

DTF : DIGITAL TWIN FACTORY

SCOAST-DT: SPACE-BASED DIGITAL TWINS OF COASTAL ZONES

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Babic², Yves Morel³, Alexis Chaigneau³, Fabien Rétif⁴, Victor Okpeitcha⁵, Yves Soufflet⁶**

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1 : CNES French National Center for Space Studies

2 : BRGM

3 : LEGOS/CNRS/IRD

4 : Snale

5 : Pro Data Environnement

6 : Waves'n Sea

JOURNÉES D'ÉCHANGES SUR LES PROGRAMMES DESTIN-E ET DTE
30/06/2026

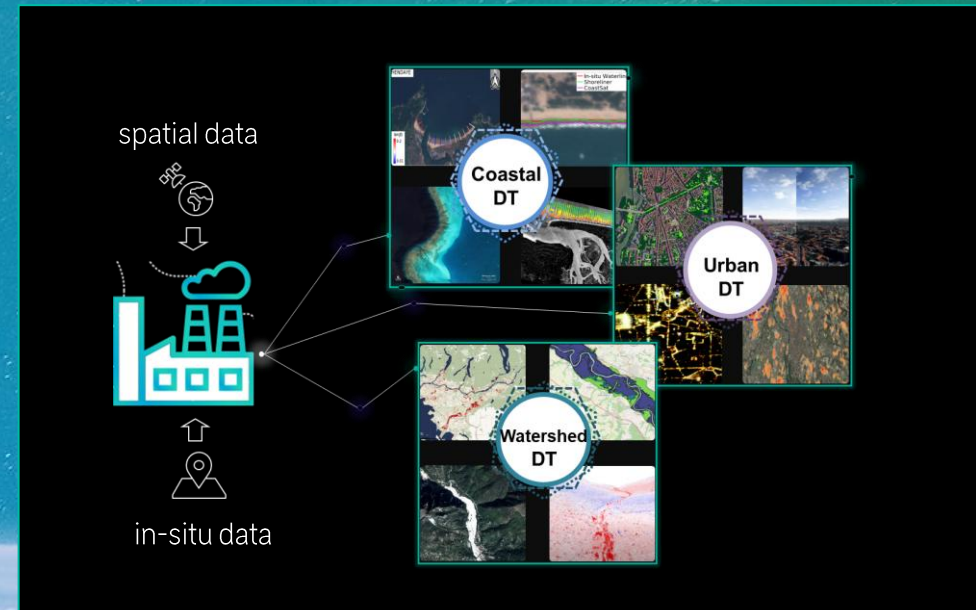


A DIGITAL TWIN...



Digital Twins share many common features

FACTORY



The Factory aims to modularize and share these common functionalities

DTF

DIGITAL TWIN FACTORY

DRIVERS

IMPACTS

COCKPIT

CNES

Recherche de lieux

Explorer les données

Téléverser

JEU DE DONNÉES (6)

Disable All

Tout réduire

Supprimer tout

Sentinel-2 cloudless layer for 2025 by EOX - 3857

ZOOM IDÉAL

INFORMATION

Opacité : 100 %

Orthoimage PHR1B (2024-12-07)

ZOOM IDÉAL

INFORMATION

Opacité : 100 %

Orthoimage PHR1A (2024-11-10)

ZOOM IDÉAL

INFORMATION

Opacité : 100 %

Orthoimage PHR1B (2024-11-04)

ZOOM IDÉAL

INFORMATION

Opacité : 100 %

Orthoimage PNEO3 (2024-10-06)

ZOOM IDÉAL

INFORMATION

Opacité : 100 %

COS 9 Ortho PHR1B (2024-12-07)

ZOOM IDÉAL

INFORMATION

SENTINEL 2

- Large scale land use / land cover
- Shoreline detection (→ shoreliner)
- Seasonal events

[Moteur de données](#)

[ES](#) [CESIUM](#) [ion](#) [Attribution des données](#) [Terms of use](#) [Credits](#)

Lat 22.28434°S Lon 166.46150°E Élev. 0m 50 m

DTF

DIGITAL TWIN FACTORY

DRIVERS

IMPACTS

COCKPIT

cnes

Recherche de lieux

+

Explorer les données

Téléverser

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Q ZOOM IDÉAL

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COS 9 Ortho PHR1B (2024-12-07)

Q ZOOM IDÉAL

INFORMATION

Opacité : 100 %

VHR images (stereo / tri-stereo)

Pléiades (0,5m / RGB-NIR)

CESIUM

ion

Attribution des données

Terms of use

Credits

Lat 22.28213°S

Lon 156.46342°E

Élev. 0m

50 m

DTF

DIGITAL TWIN FACTORY

DRIVERS

IMPACTS

COCKPIT

cnrs

Recherche de lieux

Explorer les données

Téléverser

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INFORMATION

Opacité : 100 %

Orthoimage PNEO3 (2024-10-06)

ZOOM IDÉAL

INFORMATION

Opacité : 100 %

COS 9 Ortho PHR1B (2024-12-07)

ZOOM IDÉAL

INFORMATION

Paramètres de la carte

Assistance

FR

Histoire

Partager / Imprimer

VHR images (stereo / tri-stereo)

PNEO (0,3m / RGB-NED)

Cesium

ion

Attribution des données

Terms of use

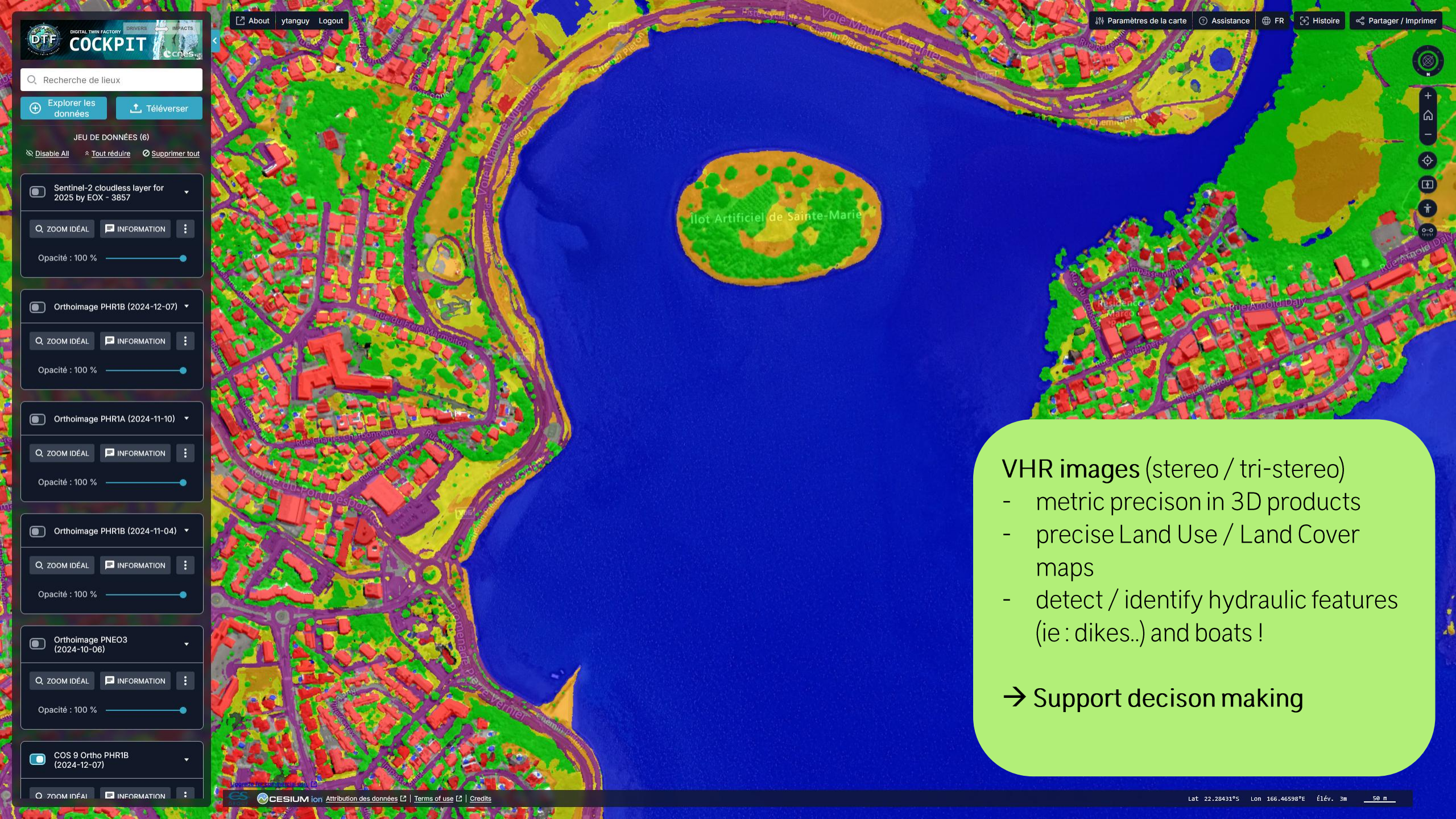
Credits

Lat 22.28726°S

Lon 166.45126°E

Élev. 24m

50 m

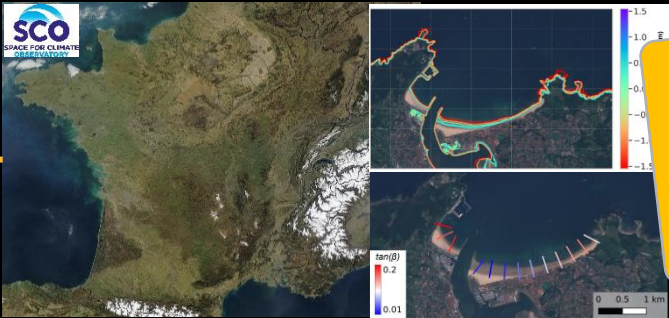


VHR images (stereo / tri-stereo)

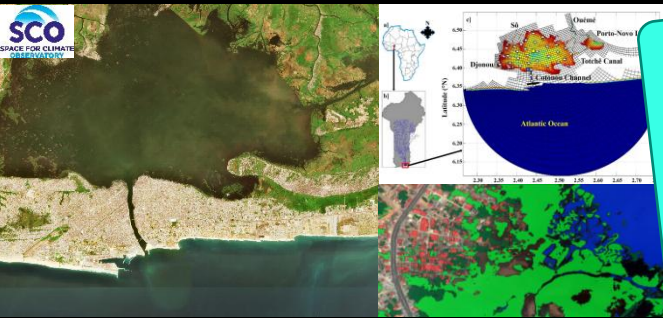
- metric precision in 3D products
- precise Land Use / Land Cover maps
- detect / identify hydraulic features (ie : dikes..) and boats !

→ Support decision making

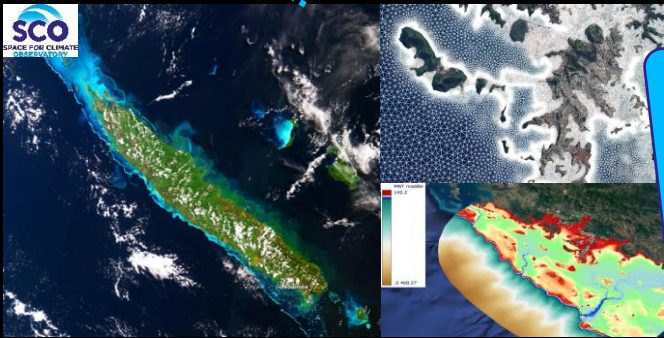
SCOAST-DT : 3 DIFFERENT SITES AND THEMATIC



France, Shoreline (IRD, Wave n'see)
--
What-now? Historical shoreline
What-next-if? : Shoreline evolution modelling,
Impact assessment, adaptation strategy



Nokoué lagoon (Benin),
Flooding/Water Quality (IRD, CNRS/LEGOS,
Snale)
--
What-now? LULC, historical flood & quality
What-if? : Hydrodynamic modelling, flooding
impact, spreading pollutants



New Caledonia,
Marine Submersion (BRGM, NC gvt)
--
What-now? 3D Digital Repliqua
What-if? : Marine submersion impact
assessment

COASTAL DIGITAL TWIN FROM SPACE

DIGITAL REPLICA FROM SPACE : a 3D representation of the coastal zone
ANYWHERE, at **ANY TIME** without any prior knowledge

DRIVERS



IMPACTS

Soil and land-use
classification, 3D
topography,
hydrology...

Shoreline, inter-tidal
zone evolution...

Bathymetry, water level
and quality, biological
processes, benthic
mapping, sea-state
observations...

OCEAN DT



LAND DT

MODELS
and scenario projections



DIGITAL REPLICA : LAND SIDE VHR, NOKOUÉ, BENIN

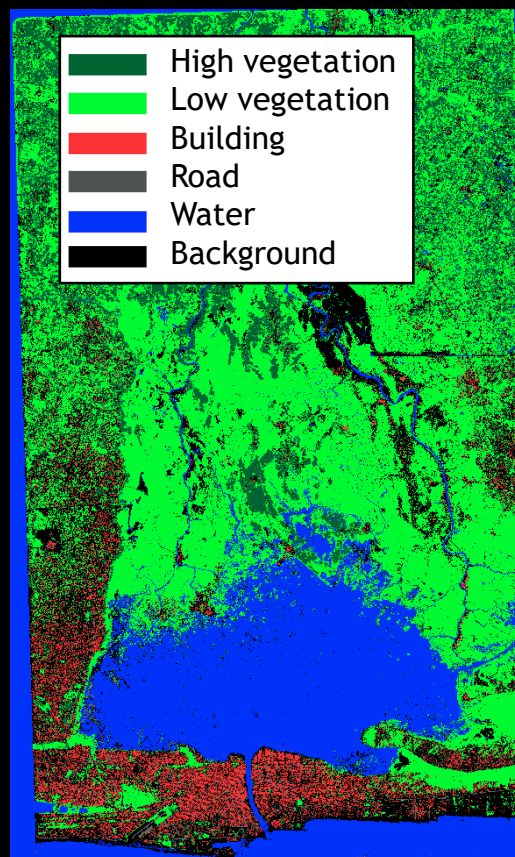


Images

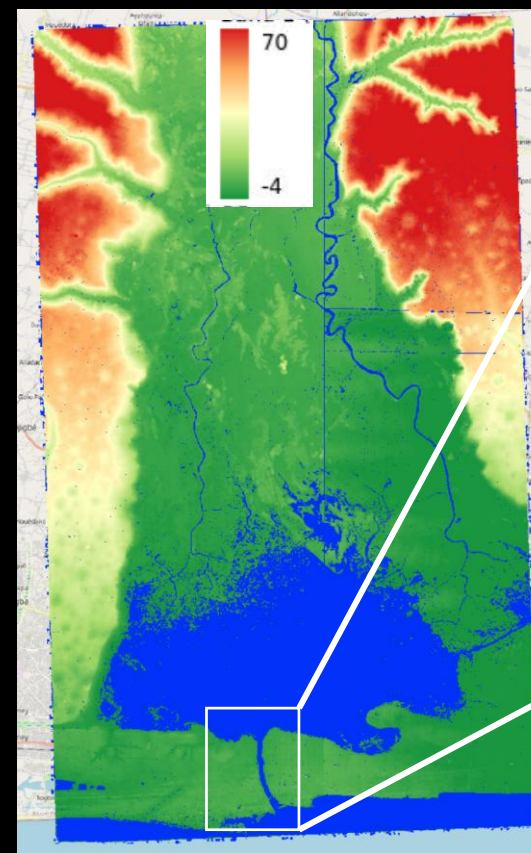


Pleiades 50cm
Tri-stereo

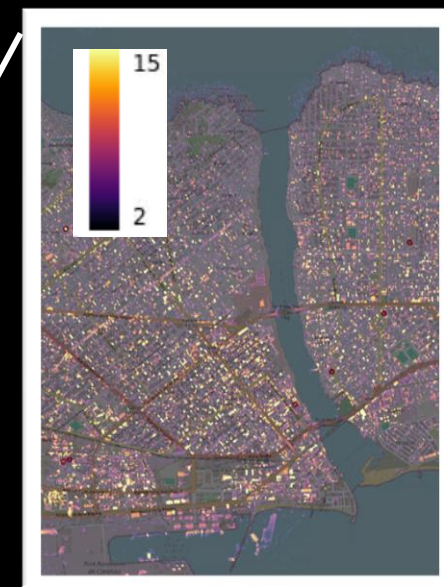
Land cover



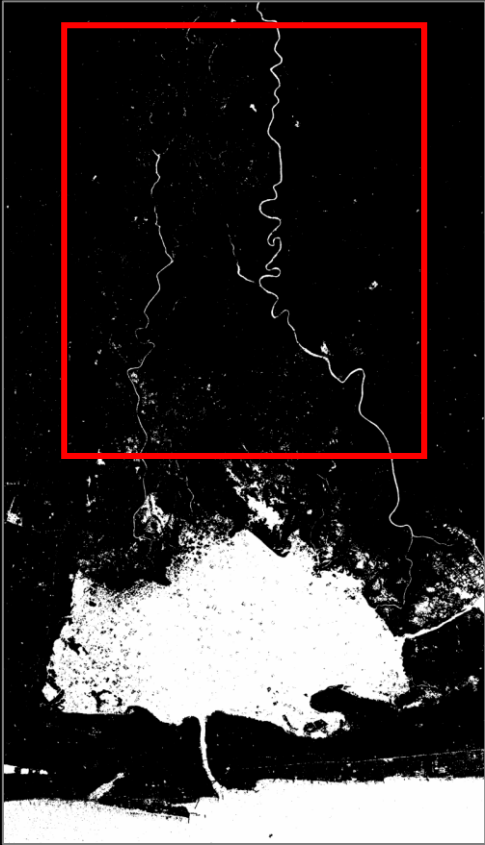
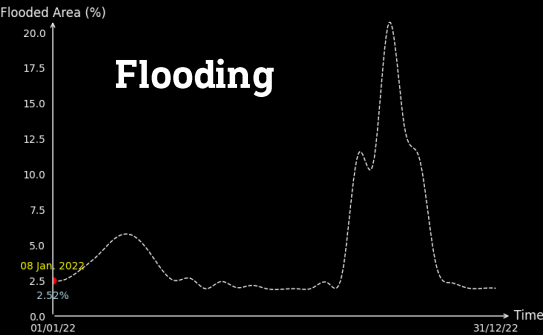
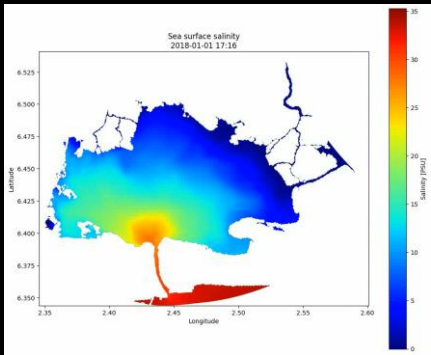
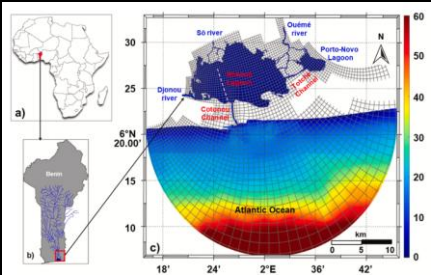
DTM



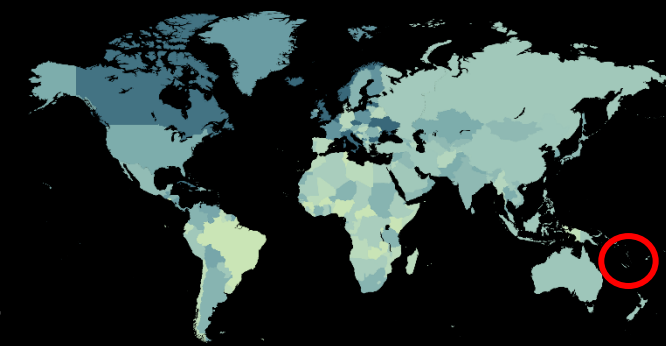
DHM



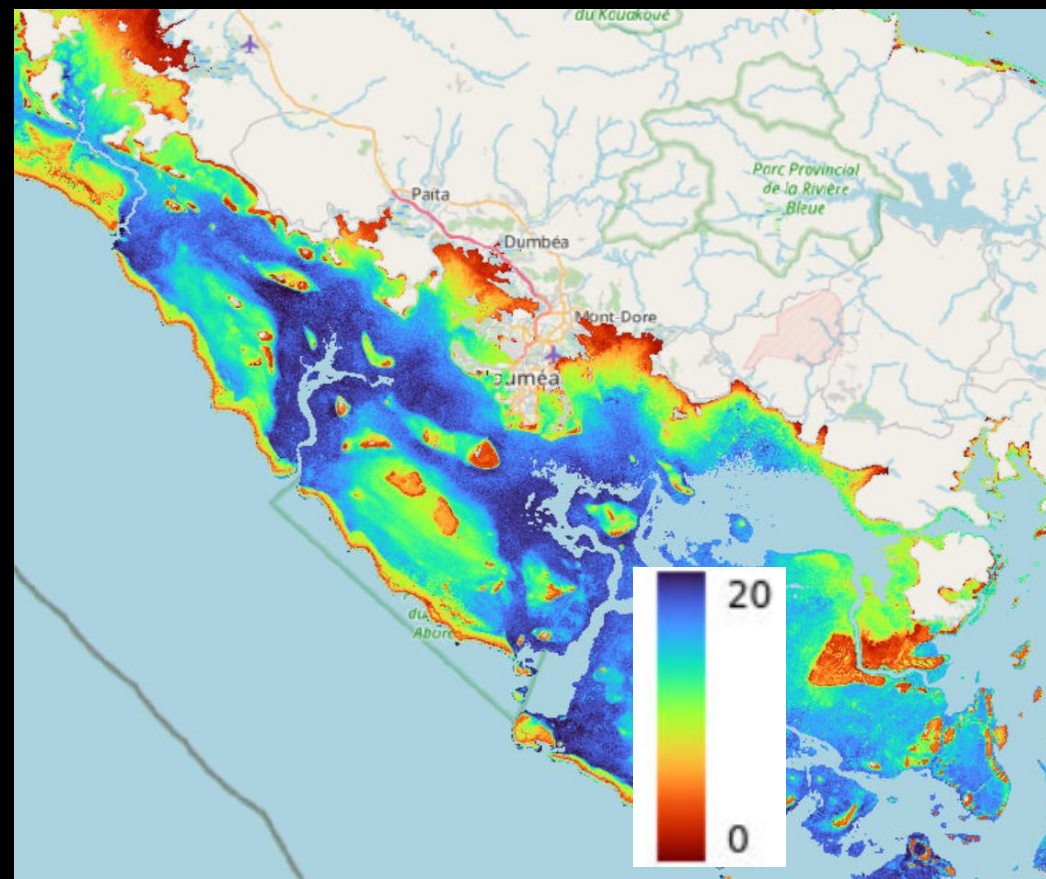
MODELING : LAGOON HYDROLOGY



DIGITAL REPLICA : SEA SIDE BATHYMETRY IN NOUMÉA



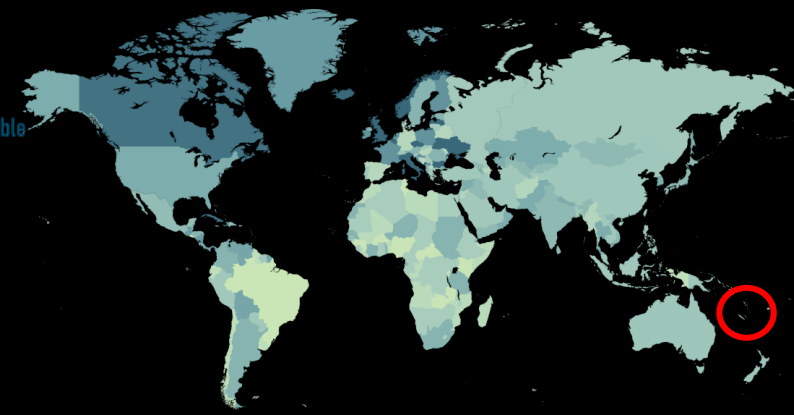
Water color inversion in Nouméa



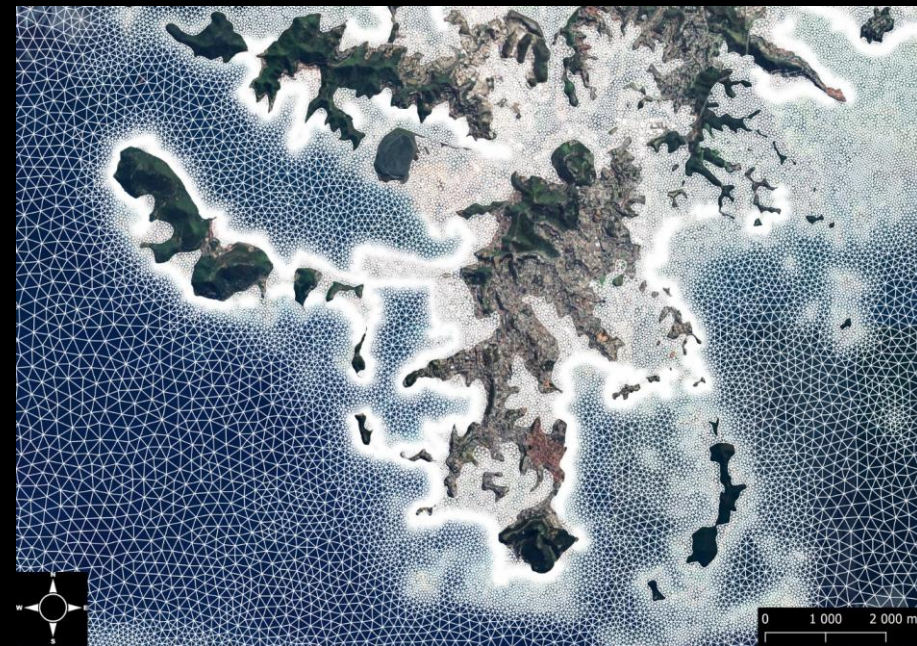
Based on Copernicus/Sentinel-2

MODELING : MARINE SUBMERSION IN NOUMÉA

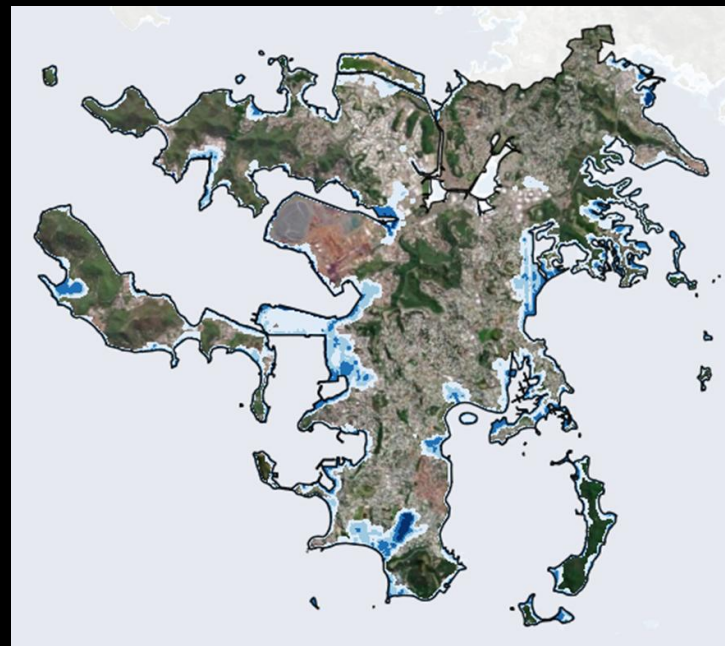
Model : TELEMAC



Mesh Generation based on spatial bathymetry and topography



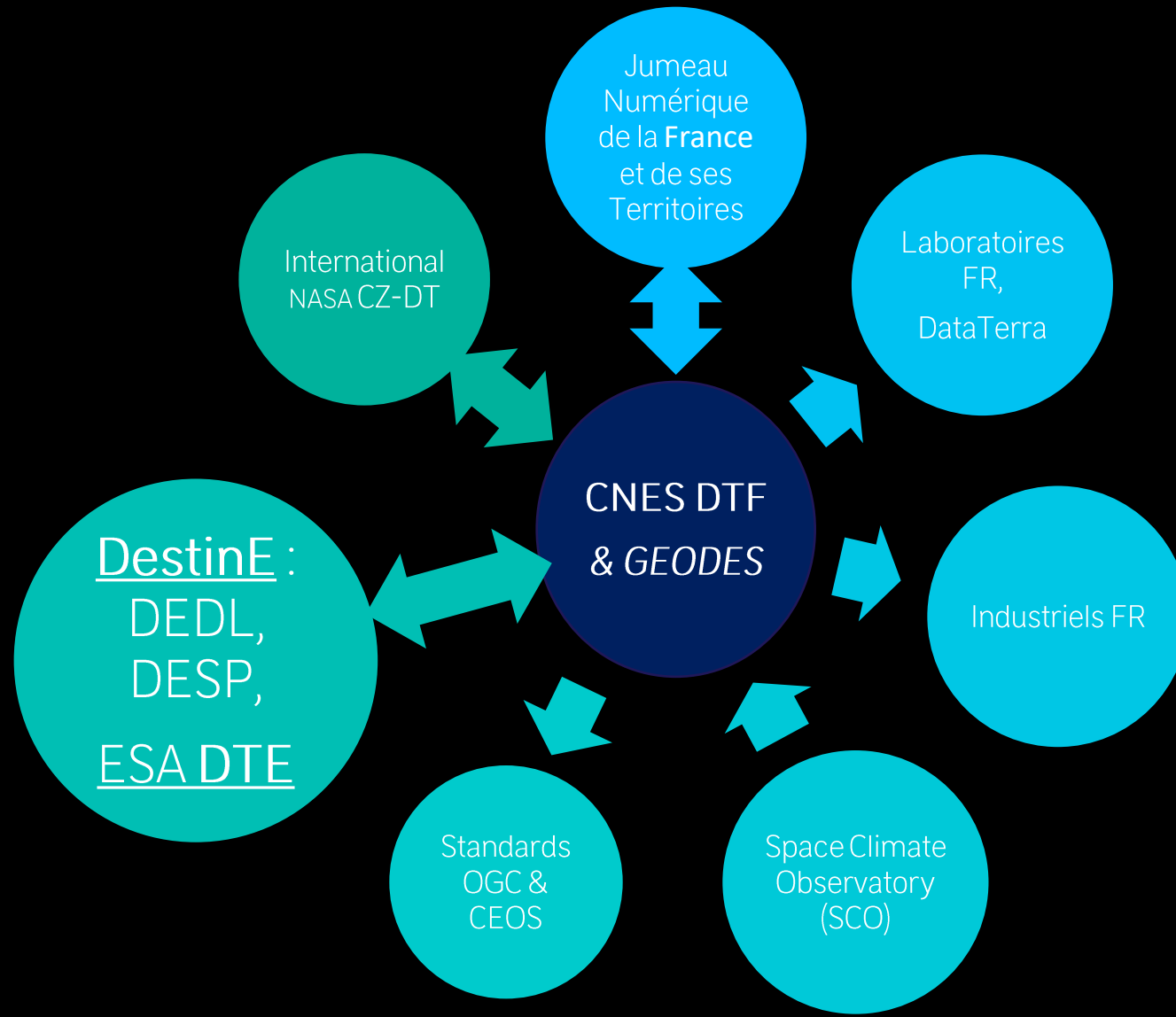
Submersion computation with uncertainty



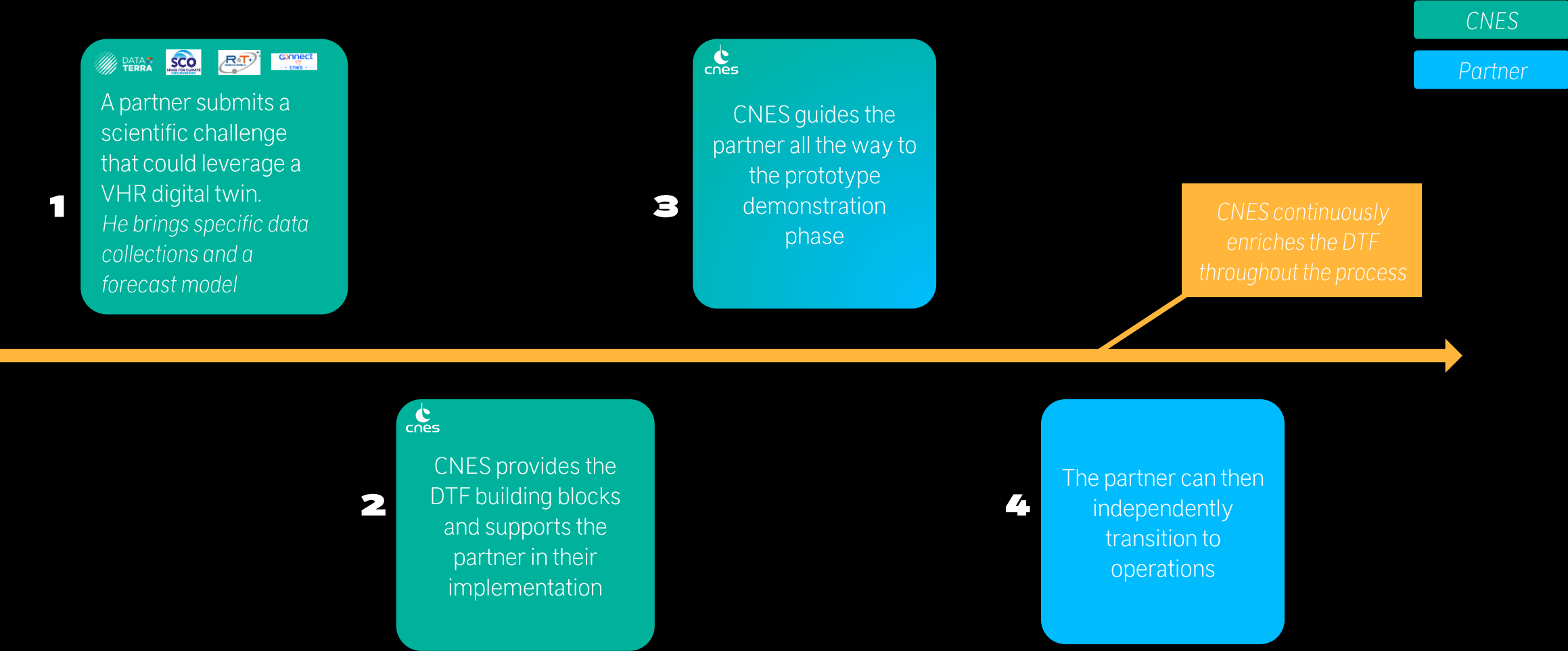
Identification of flooded buildings



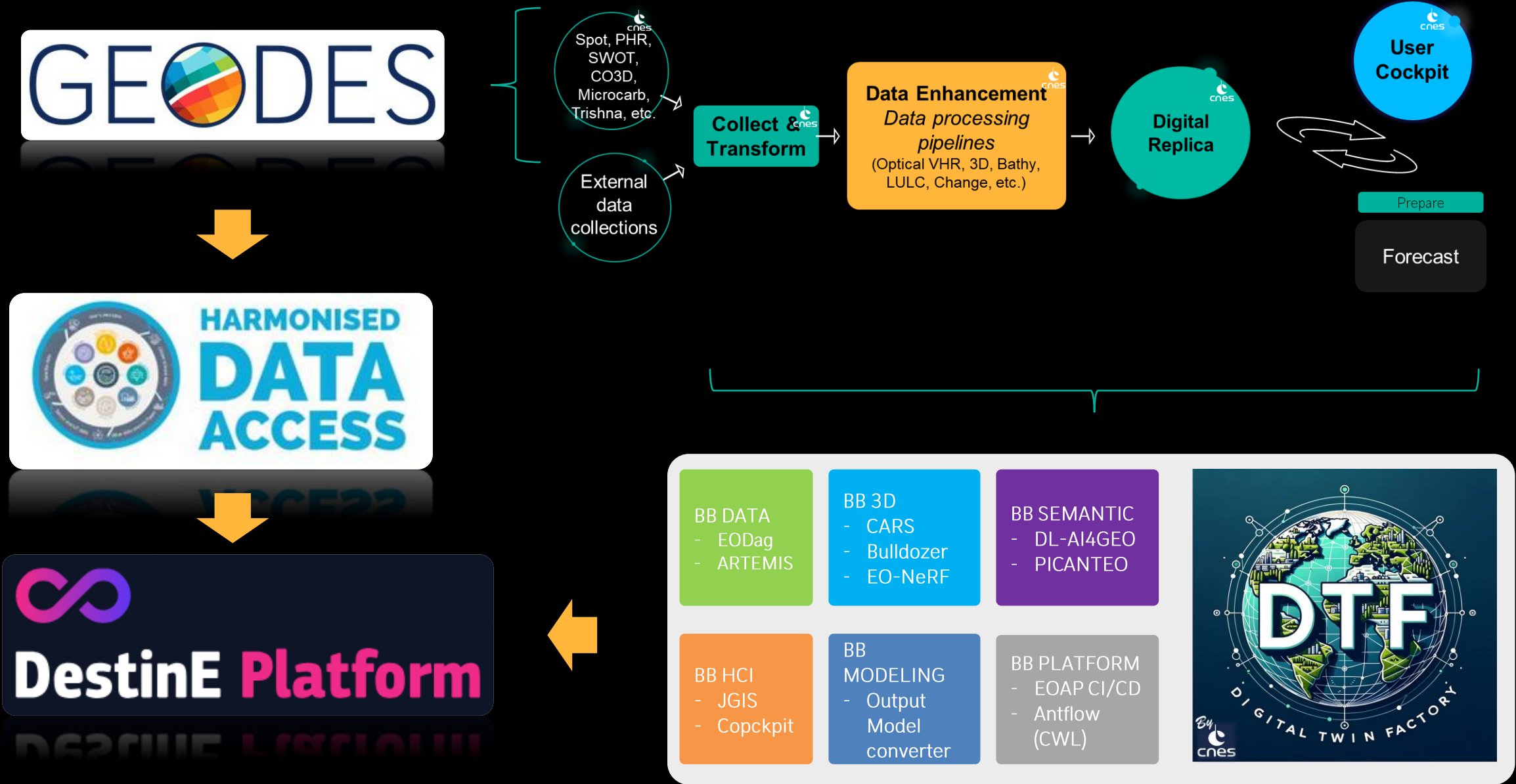
DTF COLLABORATIONS



DTF USER GUIDE



DTF → HOW TO CONNECT OR INTERACT WITH DESTIN-E ?



TAKE-AWAY MESSAGES



DTF : advanced & interoperable building blocks designed to facilitate the creation of thematic, local & very high resolution digital twins



GEODES : reference portal for satellite data distribution (Copernicus S2 / S1, VHR images – SPOT, PHR world heritage, COSD, SWOT, TRISHNA)

SCOast-DT : implementations of Digital Twins in Noumea, Nokué. Various models and scenarios.



Open Science, Open to collaborations 😊

**Thank
you for
your
attention**

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