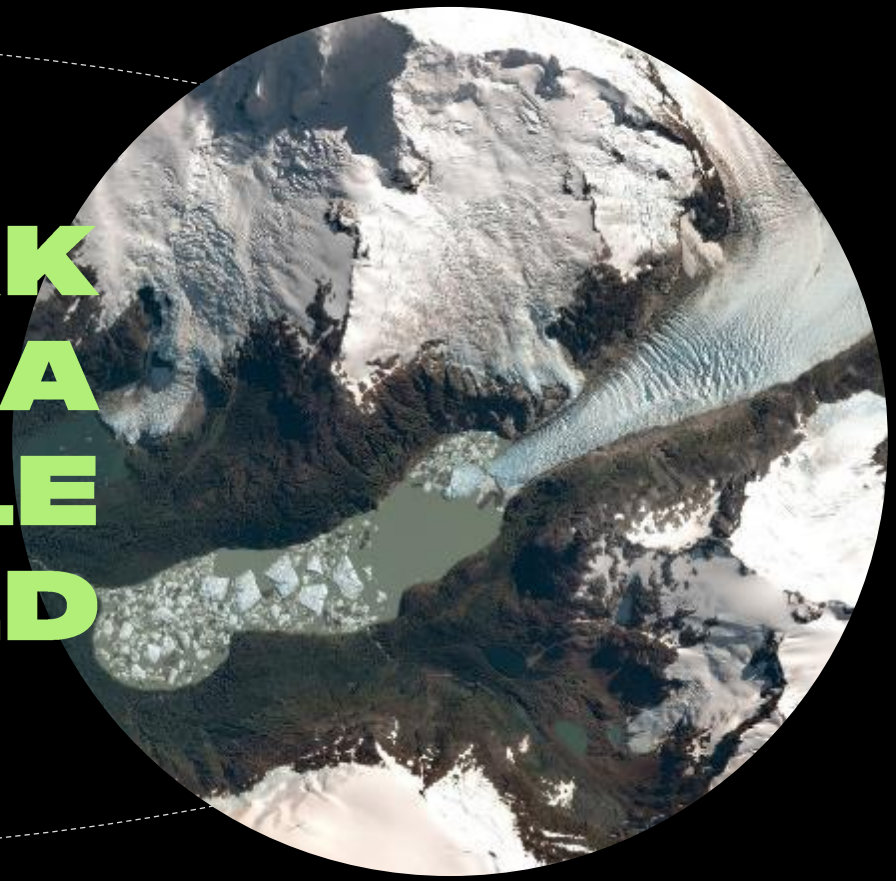
PROMOTE **SUSTAINABLE** USE OF SPACE

© CNES/Ill/David Ducros, 2022

DECARBONIZE THE SPACE SECTOR



© CNES/David Ducros, 2016



© CNES/Distribution Airbus DS, 2020

EXTEND OUR SCIENTIFIC EXCELLENCE

POSITION FRANCE IN
EUROPEAN PROGRAMMES

© NASA/JPL Caltech, 2019

LEAD AND SUPPORT THE
SCIENTIFIC COMMUNITY

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STRENGTHEN
PARTNERSHIPS

© CNES/DE PRADA Thierry, 2021

PROMOTE SPACE IN THE
INTERNATIONAL ARENA

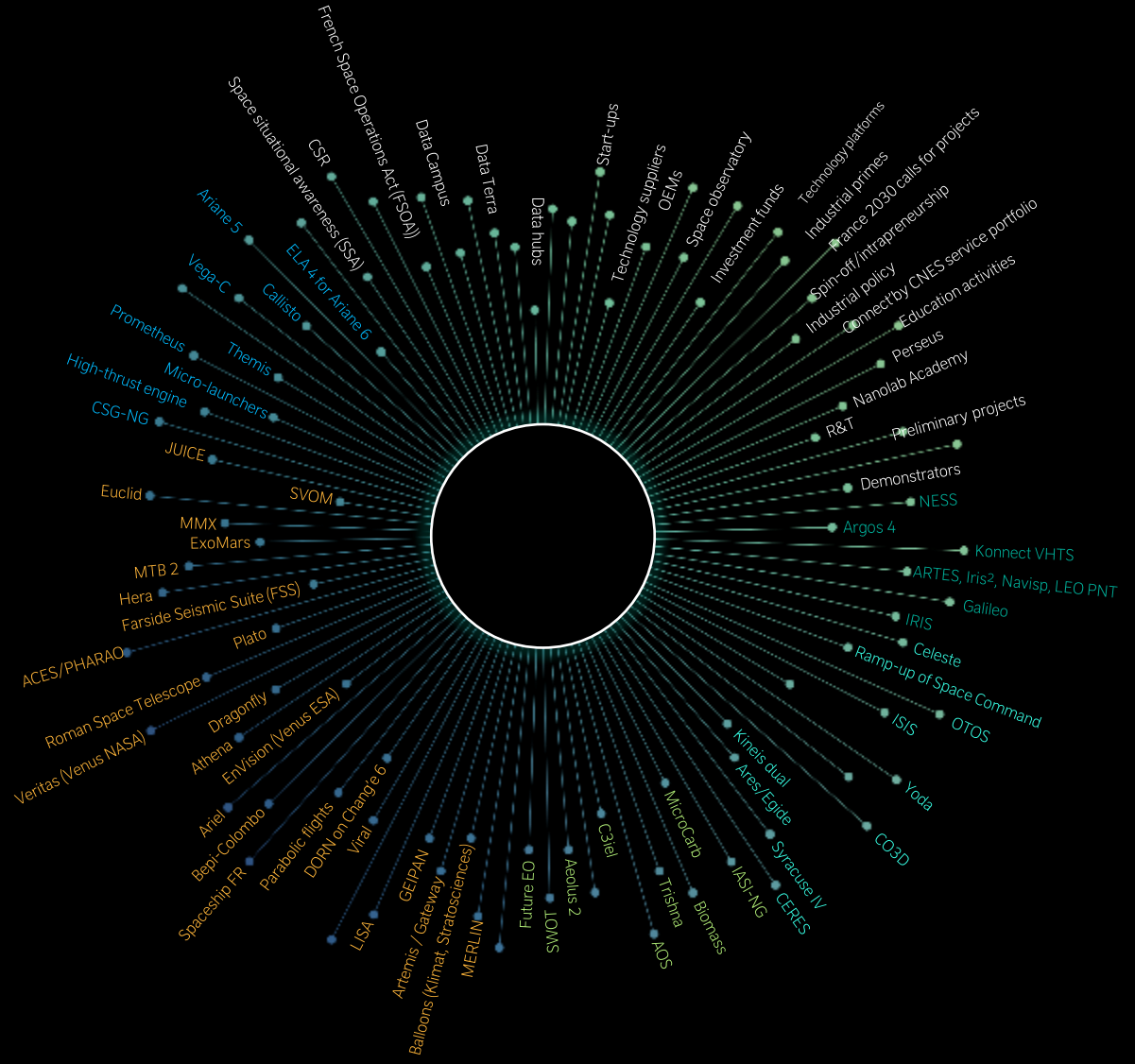
INSPIRE
SCIENTIFIC
CAREERS

© CNES/TRONQUART Nicolas, 2017

© NASA/ESA/CSA/STScI/Klaus Pontoppidan (STScI), Alyssa Pagan (STScI), 2023

LEAD AMBITIOUS PROJECTS

- **SPACE TRANSPORTATION**
- **UNIVERSE SCIENCES / EXPLORATION**
- **CLIMATE SCIENCE / EARTH OBSERVATION**
- **DEFENCE**
- **TELECOMMUNICATIONS / NAVIGATION**



FRENCH SPACE ECOSYSTEM – KEY FIGURES

3 billion €

French public space budget in 2024

45 €
per year et per habitant

5e
country, after USA, China, Japon and Russia

1er
national budget in Europe

1 000

French companies in the space sector, representing 1,500 establishments 90% SMEs and mid-sized companies

More than

80

academic programmes specialising in space studies

More than

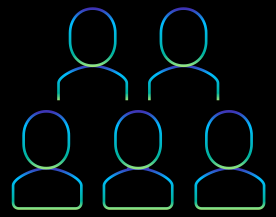
15

University Space Centres collaborating with CNES

70 000

people

work in the space industry in France, in manufacturing and services, and in academia.



1er

European country in terms of **private investment** in space

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Source : Observatoire du spatial du CNES. Crédits : CNES

THE INTERNATIONAL CHARTER FOR SPACE AND MAJOR DISASTERS

EMILIE

BRONNER

Project Leader and CNES Representative on the Charter's Executive Secretariat (CNES)

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THE INTERNATIONAL CHARTER FOR SPACE AND MAJOR DISASTERS

SPACE FOR EMERGENCY RISK MANAGEMENT

VIP VISIT, CNES, TOULOUSE

OCTOBER 2025

OUTLINE

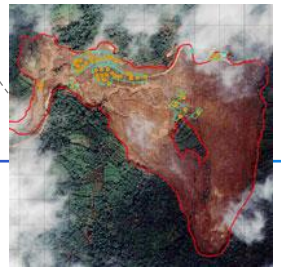
01 WHAT IS THE CHARTER ?

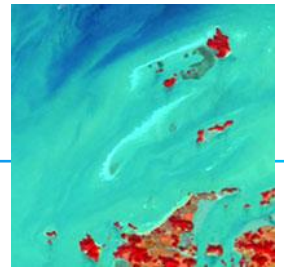
02 MAJOR DISASTERS

03 KEY FIGURES

04 WHAT PROVIDES THE CHARTER ?

05 RISK MANAGEMENT AND RISK CYCLE





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01

WHAT IS THE CHARTER ?

HISTORY, MEMBERS AND OBJECTIVES

HISTORY AND DEFINITION

1999

created in 1999 by CNES and ESA

Nov. 2000

Operational start

International agreement between space agencies to provide satellite earth observation imagery in case of major disasters

INTERNATIONAL CHARTER SPACE & MAJOR DISASTERS
CHARTE INTERNATIONALE ESPACE ET CATASTROPHES MAJEURES

MEMBERS AND DATA PROVIDERS

Today

17

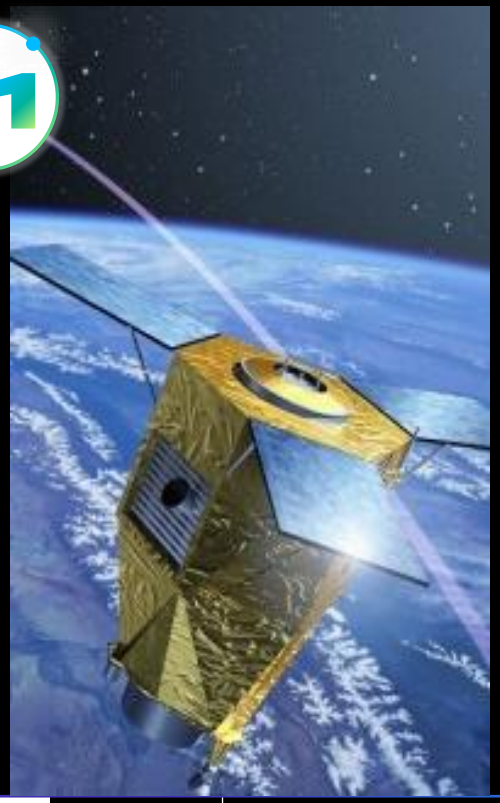
Space agencies are members.

9 satellite data providers :

- BlackSky
- Iceye
- Maxar
- Planet
- Satellogic
- Geosat
- CONIDA
- China Siwei
- GHG-sat

CHARTER OBJECTIVES

01 Urgent and priority programming of earth observation satellites



@CNES Mars 2003, illustration Pierre Carril

02 Organization of emergency rapid mapping of disasters

@Icube-SERTIT 2023

03 Worldwide service 24/7

04 FREE for end users

@PEXELS DIALO Photography

A CHARTER FOR WHO? ACTIVATED BY WHO?

The Charter serves :

- **Actors in crisis management** (rescue teams, civil protection agencies, United Nations, NGO, etc.)
- **Decidors in crisis management** (for damage and recovery estimation, for humanitarian help sizing, etc.).

The Charter **can be activated by all the countries** in the world :

- Since 2012, it is called **Universal Acces**.
- To date, **100 authorized users** can trigger the Charter for themselves or a neighbouring country.
- In Philippines, **no authorized users** but the Charter can be triggered by Sentinel-Asia, United nations, Asian Disaster Reduction Center (ADRC)
- **42 activations for Philippines since 2000**
  - Last activation was : 20th September 2025 for landslide and storm (Super Typhoon Ragasa (local name Nando))

02

MAJOR DISASTERS

DEFINITION AND STATISTICS


DEFINITION

MAJOR DISASTER

SUDDEN EVENT CREATING A SITUATION OF GREAT DISTRESS WITH **HUMAN LOSSES, SIGNIFICANT MATERIAL DAMAGE AND ENVIRONMENTAL IMPACTS**

TYPE OF DISASTERS MANAGED BY THE CHARTER

NATURAL DISASTERS

Earthquakes

Tsunamis

Landslides

Volcanic eruption

Flood

Storms

Fires

MAN-MADE DISASTERS

Oil spills

Industrial accidents

OUT OF THE CHARTER SCOPE

Wars, armed conflicts

Droughts

Disasters where space contribution is not proven

03

KEY FIGURES

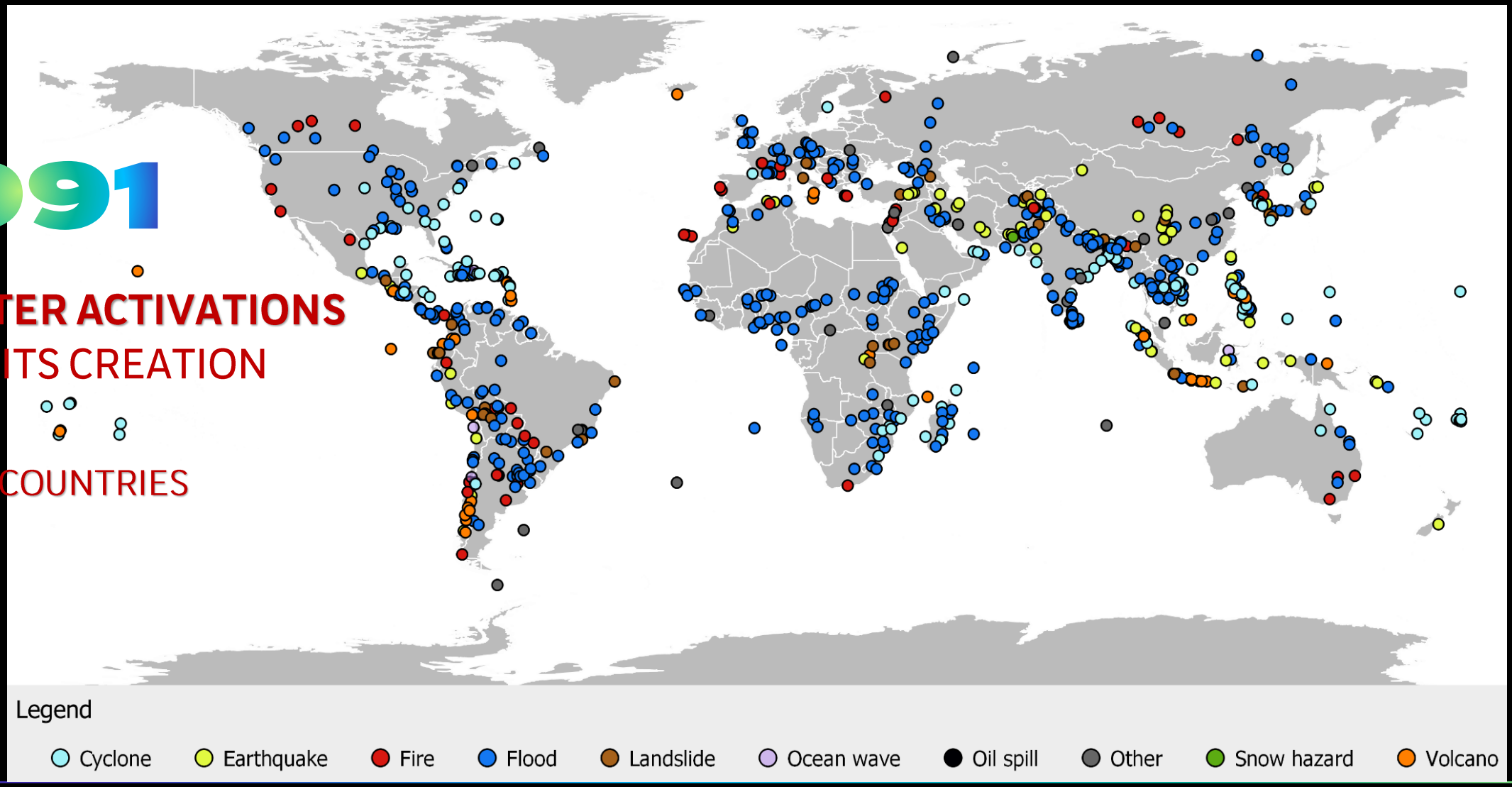
FIGURES AND TYPES OF ACTIVATION

TOTAL NUMBER OF CHARTER ACTIVATIONS

+991

CHARTER ACTIVATIONS
SINCE ITS CREATION

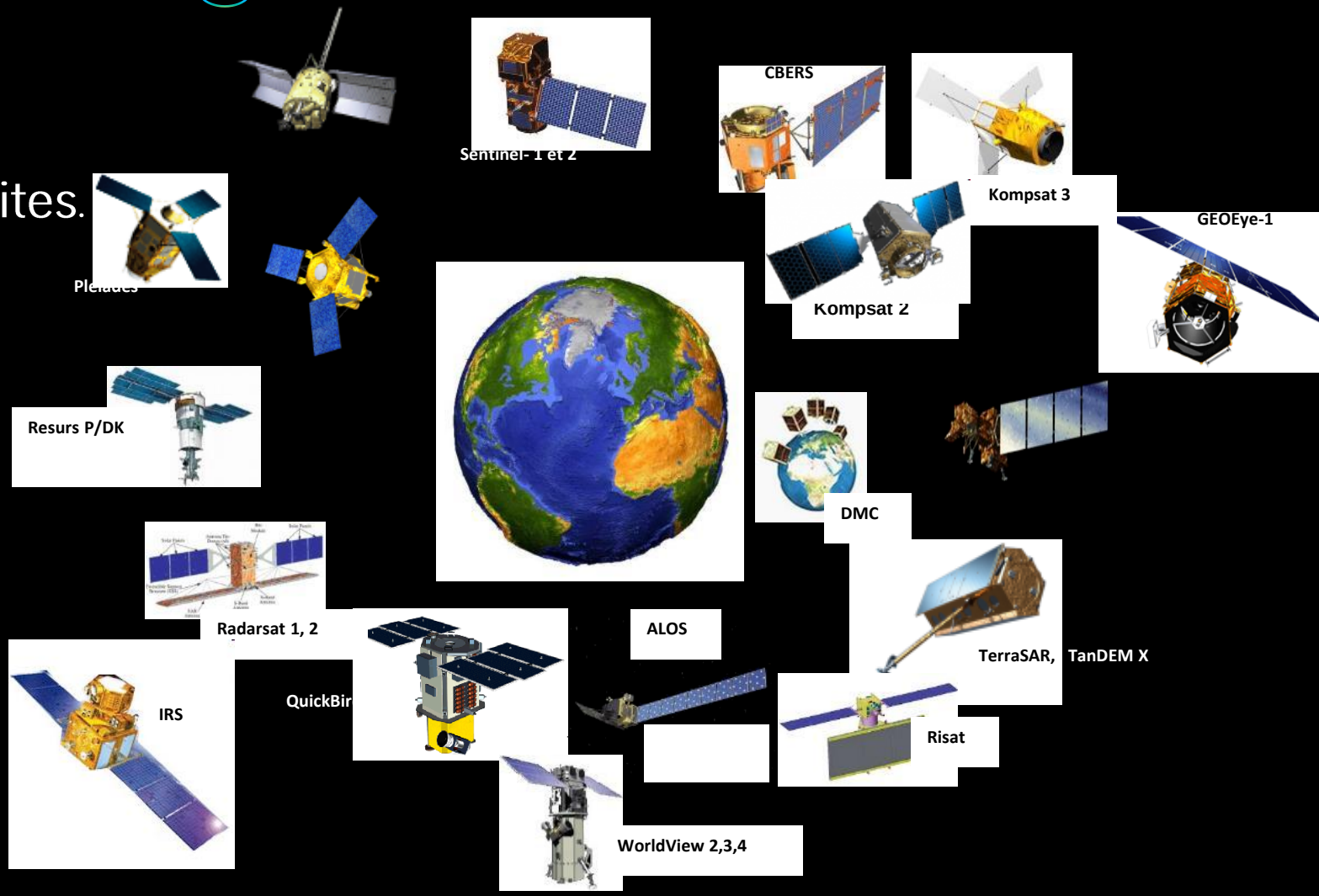
IN 144 COUNTRIES



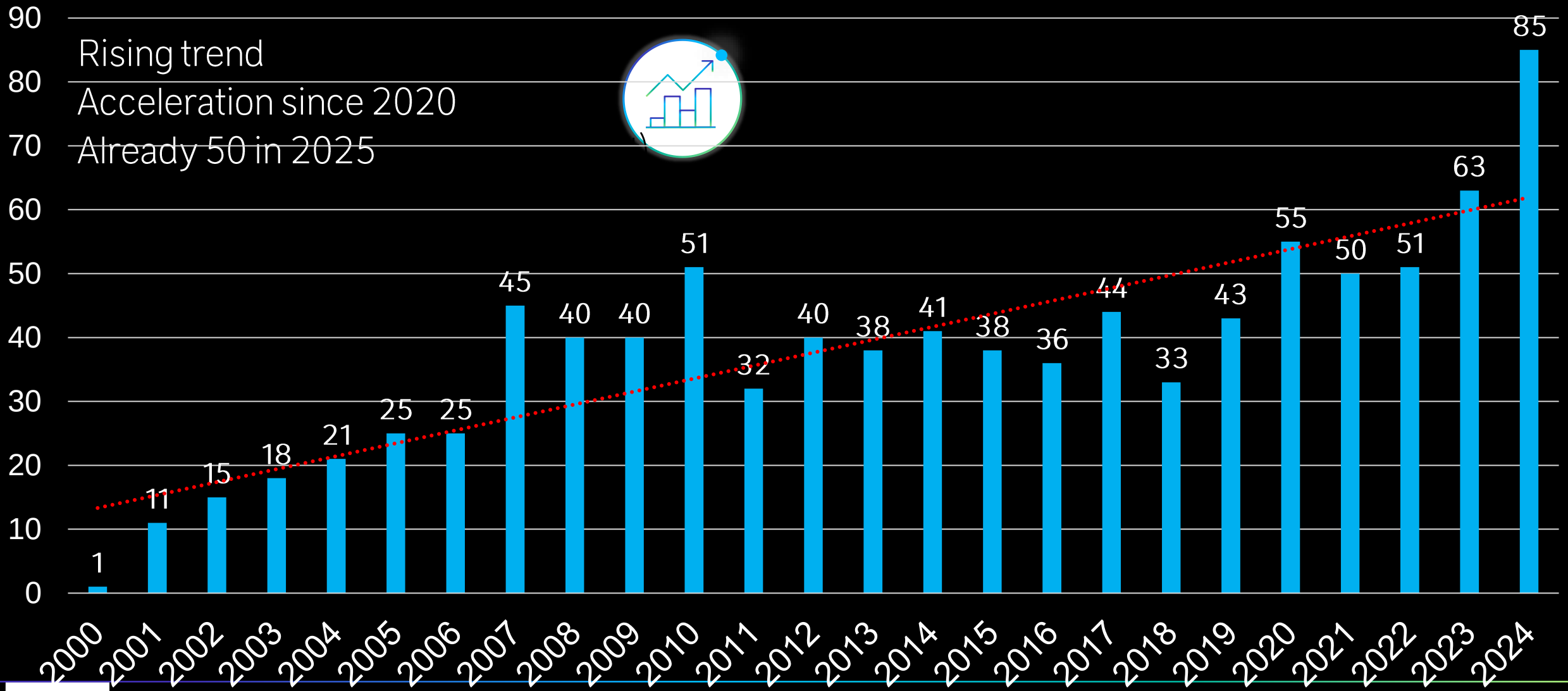
CHARTER SATELLITES

+270 contributing satellites.

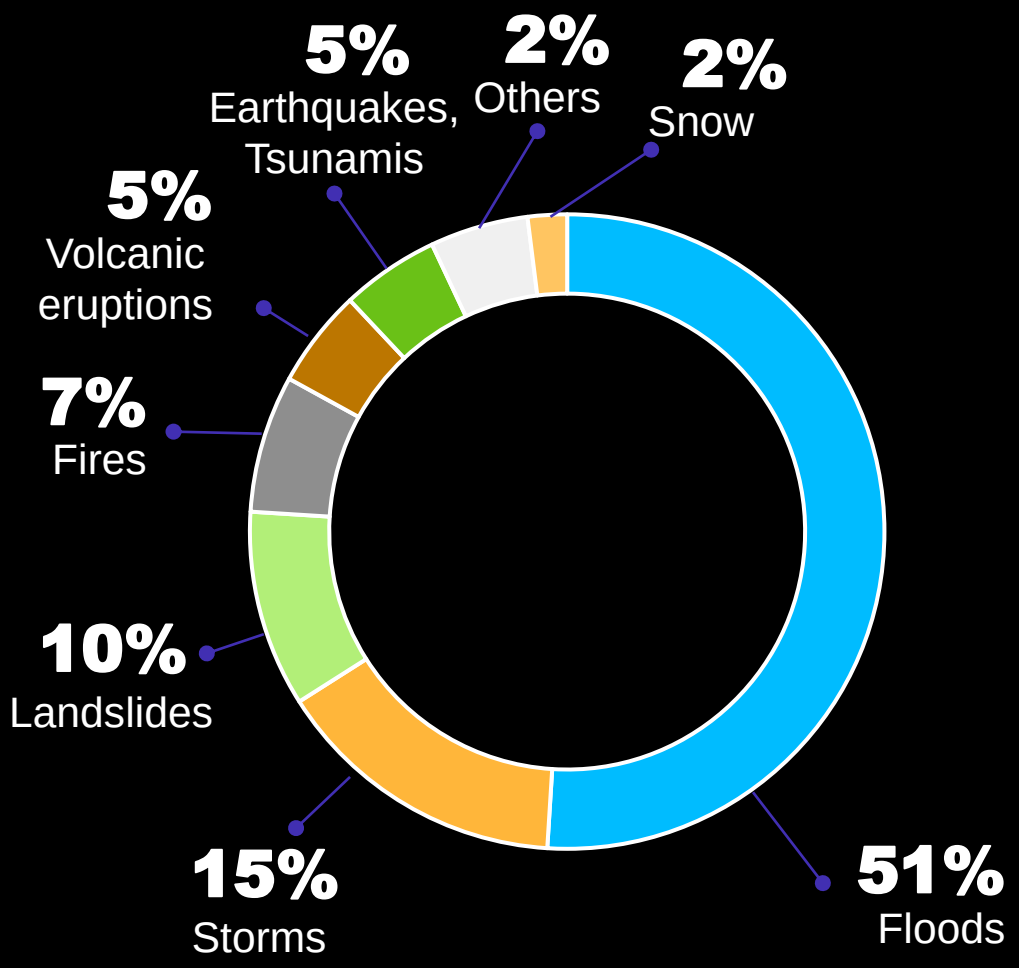
- Technology : Optical/radar
- French satellites:
  - SPOT 6
  - Pléiades
  - Pléiades Neo
- **Objective** : to provide the following products as quickly as possible at the scene of disasters:



ANNUAL AVERAGE ACTIVATIONS NUMBER



ACTIVATIONS VS TYPE OF DISASTERS



Half of Charter activations are caused by floods.

75% of activations concern hydro-meteorological events.

04

WHAT PROVIDES THE CHARTER ?

SATELLITE IMAGES AND VALUE-ADDED PRODUCTS

CHARTER PRODUCTS

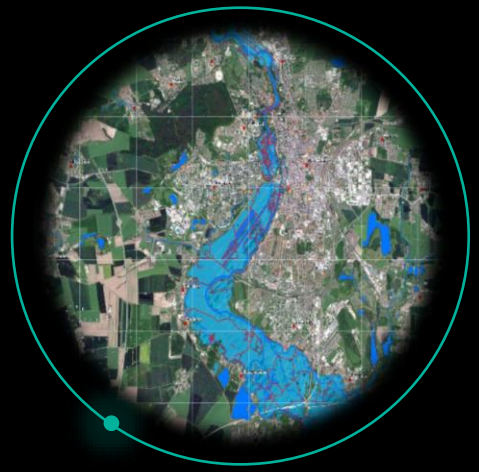
OBJECTIVE : PROVIDE AS FAST AS POSSIBLE TO THE DISASTER SITE THE FOLLOWING PRODUCTS

PROGRAMMED
SATELLITE IMAGERY

Optical/radar images delivered in a few hours to end users.

ARCHIVED
SATELLITE IMAGERY

To produce before/after in order to better evaluate the damage.



VALUE ADDED
PRODUCTS

Crisis map or damage estimate map built from information extracted from satellite images.

CHARTER PRODUCT : ERUPTION TONGA 2020

CHARTER PRODUCT : ERUPTION TONGA 2020

CHARTER PRODUCT : ERUPTION TONGA 2020

Pleiades © CNES (2022), Distribution Airbus DS

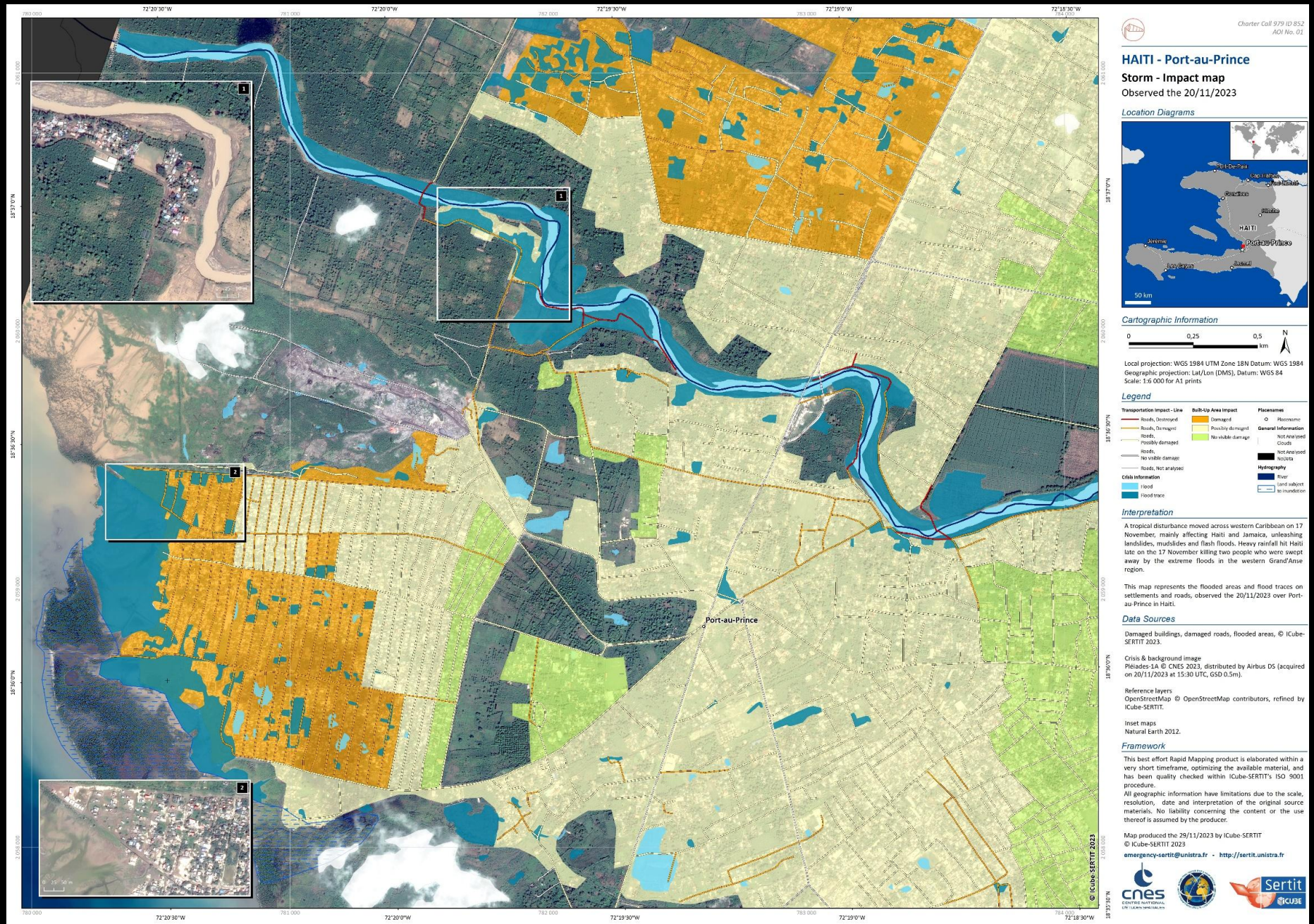
Pleiades Neo © Airbus DS (2022)

CHARTER PRODUCT : LANDSLIDE/STORM VESUBIE FRANCE 2020

Pleiades © CNES (2016), Distribution Airbus DS

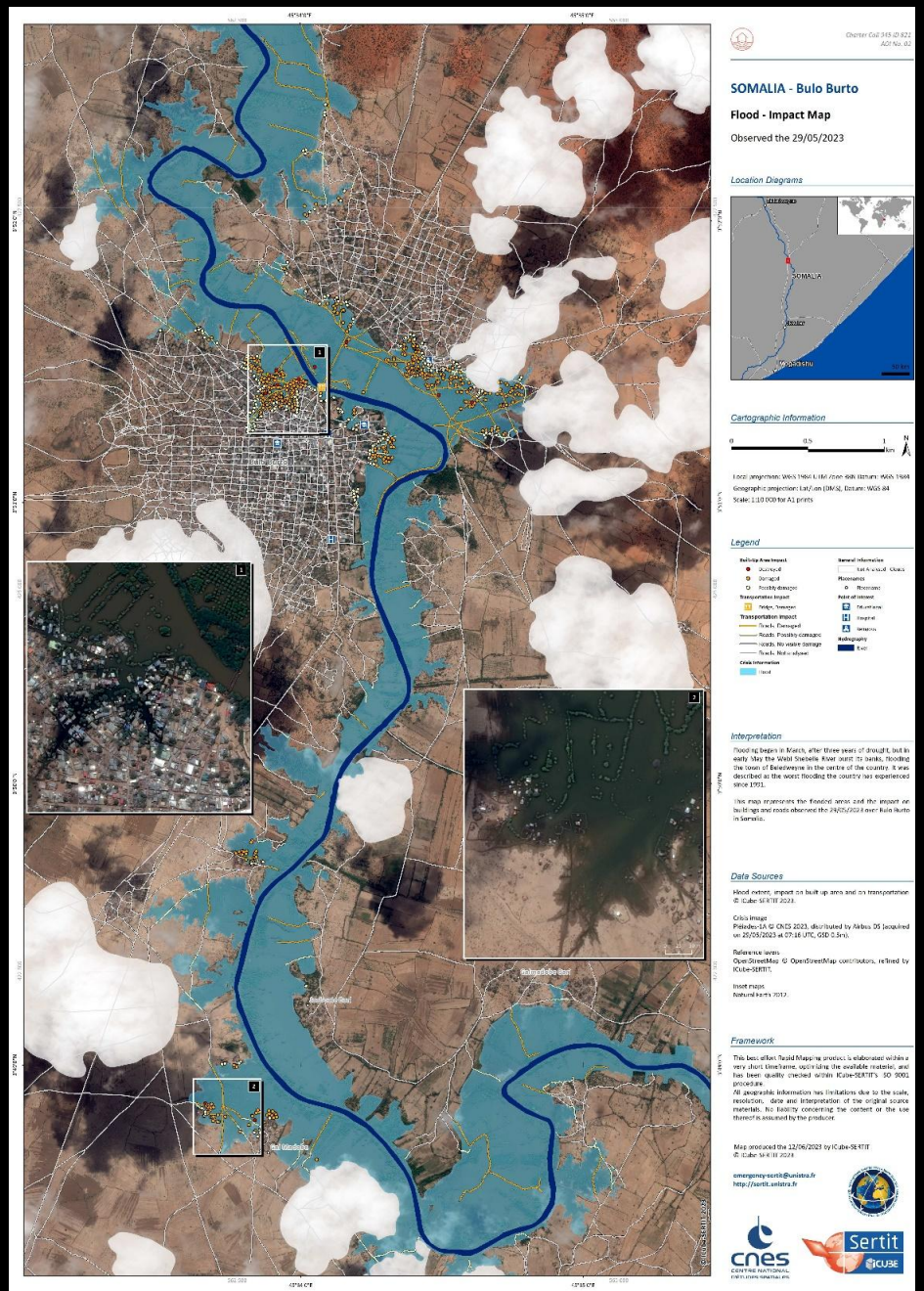
Pleiades © CNES (2020), Distribution Airbus DS

CHARTER PRODUCT : STORM HAITI 2023



@Icube-SERTIT 2023

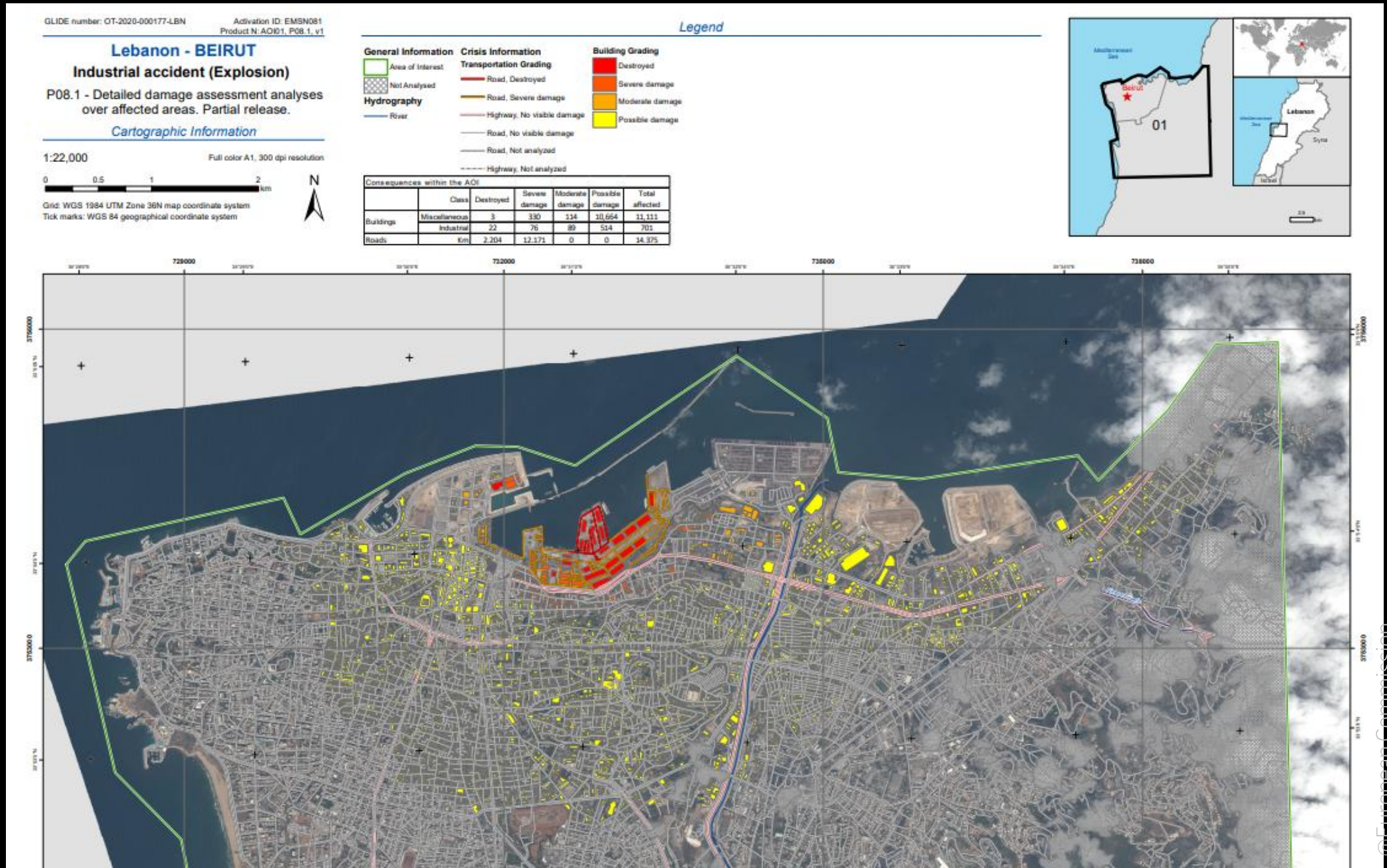
CHARTER PRODUCT : FLOODS 2023



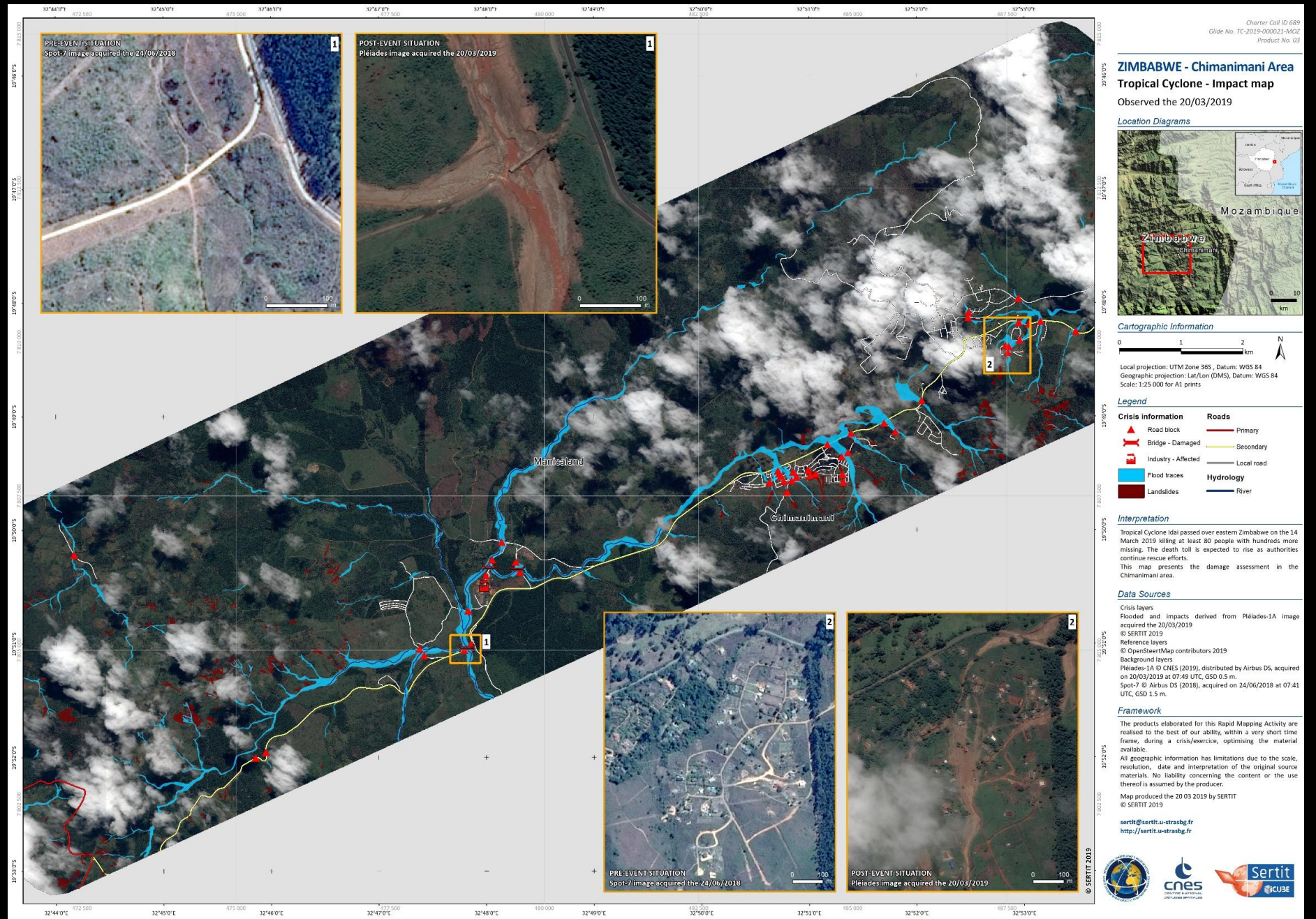
@Icube-SERTIT 2023

@Icube-SERTIT 2019

CHARTER PRODUCT : EXPLOSION BEYROUTH 2020



CHARTER PRODUCT : STORM ZIMBABWE 2019



Charter Call ID 689
Glide No. TC-2019-000021-MOZ
Product No. 03

ZIMBABWE - Chimanimani Area

Tropical Cyclone - Impact map

Observed the 20/03/2019

Location Diagrams

Cartographic Information

0 1 2 km

N

Local projection: UTM Zone 36S , Datum: WGS 84
Geographic projection: Lat/Lon (DMS), Datum: WGS 84
Scale: 1:25 000 for A1 prints

Legend

Crisis information
- Road block
- Bridge - Damaged
- Industry - Affected
- Flood traces
- Landslides

Roads
- Primary
- Secondary
- Local road

Hydrology
- River

Interpretation

Tropical Cyclone Idai passed over eastern Zimbabwe on the 14 March 2019 killing at least 80 people with hundreds more missing. The death toll is expected to rise as authorities continue rescue efforts.
This map presents the damage assessment in the Chimanimani area.

Data Sources

Crisis layers
Flooded and impacts derived from Pléiades-1A image acquired the 20/03/2019
© SERTIT 2019
Reference layers
© OpenSteertMap contributors 2019
Background layers
Pléiades-1A © CNES (2019), distributed by Airbus DS, acquired on 20/03/2019 at 07:49 UTC, GSD 0.5 m.
Spot-7 © Airbus DS (2018), acquired on 24/06/2018 at 07:41 UTC, GSD 1.5 m.

Framework

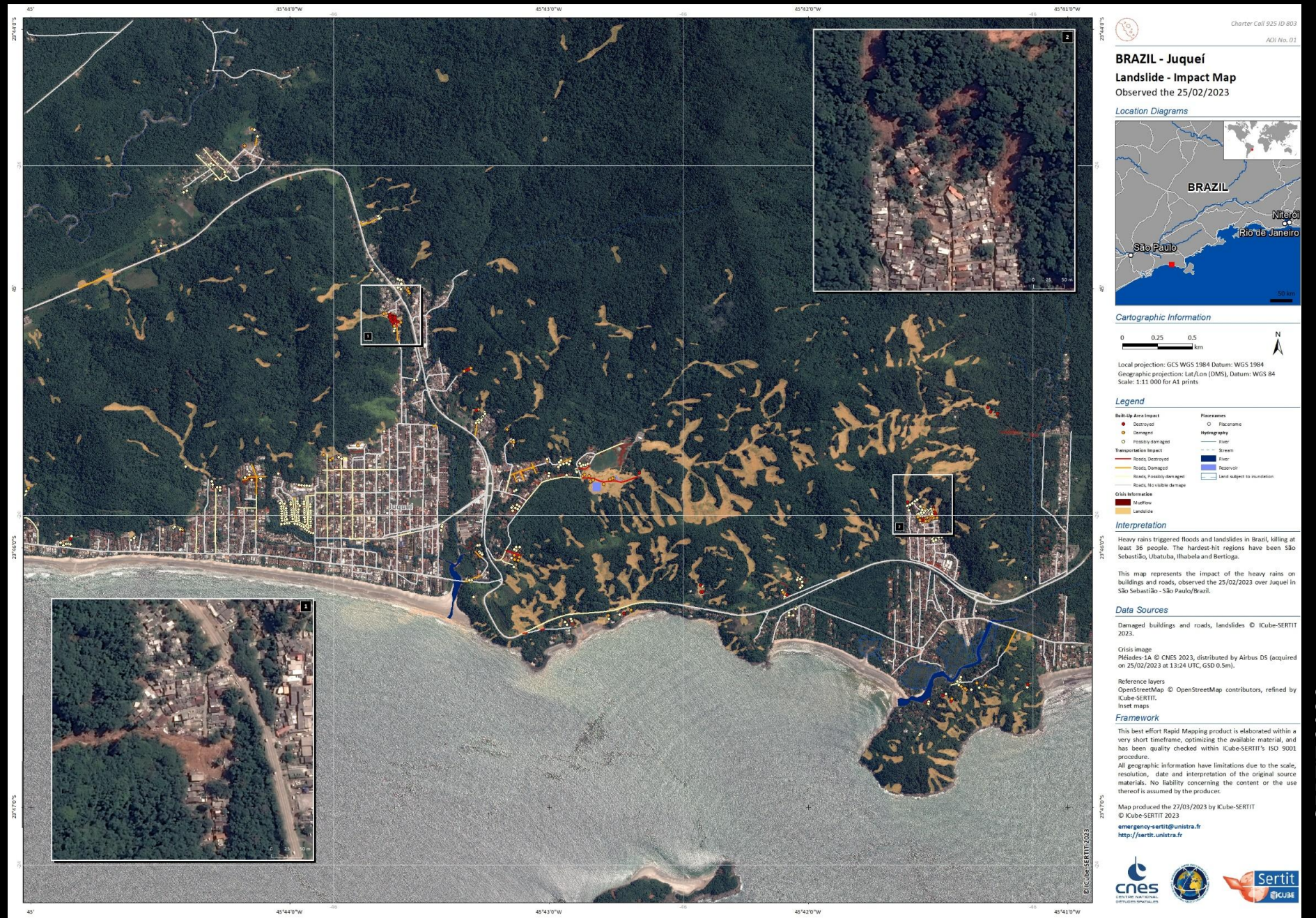
The products elaborated for this Rapid Mapping Activity are realised to the best of our ability, within a very short time frame, during a crisis/exercice, optimising the material available.
All geographic information has limitations due to the scale, resolution, date and interpretation of the original source materials. No liability concerning the content or the use thereof is assumed by the producer.

Map produced the 20 03 2019 by SERTIT
© SERTIT 2019

sertit@sertit.u-strasbg.fr
http://sertit.u-strasbg.fr

@Icube-SERTIT 2019

CHARTER PRODUCT : LANDSLIDE BRAZIL 2023



Charter Call 925 ID 803

AOI No. 01

BRAZIL - Juqueí

Landslide - Impact Map

Observed the 25/02/2023

Location Diagrams

Cartographic Information

0 0.25 0.5 km

N

Local projection: GCS WGS 1984 Datum: WGS 1984
Geographic projection: Lat/Lon (DMS), Datum: WGS 84
Scale: 1:11 000 for A1 prints

Legend

Interpretation

Heavy rains triggered floods and landslides in Brazil, killing at least 36 people. The hardest-hit regions have been São Sebastião, Ubatuba, Ilhabela and Bertioga.

This map represents the impact of the heavy rains on buildings and roads, observed the 25/02/2023 over Juqueí in São Sebastião - São Paulo/Brazil.

Data Sources

Damaged buildings and roads, landslides © ICube-SERTIT 2023.

Crisis image
Pléiades-1A © CNES 2023, distributed by Airbus DS (acquired on 25/02/2023 at 13:24 UTC, GSD 0.5m).

Reference layers
OpenStreetMap © OpenStreetMap contributors, refined by ICube-SERTIT.
Inset maps

Framework

This best effort Rapid Mapping product is elaborated within a very short timeframe, optimizing the available material, and has been quality checked within ICube-SERTIT's ISO 9001 procedure.
All geographic information have limitations due to the scale, resolution, date and interpretation of the original source materials. No liability concerning the content or the use thereof is assumed by the producer.

Map produced the 27/03/2023 by ICube-SERTIT
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http://sertit.unistra.fr

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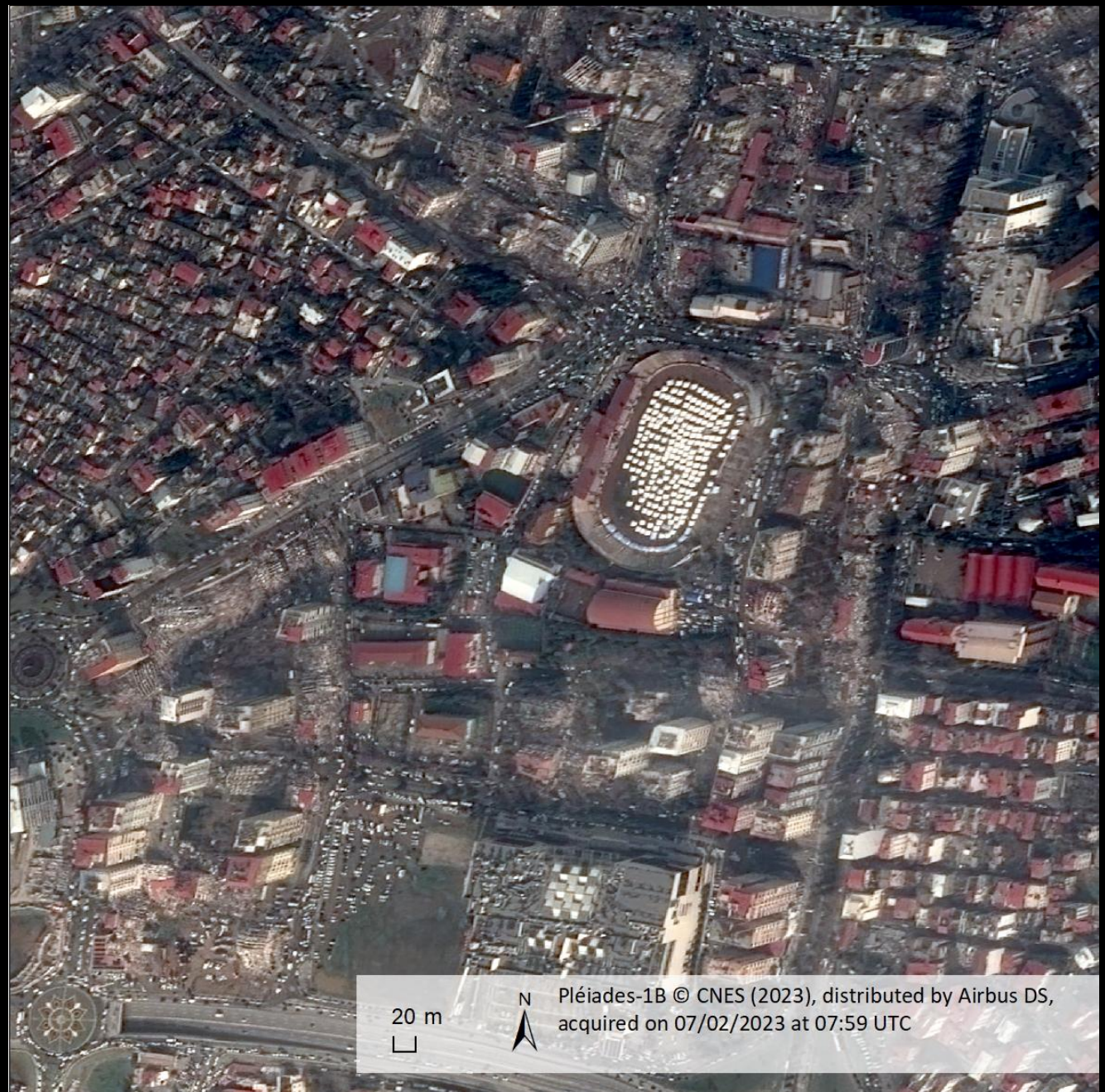
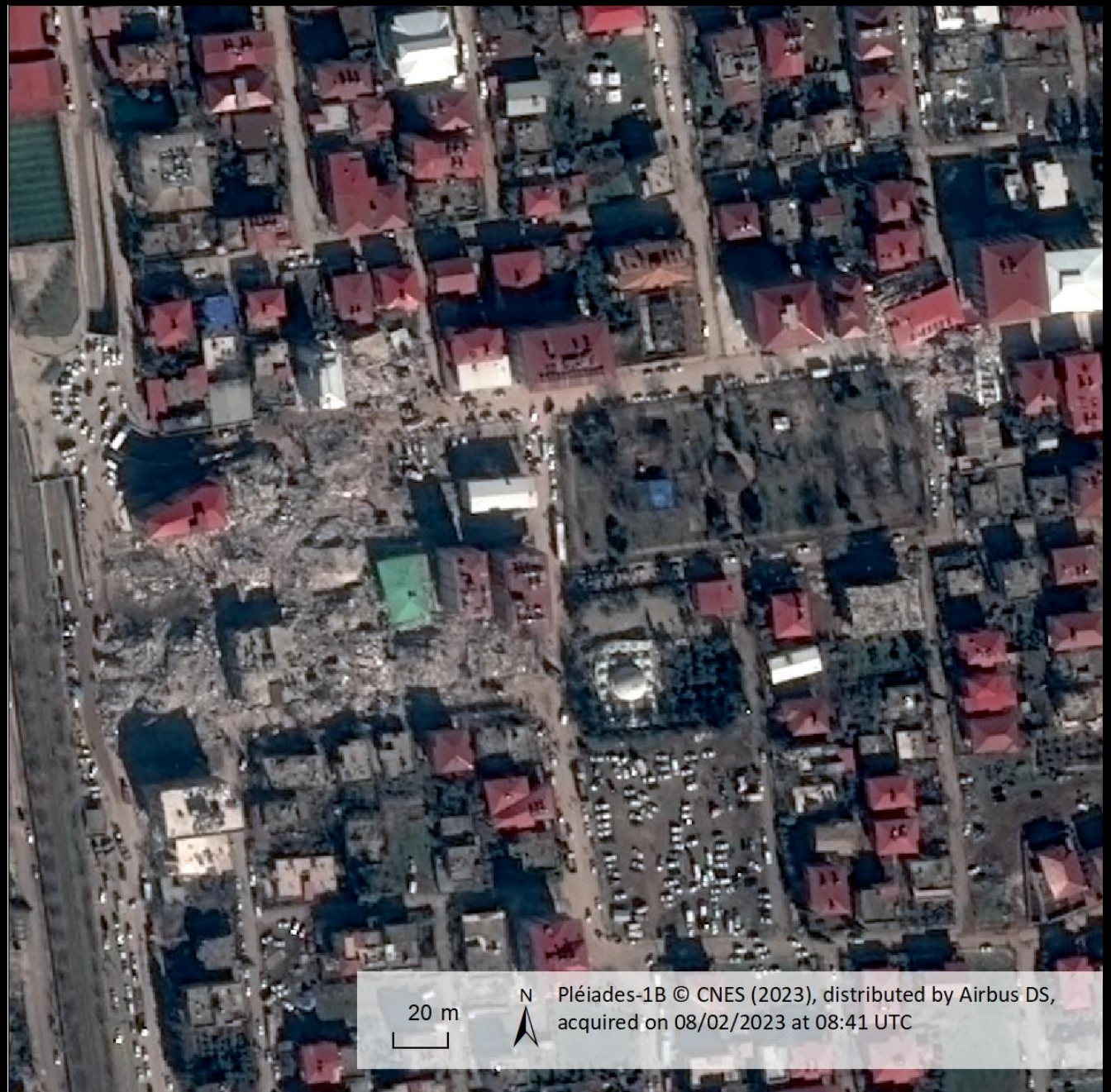
CHARTER PRODUCT : EARTHQUAKE TURKIYE/SYRIA 2023



CHARTER PRODUCT : EARTHQUAKE TURKIYE/SYRIA 2023

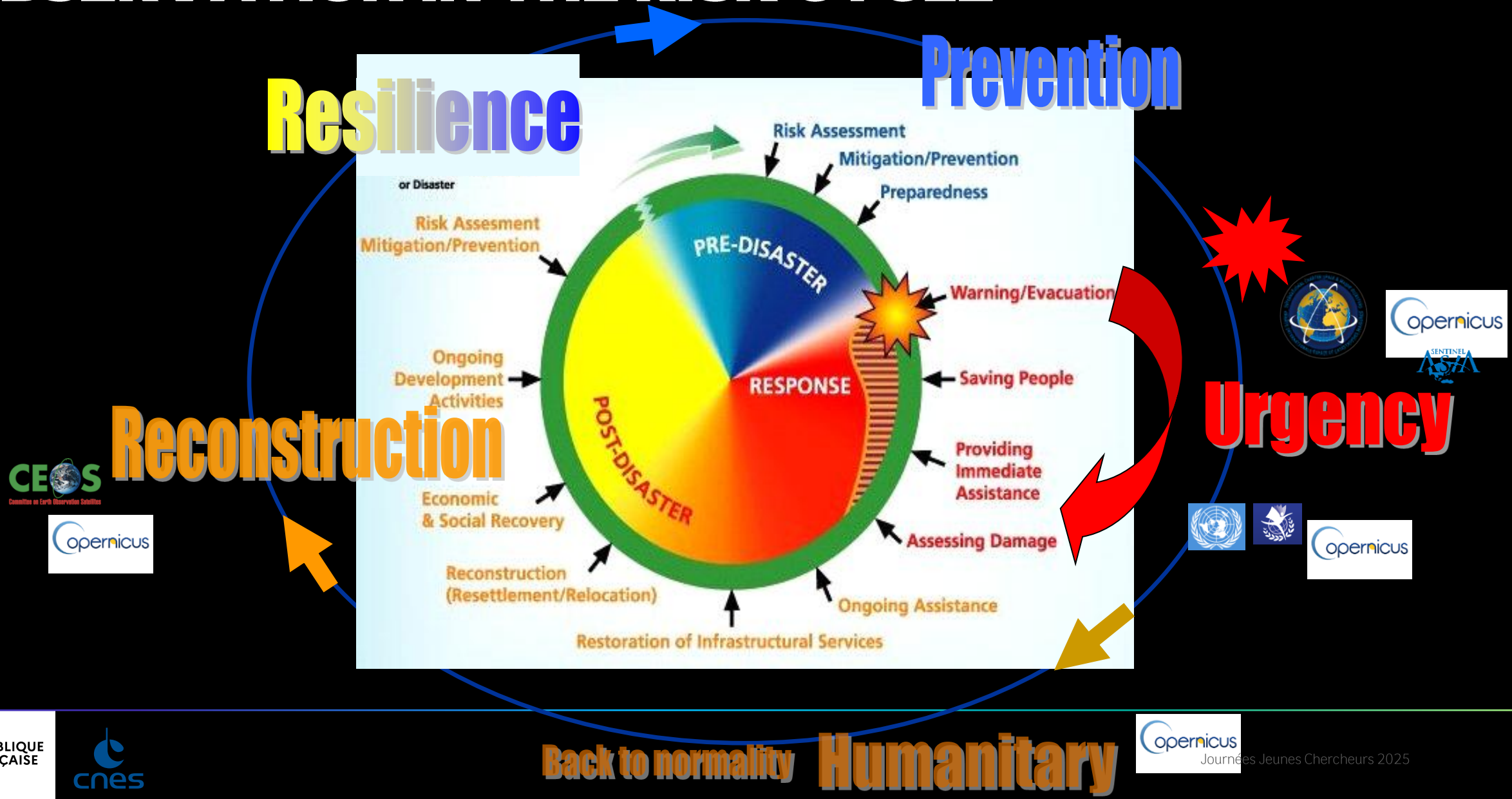


05

SPACE FOR RISK

RISK MANAGEMENT AND RISK CYCLE

CONTRIBUTION OF SATELLITE EARTH OBSERVATION IN THE RISK CYCLE



FOR MORE INFORMATION

ABOUT CNES

WWW.CNES.FR

ABOUT THE CHARTER

WWW.DISASTERSCHARTER.ORG

@DISASTERSCHART

CONTACT :
EMILIE.BRONNER@CNES.FR OR
LINDA.TOMASINI@CNES.FR


THANK YOU
FOR YOUR ATTENTION

THE SPACE FOR CLIMATE OBSERVATORY INITIATIVE

FREDERIC
BRETAR

Head of Space for Climate Observatory (CNES)

SCO
SPACE FOR CLIMATE OBSERVATORY

An international alliance developing Earth Observation-based services for local decision makers / end users to adapt to climate change

Promotional video

cnes
CENTRE NATIONAL D'ÉTUDES SPATIALES

THE SCO INTERNATIONAL ALLIANCE

AN INTERNATIONAL ALLIANCE DEVELOPING EARTH OBSERVATION-BASED SERVICES FOR LOCAL DECISION MAKERS / END USERS TO ADAPT TO CLIMATE CHANGE

Launch of the One Planet Summit

December 2017

SCO SPACE FOR CLIMATE OBSERVATORY

Creation of the Space for Climate Observatory

September 2019

Charter on the establishment of the Space for Climate Observatory (SCO)

Entry into force of the SCO Charter to define the governance and activities

September 2022

Adoption of the first SCO Work Programme (2023-2025)

October 2023

Release of the 2024 SCO annual report

May 2025

HIGH LEVEL OBJECTIVES

- **Create a network of space agencies, public institutions, and private stakeholders** committed to using satellite data to address local impacts of climate change — particularly for the benefit of civil society ;
- **Provide** decision-makers, both public and private, **with operational tools, data services, and studies** that support adaptation strategies across sectors ;
- **Foster cooperation** around these digital tools — to encourage their adoption and scale-up worldwide.

THE SCO IN 2025

THE GOVERNANCE

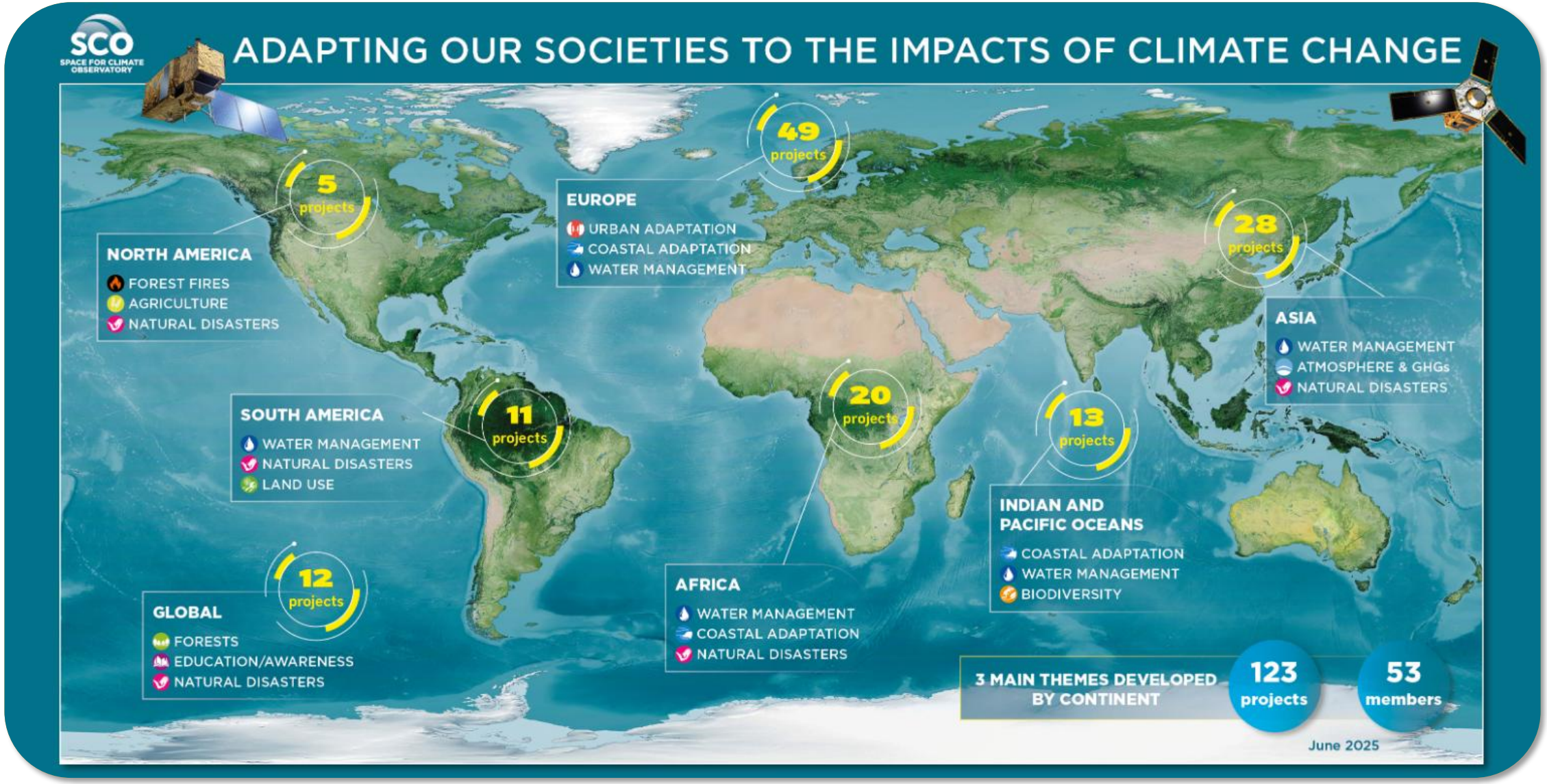
57
Signatories

30 Countries
3 UN Prog
3 IO

THE PORTFOLIO

Projects	Countries	Partners
123	51	500+

THE SCO across the world in 2025



BENEFICIARIES AROUND THE WORLD

OBSERVING NATURAL HAZARDS AND DISASTERS FROM SPACE

RAQUEL

RODRIGUEZ-SUQUET

Earth Observation Application Specialist (CNES)

OBSERVING NATURAL HAZARDS AND DISASTERS FROM SPACE

LAB'OT

Vincent Lonjou - vincent.lonjou@cnes.fr
Raquel Rodriguez Suquet – raquel.rodriguezsuquet@cnes.fr

THE EARTH OBSERVATION SATELLITE DATA...

A WIDE RANGE OF MEASUREMENT TECHNIQUES AND DATA...

- Optical/radar imaging, lidar, atmospheric sounding, altimetry...
- Public / commercial data
- Fr / EU / hors EU Data

...WITH LONGTIME SERIES

- Optique (SPOT > 1986)
- Altimetry (Jason > 1991)

… ALLOW TO ADDRESS MANY TOPICS

URBAN :
3D mapping, vegetation cover/land artificialization

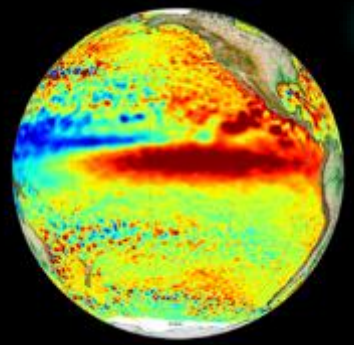
AGRICULTURE /FORESTRY :
Forest characterization and monitoring, production monitoring

RURAL :
Land use planning, tourism

LITTORAL :
Coastal management, bathymetry

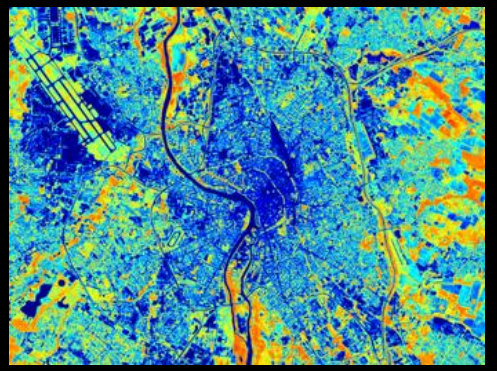
RISKS AND DEFENSE :
International Charter , CopernicusEM , Ministries

ENVIRONMENT :
Air quality, land use

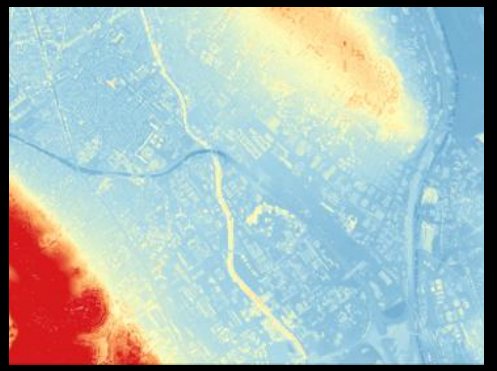


Ocean level anomalies with altimetry constellation

Land cover with Sentinel-2



Vegetation mapping with SPOT6-7

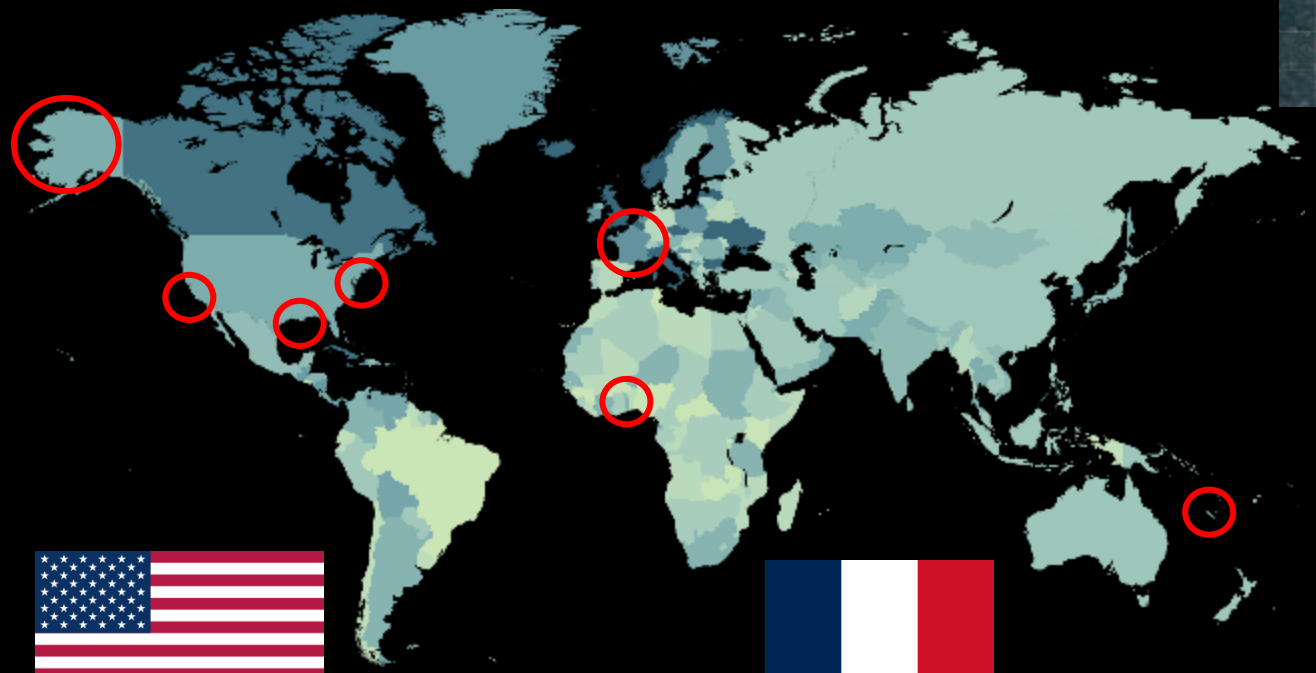


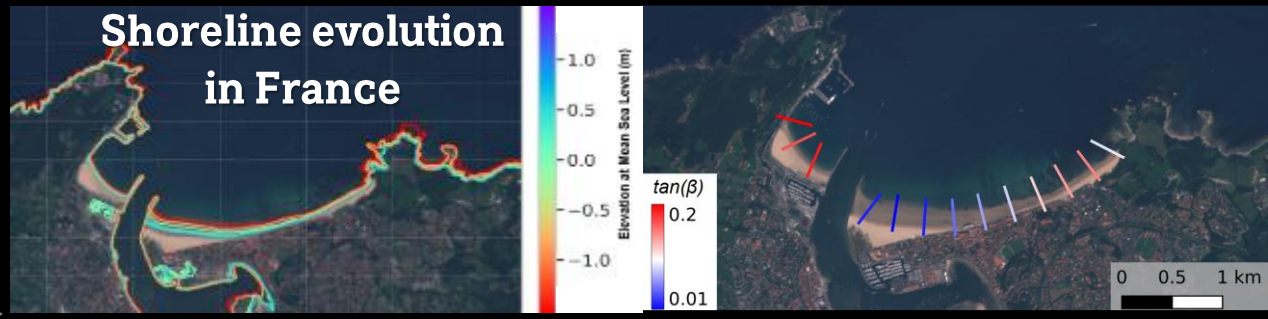
3D mapping with Pleiades et CO3D

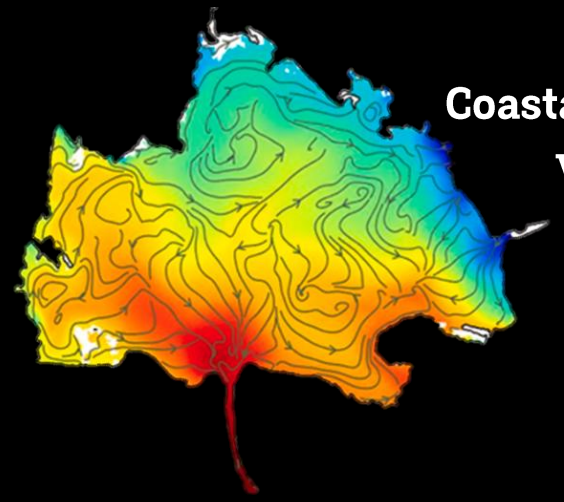
SCOAST-DT : CREATING AND OPERATING SPACE BASED COASTAL ZONE DIGITAL TWINS

CZ-DT

SCOast-DT

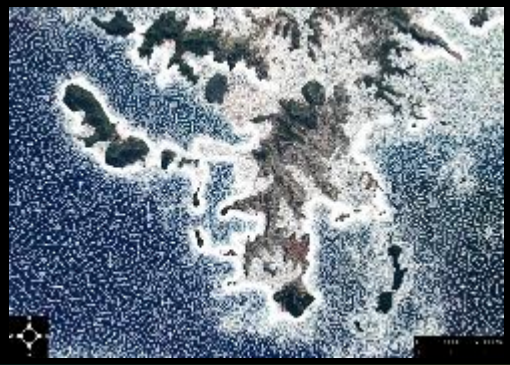






Coastal lake in Nokoué, floodings, water salinity in Benin

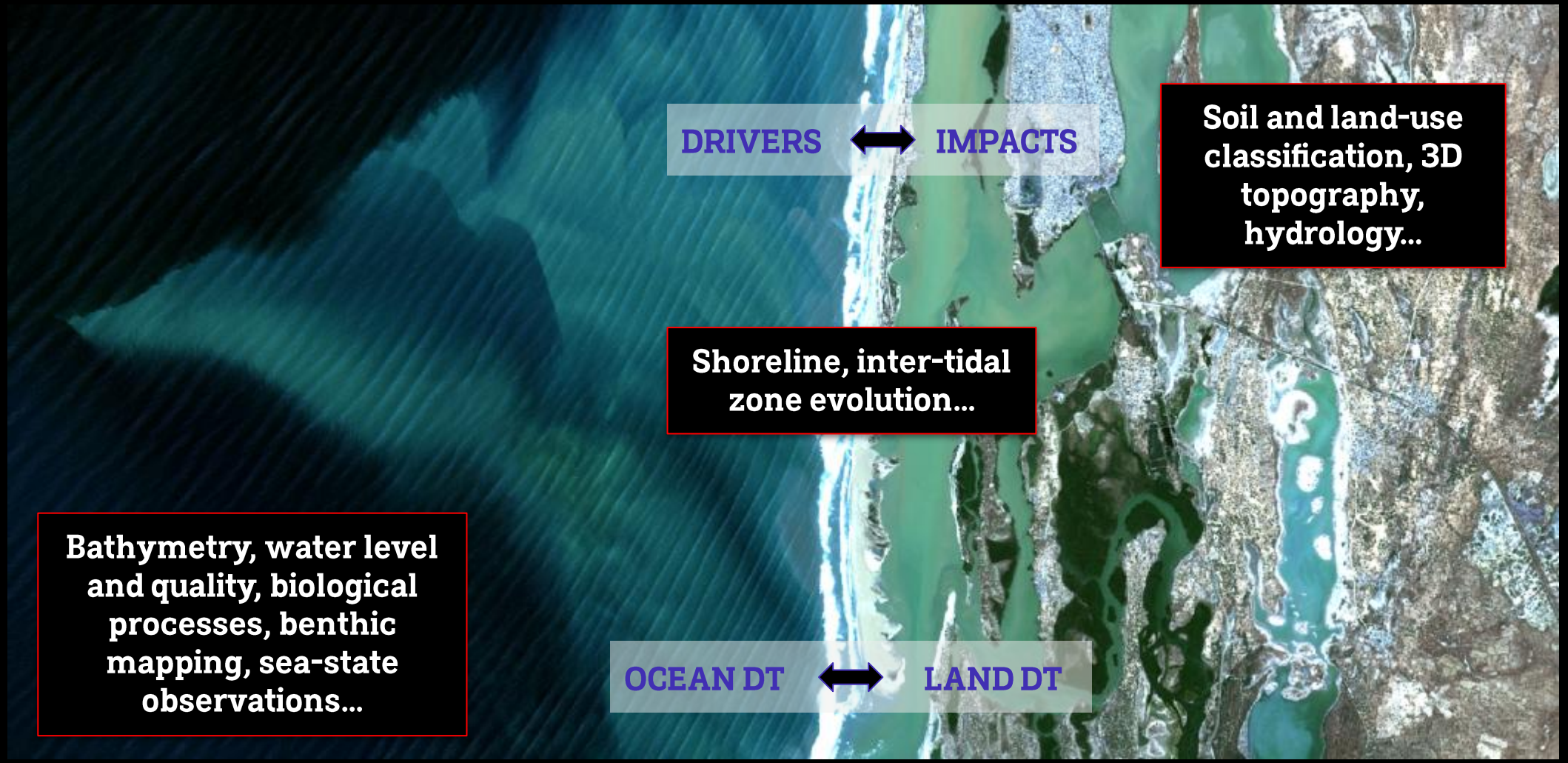
Marine submersion in New-Calédonia



US PI : thomas.g.grubb@nasa.gov
https://esto.nasa.gov/earth-system-digital-twin/

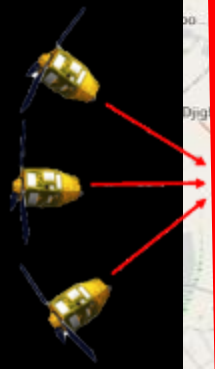
COASTAL DIGITAL REPLICA FROM SPACE

A 3D representation of the coastal zone ANYWHERE, at ANY TIME without any prior knowledge (+ modelling approaches and scenario projections)



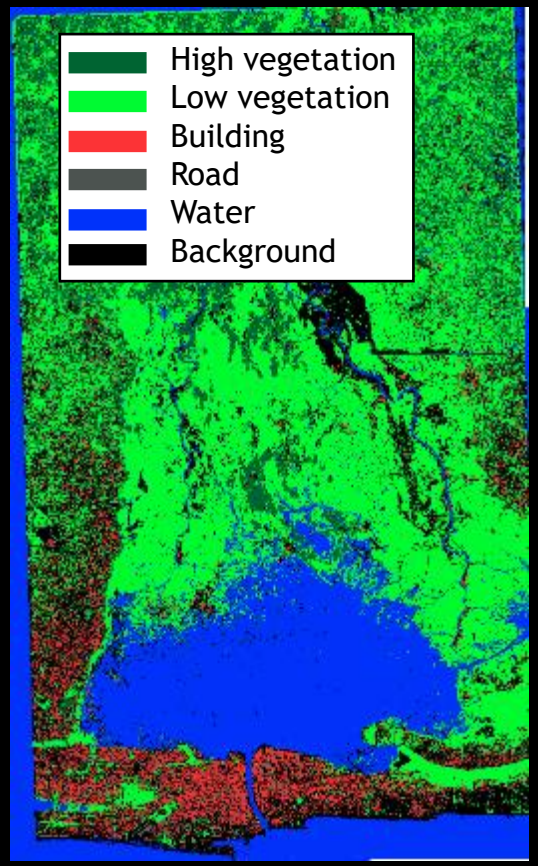
NOKOUÉ DIGITAL REPLICA

Tri-stereo

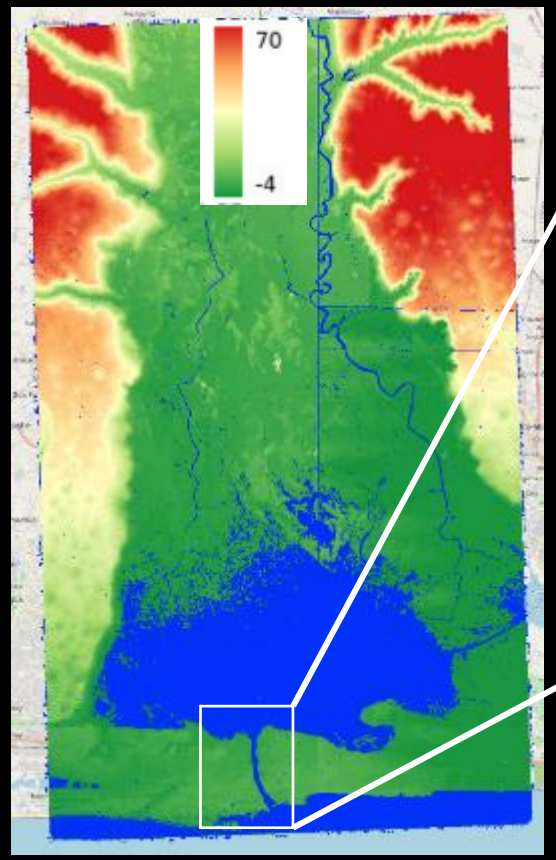


Images

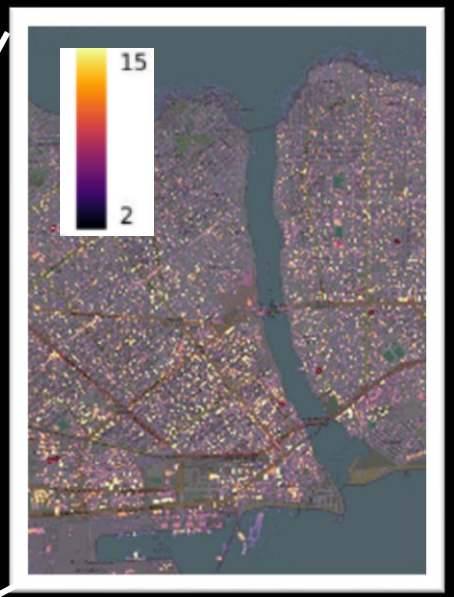
Land cover



DTM

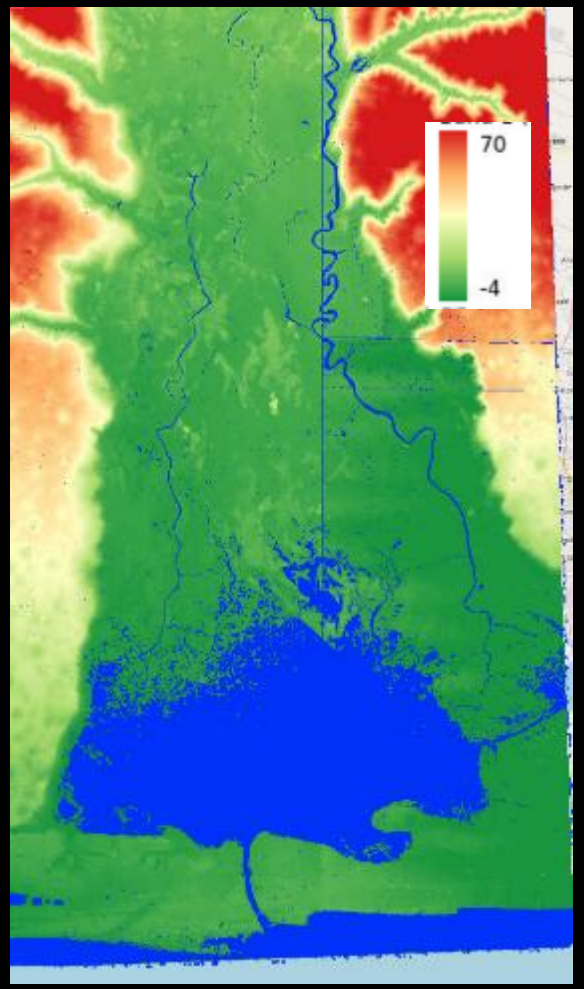


DHM

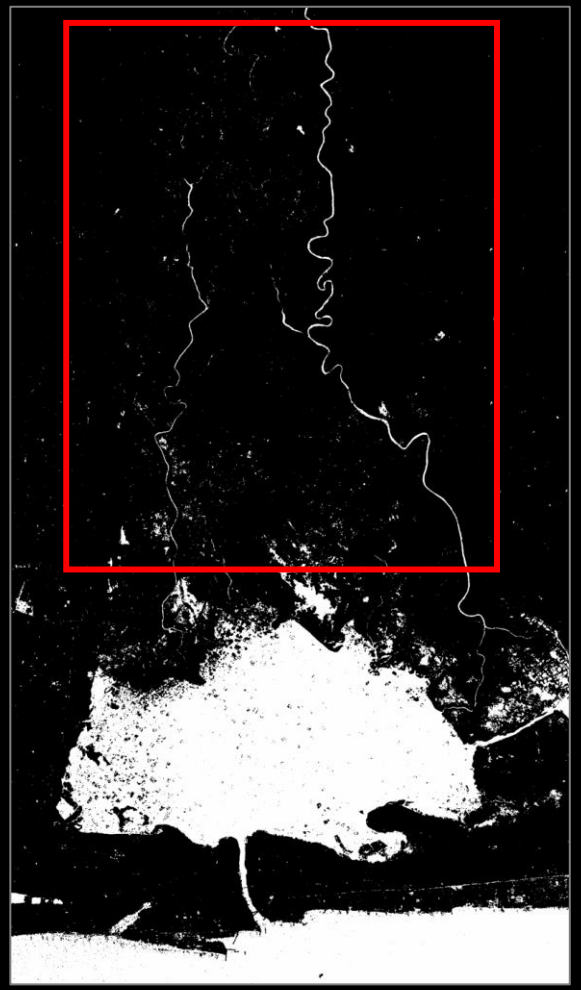


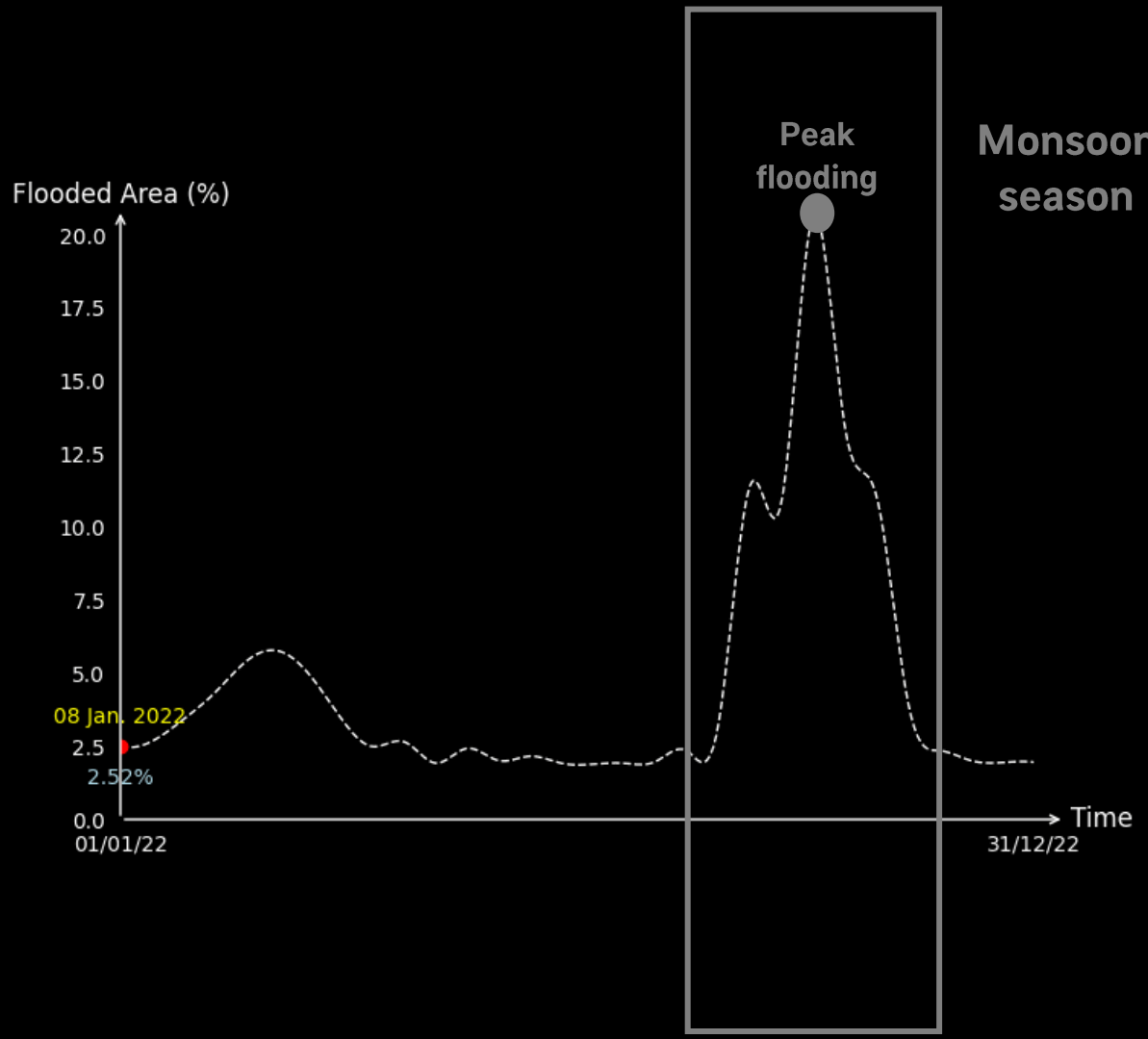
NOKOUÉ DIGITAL REPLICA : FLOOD MAPPING

DTM



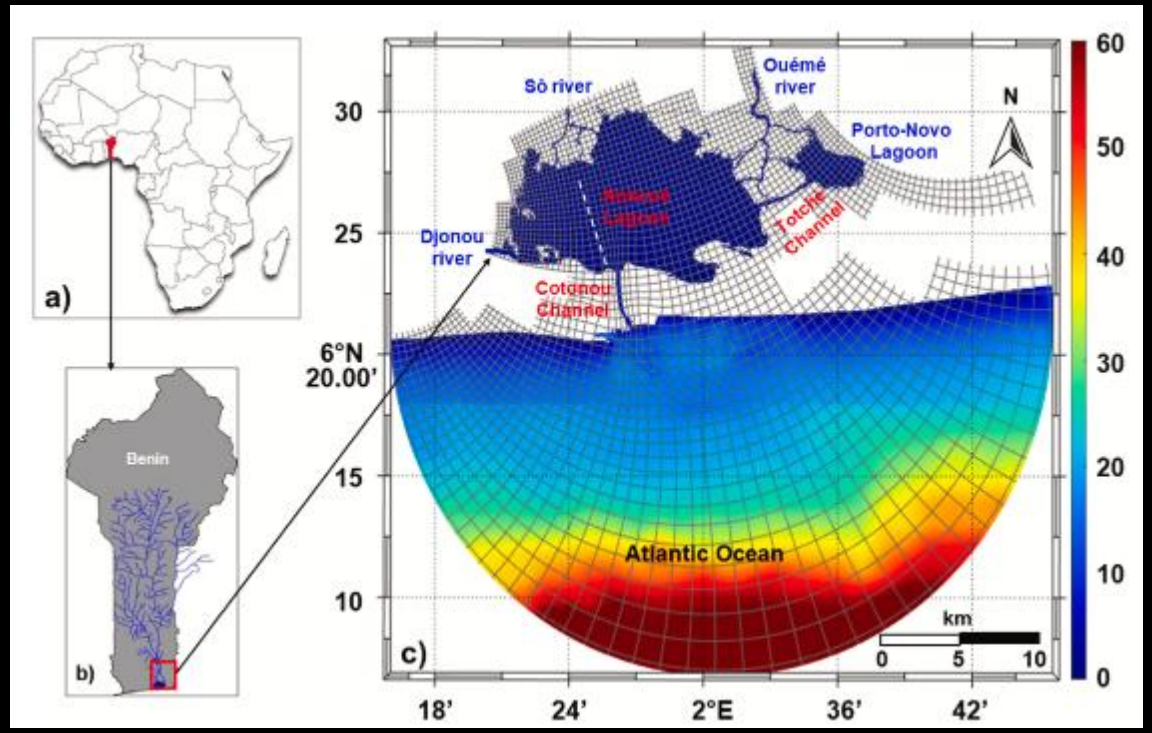
Flood extent

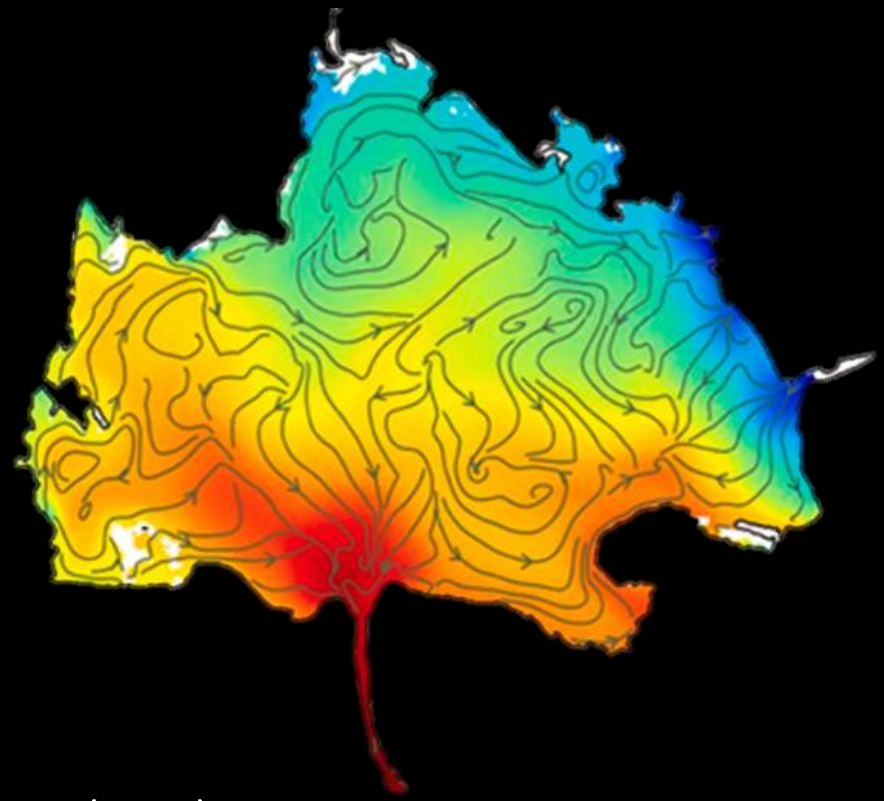




MODELING

Model : **SYMPHONIE**





Model Salinity (color) & Circulation streamlines, May 2018

Okpeitcha et al, RSMS, 2024
Honfo et al, OM, 2024

NOUMEA DIGITAL REPLICA

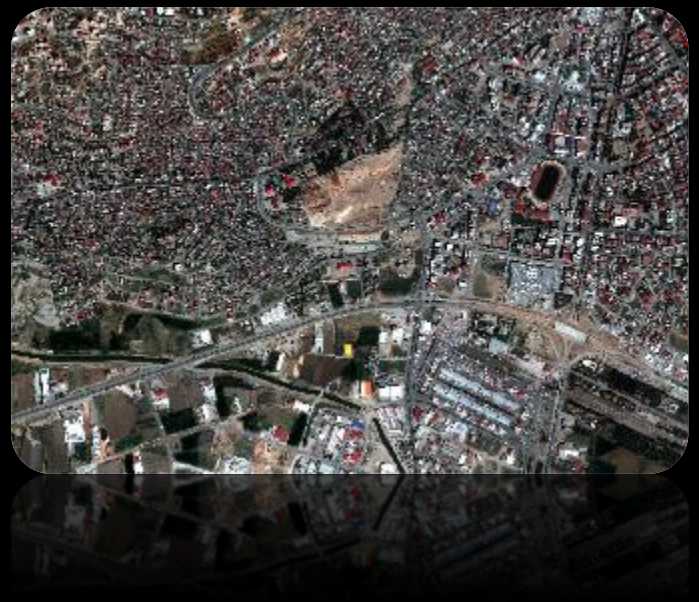
New Caledonia (Nouméa) marine submersion risk

VIDEO

PICANTEO – CHANGE DETECTION FROM VHR OPTICAL DATA

EARTHQUAKES

- Kahramanmaras earthquakes in Türkiye (6th February 2023)
- International Charter activated - Activation n°797



Visualisation of the change detection results for the Turkey ROI.

First row: *prediction* for intact buildings blue destroyed buildings in red.

Second row: overlay with SERTIT's manually *annotated* destroyed building instances in purple.

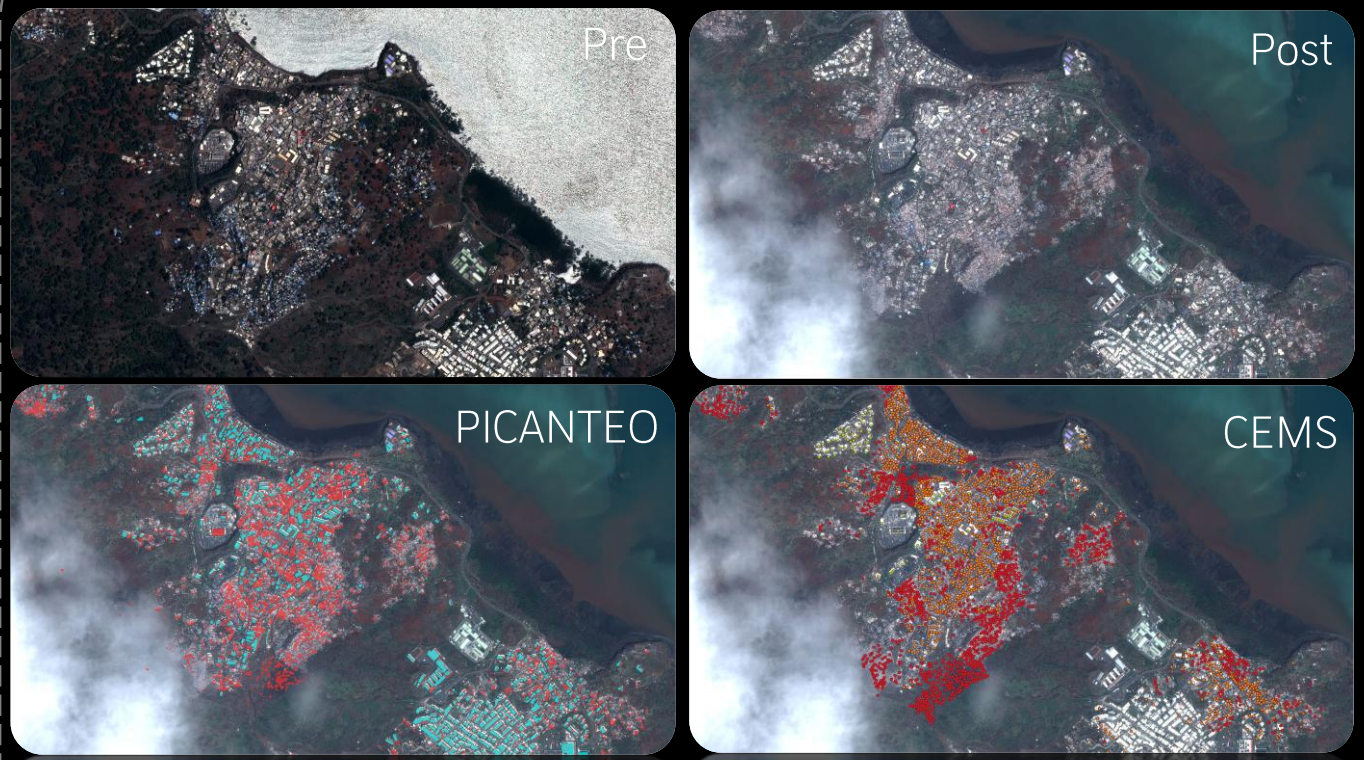
PICANTEO – CHANGE DETECTION FROM VHR OPTICAL DATA

CYCLONES

- Cyclone Chido in Mayotte - International Charter activated Activation n°939
- 14th December 2024

COHERENCE

Change Detection (PICANTEO) - Change Detection and Copernicus Emergency Management Services (CEMS) annotation



COMPLEMENTARITY

Change Detection (PICANTEO) - missed buildings in CEMS annotation

PICANTEO – CHANGE DETECTION FROM VHR OPTICAL DATA

WILDFIRES

- Wildfires in Valparaiso area in Chili with 43000ha burned - International Charter activated Activation n° 859
- 3rd February 2024

FURTHER INFORMATION

SCOast-DT project until mid 2027

https://www.spaceclimateobservatory.org/scoast-dt

SCOast-DT presentation @ LPS

Thrusday, 16h15, Hall G2

F.04.15 Resilient Coasts: Adaptive Strategies for Sustainable Ocean Management in a Changing Climate

PICANTEO

Picanteo: CNES change detection framework for natural disaster response

Thank you for your attention

Raquel Rodriguez Suquet

Raquel.rodriguezsuquet (at) cnes.fr

Vincent Lonjou

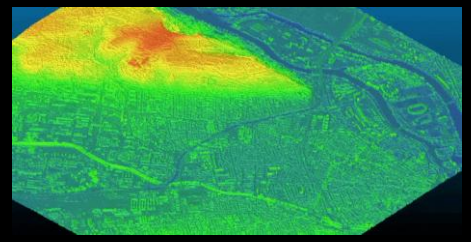
vincent.lonjou (at) cnes.fr

OPEN SOURCE CNES TOOLS

Stereo => DSM
https://github.com/CNES/cars

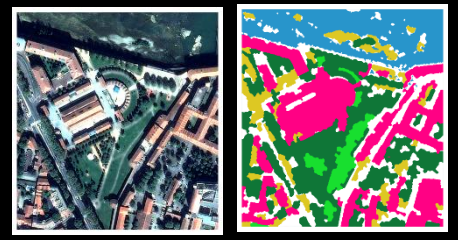
David.Youssefi (at) cnes.fr

DSM => DTM + DHM
https://github.com/CNES/bulldozer



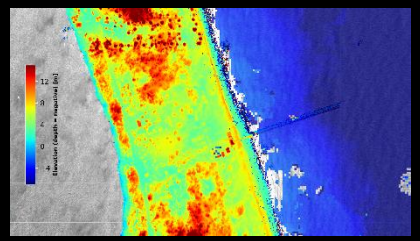
Dimitri.Lallement (at) cnes.fr

Land Use
https://github.com/CNES/slurp/



Yannick.Tanguy (at) cnes.fr

Images/Videos => Bathymetry
https://github.com/CNES/S2Shores



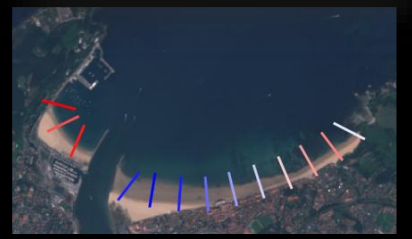
Erwin.Bergsma (at) cnes.fr

Sentinel-1 => Flood Maps
https://github.com/CNES/floodml

Raquel.RodriguezSuquet (at) cnes.fr

***To be released on** https://github.com/CNES/*

VHR change detection
This summer !
picanteo
A dedicated coastal customized version will follow



Shoreline and derived products
End 2026

+ 30 years of processed data over metropolitan France

DATA DISTRIBUTION

www.theia-land.fr/en/theia-data-and-services-center

https://hydroweb.next.theia-land.fr/

https://geodes-portal.cnes.fr/

Synchronization and sharing with other initiatives

CEOS Committee on Earth Observation Satellites

Open Geospatial Consortium

SCO SPACE FOR CLIMATE OBSERVATORY

UNITED NATIONS

Destination Earth

• • •


THANK YOU
FOR YOUR ATTENTION