ADB esa

"Space in Support of International Development Assistance"

Better Data for Better Decisions

Wednesday, 12 May 2021 • 3:00–5:00 p.m. *(GMT+8 Manila time)*

Earth Observation Services to Support Water Resources, Agriculture and Aquaculture in Indonesia

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Water Security: Our Investments

INTEGRATED FLOOD RESILIENCE

bringing together soft and infrastructure investments

IRRIGATED AGRICULTURE

towards greater water efficiency, improved farming productivity and profitability; and environmental sustainability

INFRASTRUCTURE O&M

to sustain function of investments and improve budget efficiency

SOURCE TO TAP

bringing upstream and downstream actors to work together for comprehensive water supply development

READINESS AND BANKABILITY OF INVESTMENTS

through rigorous planning and robust engineering

PLANNING & TECHNOLOGY

innovation for smart infrastructure planning and monitoring

Rural Development: Our Investments

DRYLAND AGRICULTURE DEVELOPMENT

to boost productivity and profitability of fruit and vegetable farming

ICT FOR FARMERS

to provide them with information on inputs, weather, market and cropping schedule

SUSTAINABLE AQUACULTURE DEVELOPMENT

to reduce environment degradation and boost productivity and profitability of shrimp aquaculture

VALUE CHAIN ANALYSIS FOR FRUIT AND VEGETABLE

to improve value added of farmers outputs

VILLAGE DEVELOPMENT

to support entrepreneurship and reduce regional inequality

Earth Observation Services: Enhanced Investment Design

Provide solutions to address lack of reliable field data

Land Cover Mapping assures information of spatial distribution of specific land cover types

Provide indicators that are usually not available in the field

Surface Water Monitoring Indicator provides spatial representation of available surface water. Biomass indicators provides representation of production potential and design of irrigation schemes.

Historically, Weekly

Resulting into a better prioritization of the investment

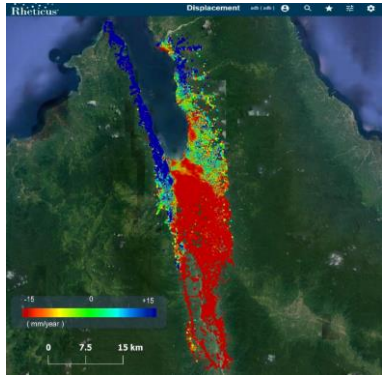
ADB-ESA Response in 2018 – until present
Loan 3793: Emergency Assistance for Rehabilitation and Reconstruction

OP1 | OP2 | OP3 | OP5

Implementation: 2019 – 2023
Financing: sovereign, sector Loan $188 million (OCR) [Public Works Infrastructure Component]

Approach/ Design: The project is supporting to build back better critical infrastructure in Palu, Central Sulawesi, which was affected by an earthquake, a tsunami and liquefaction in September 2018. The project will finance the reconstruction of severely damaged water intakes, the 42km long Palu-Sigi-Donggala (PASIGALA) raw water transmission system, two water treatment plants; coastal protection, and the Gumbasa irrigation system with the Ministry of Public Works and Housing. The project introduced a "source to tap" approach, linking upstream water resource management to downstream water distribution to provide piped water supply to 25,000 households.

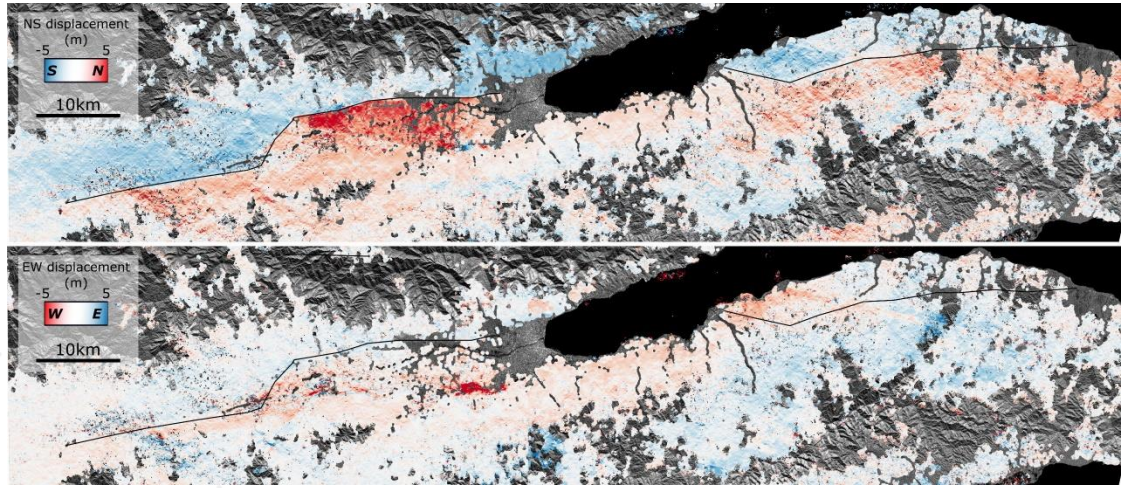
The project benefited from the partnership with the European Space Agency introducing geo-spatial technologies for planning and monitoring. It considers earthquake and hydrogeological conditions causing liquefaction to design infrastructure for long term resilience.

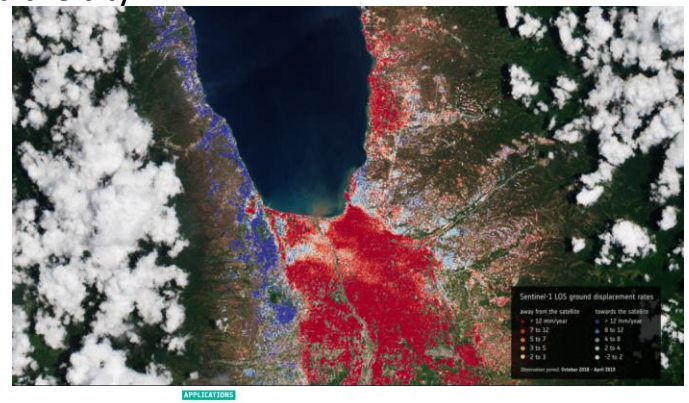


ESA Support to the ADB Project for Reconstruction in Central Sulawesi

On **28 September 2018**, the Indonesian island of **Sulawesi was struck by a 7.5 magnitude earthquake**. The epicentre was on the island's northwest coast – **77 km north of Palu**, which lies at the head of a long narrow bay. The quake triggered a tsunami that swept huge surges of water – as high as 10 m – along the bay and swamped the city.

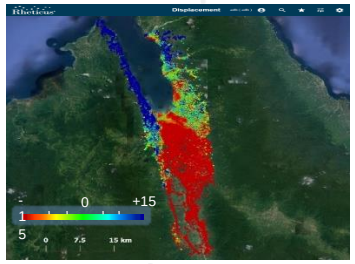
ESA has **supported ADB** and **Gov. Indonesia** for the **rehabilitation** and **reconstruction** in Central Sulawesi providing Earth Observation services and in-situ capacity building (17-21 June 2019 - 23-31 January, 2020)

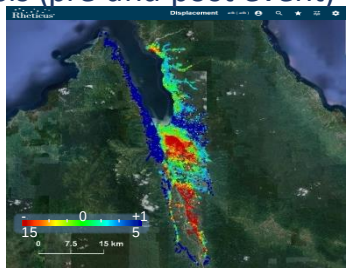




https://www.esa.int/[illegible]entinel-1/Using_satellite_information_to_help_rebuild_after_a_disaster

- Terrain deformation analysis (pre and post event)



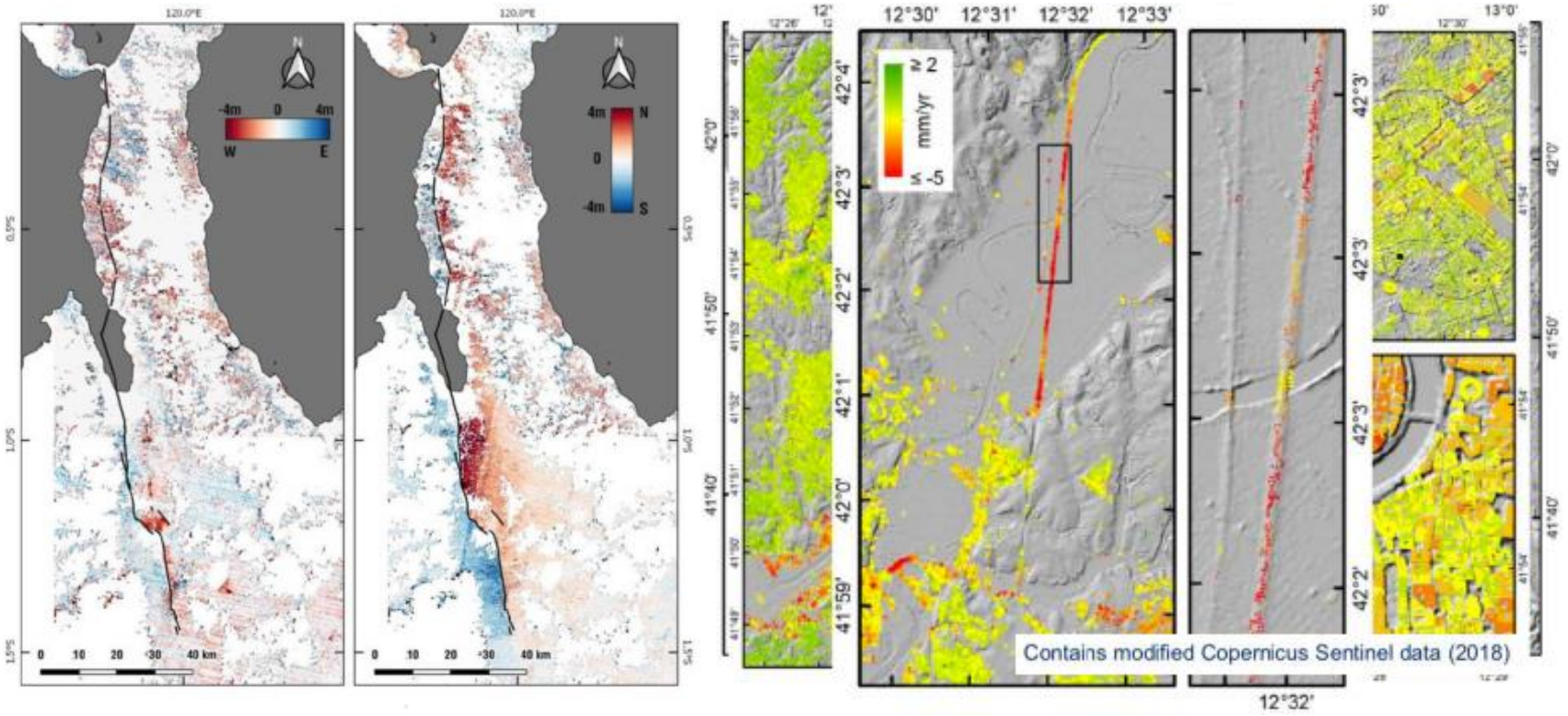


- Reconstruction monitoring (after 1 year the event)

Earth Observation for Sustainable Development and Disaster Risk Reduction

geohazards tep

Geohazards Exploitation Platform (GEP)



GEP is a part of Thematic Exploitation Platforms (TEP) which is an activity held by the European Space Agency (ESA). This program **aims to provide an environment for processing and community support related to earth data** (Earth Observation) through cloud-based services.

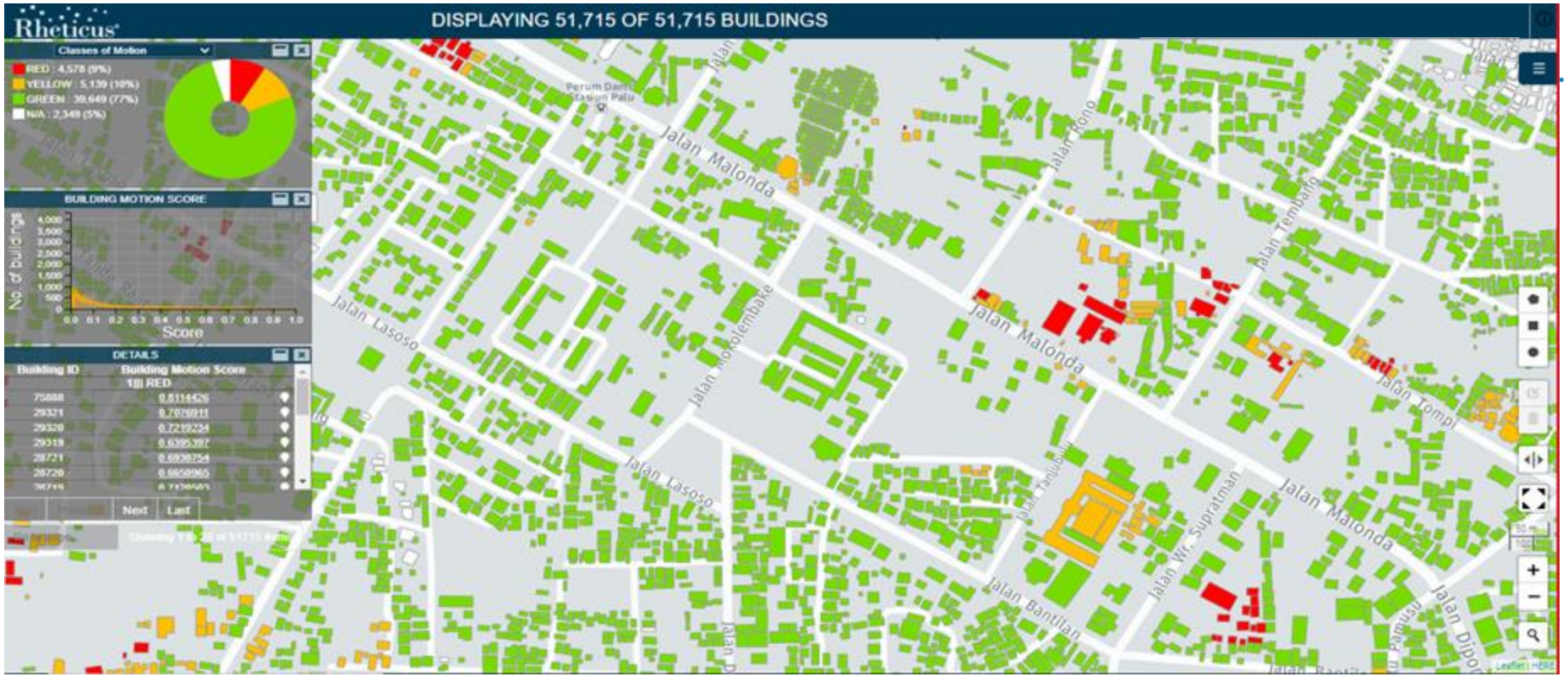
esa ADB

Stability Maps and Analytics for Buildings and Critical Infrastructure

Geospatial Cloud Platform

Stability Maps

The second product will provide the level of concern of each monitored building and critical infrastructure depending on the measurements of the displacement of the element
itself and its nearby areas as shown in the next figure including millimetric movements of
each element.



Transfer of Knowledge

- Specific training on Rheticus® cloud platform for the following entities: LAPAN, MPWH, Ministry of Energy and Mineral Resources, and BIG
- Skills transfer based on the Persistent Scatterers Interferometry technique with the focus on stability maps of buildings and critical infrastructures over urban areas

Flood Management and Coastal Protection in North Java Project (Proposed)

Implementation: 2023 - 2029
Financing: sovereign, $200 million (OCR)

Subset of Coastline Changes Map 1975-2018 for Jratunseluna river watershed, East of Semarang, Central Java, Indonesia. Visible influence of Ground subsidence, level rise and anthropogenic structures development (sea port infrastructure). Below source imageries.

Approach/Design. The project promotes an integrated water resources management approach to Improve flood resilience and raw water supply (RWS) in the in the Pemali - Juana and Cimanuk-Cisanggarung river basins in North Java. The project will also support the Ministry of Public Works and Housing in introducing Flood Forecasting and Early Warning System and river and RWS asset management, and institutional strengthening and capacity of river basin organizations in managing data.

The project will finance construction of Detailed Engineering Designs and readiness works financed through 3455-INO: Accelerating Infrastructure Delivery through Better Engineering Services Project (ESP). The project will introduce satellite-based technology to better manage floods and nature-based solution towards greener infrastructure.

Flood Monitoring and Improved Interventions

E-DRIFT: NRT Flood Monitoring Service

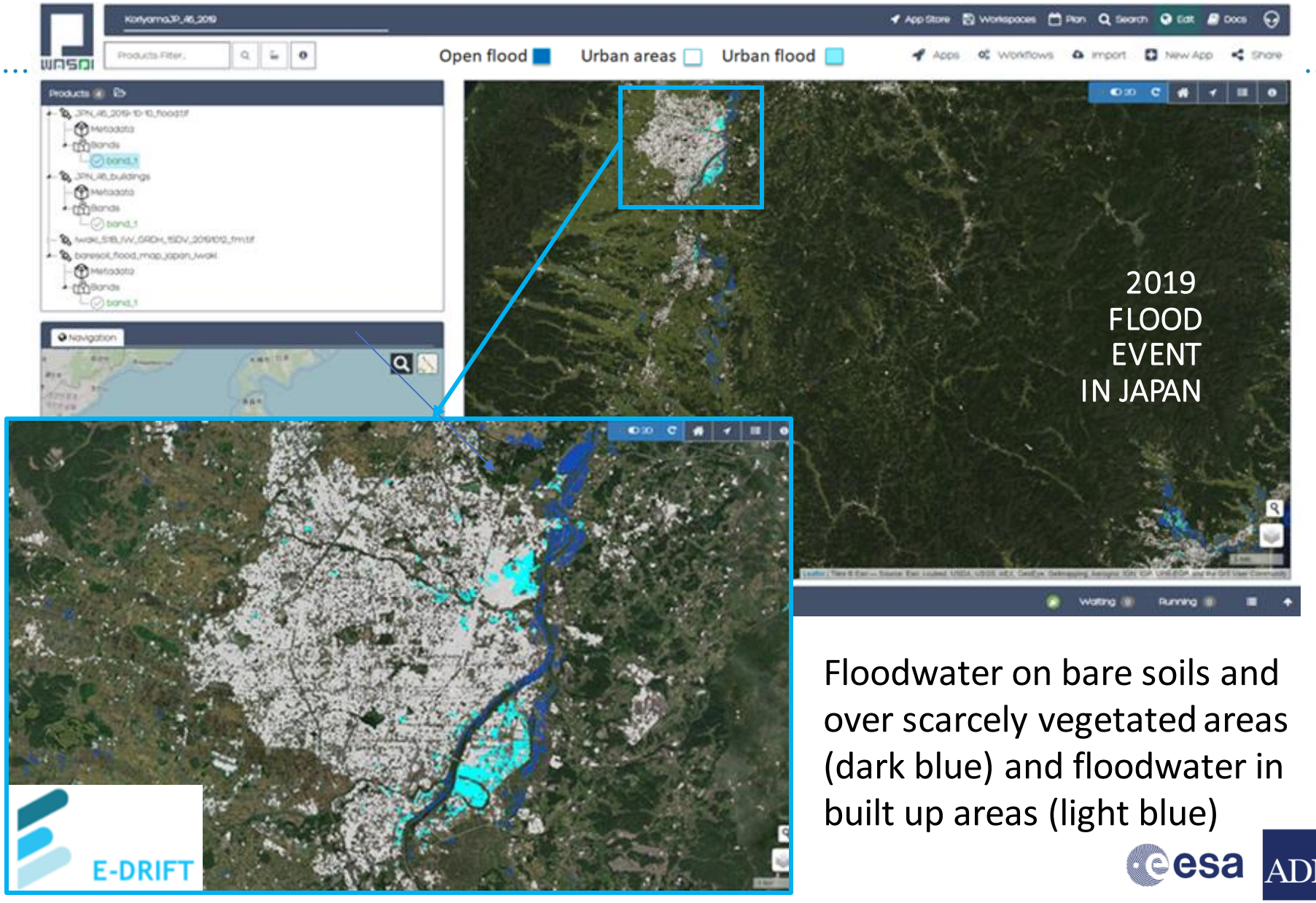
The eDrift platform enables an **automated mapping of flood extent using Sentinel-1 SAR imagery**. It includes 3 components:

- 'on demand' mapping application using as input a pair of manually selected Sentinel-1 images

- systematic & automated mapping of flood extent on bare soils and over scarcely vegetated terrain based on the Sentinel-1 collection

- 'on demand' mapping of flood extent in urban areas (using InSAR coherence)

The platform also provides access to a permanent water bodies layer and an exclusion layer informing on areas where no classification can be performed.



Floodwater on bare soils and over scarcely vegetated areas (dark blue) and floodwater in built up areas (light blue)

Advanced InSAR Chains Available Globally

CNR-IREA P-SBAS Sentinel-1
P-SBAS stands for Parallel Small BAseline Subset and it is a DInSAR processing chain for the generation of Earth deformation time series and mean velocity maps. Input: SLC (Level-1) Sentinel-1 data.

SNAPPING
Surface motioN mAPPING is a multi-temporal interferometric service developed by AUTh (GR), MJaen (ES), with the support of Terradue (IT), that produces measurements of surface displacements based on open source ESA SNAP and StaMPS software packages.

geohazards tep

EO data

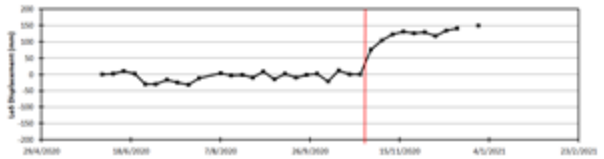
EO processing services

Geospatial products

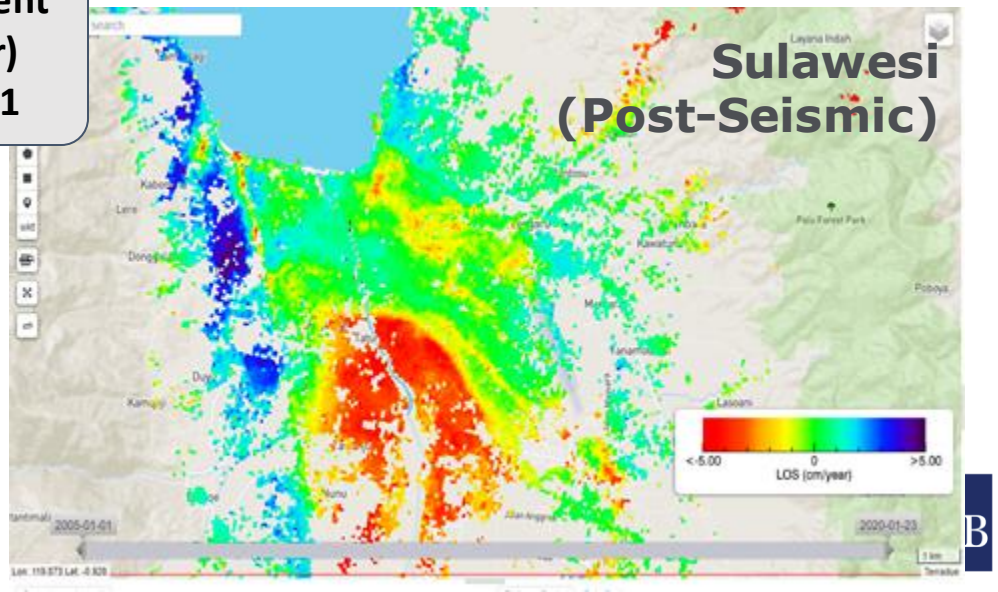
Integration environment

https://geohazards-tep.eu

P-SBAS Line of Sight displacement (cm/year) Sentinel-1



SNAPPING
SURFACE MOTION MAPPING



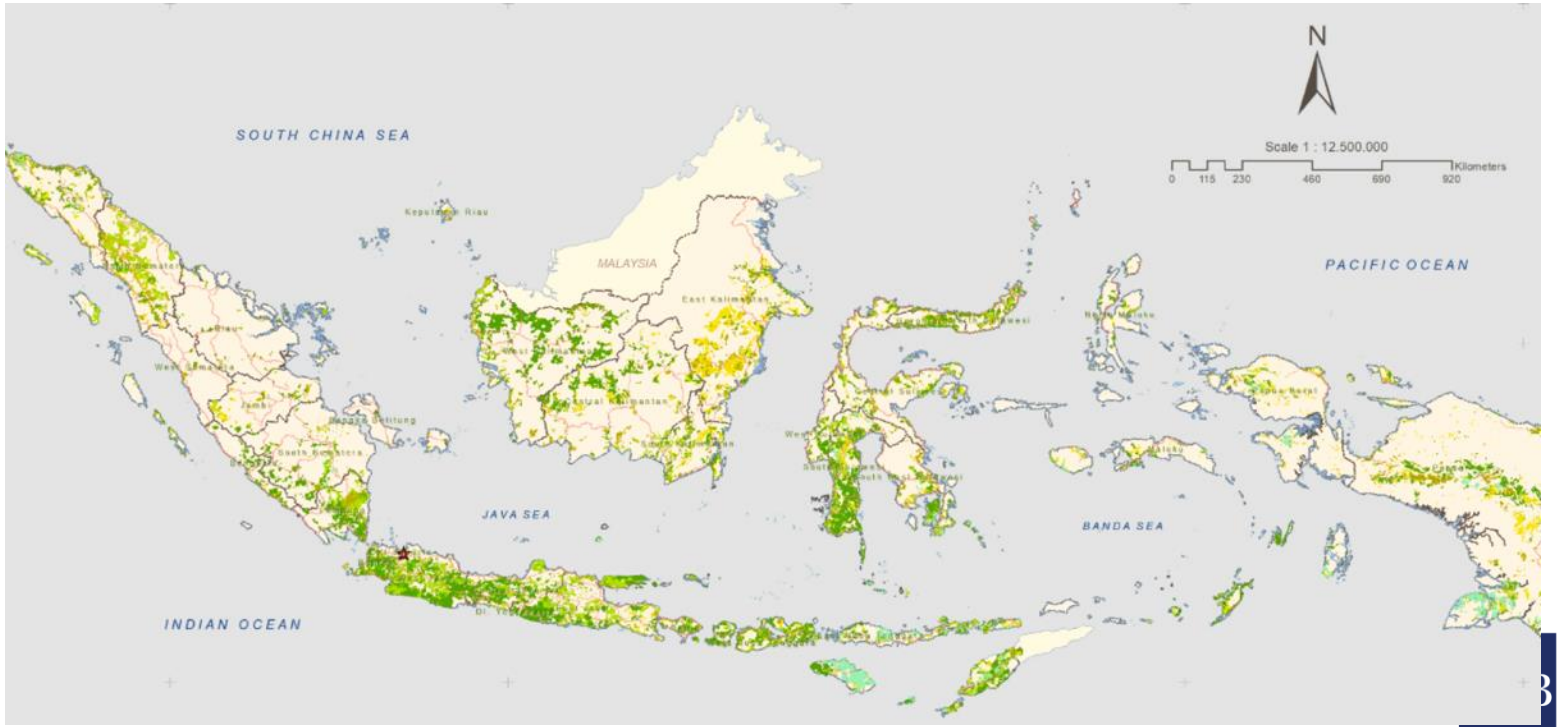
Dryland Agriculture Development Project (Proposed)

OP1 | OP2 | OP3 | OP5

Implementation: 2022 - 2027
Financing: $125 million (OCR)

Approach/Design: The proposed Project will help, through the Ministry of Agriculture, farmers to improve productivity and profitability of dryland farming, through (i) improving land, water, and connectivity infrastructure; (ii) introducing precision agriculture and climate-smart water management practices; (iii) strengthening of agribusiness systems and institutional architecture; and (iv) improving management, coordination, and capacity at national and regional level. The project will promote efficient and integrated irrigation and agriculture system, linking farmers to market and developing agriculture value chain.

Progress: The consultants to prepare the project are being recruited.

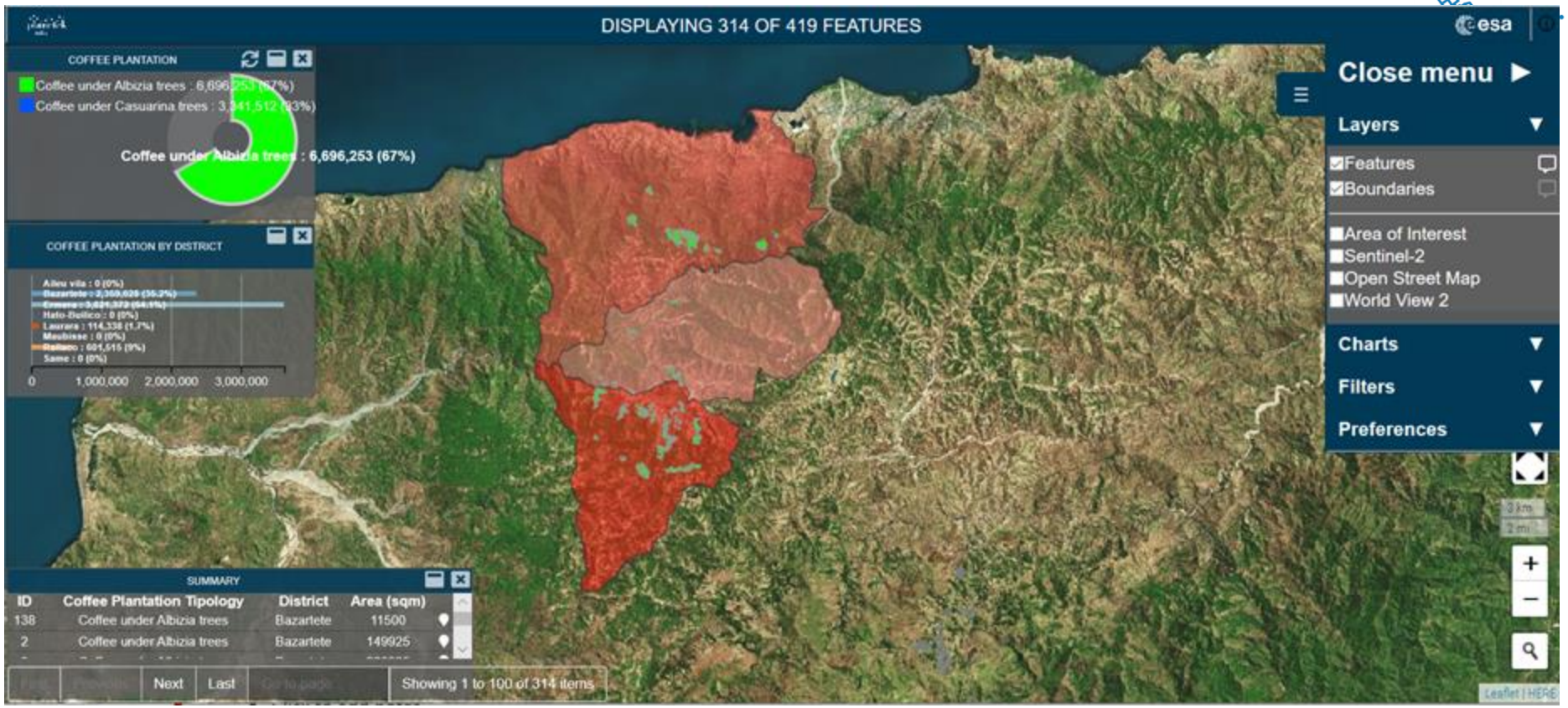


Biomass Dynamics Analytics

A dashboard to give evidence of a set of biomass-related geo-analytics overtime.

Biomass dynamics analytics

- Biomass index/parameter at parcel level:
  - median value
  - difference with previous value [%]
  - difference with median seasonal value [%]
  - Time series visualization
- Input data: Sentinel-1/2 time series
- Observation period: 2 years 2020-2021



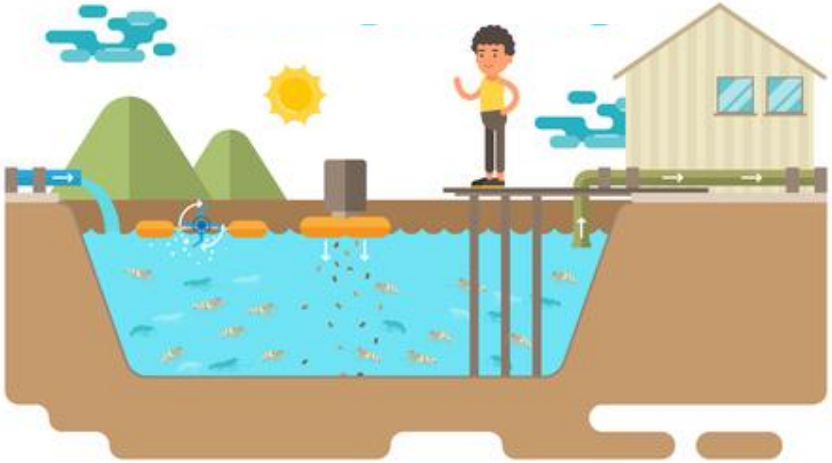
Capacity Building

Knowledge transfer and capacity building delivered as contribution to the two-day training based on the platform usage for the utilization of the provided maps.

Infrastructure Improvement for Shrimp Aquaculture Project (Proposed)

OP1 | OP2 | OP3 | OP5

Implementation: 2022 - 2027
Financing: $93 million (OCR)



Approach/Design. The project will help the Ministry of Marine Affairs and Fisheries in introducing environmentally sustainable shrimp aquaculture and improving transparency, traceability and reporting processes towards increased productivity, quality and profitability of smallholders shrimp farms in 7 provinces. The project will deliver an integrated investment addressing upstream, production, and downstream processes through infrastructure financing, support to improve farming practices and post-harvest systems, and value chain strengthening. The project will deliver three outputs: (i) Quality and sustainable inputs production increased; (ii) Sustainable aquaculture infrastructure and services developed; and (iii) Shrimp aquaculture value chain strengthened

Shoreline Mapping

Coastsat and DSAS

Shoreline Maps (Optical)

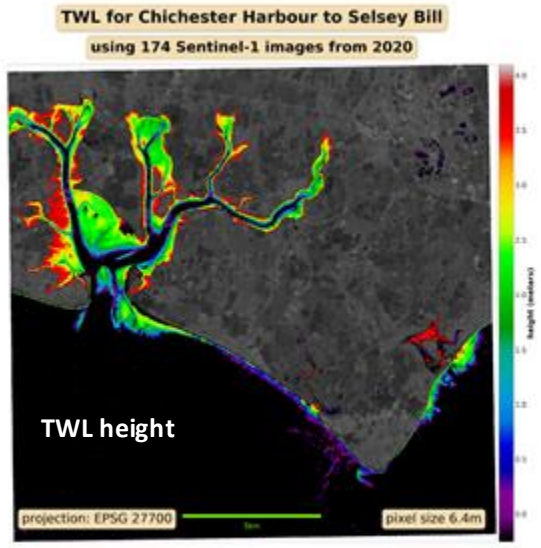
- Annual shorelines (from median composites)
- From up to 1984-2020 (though more accurate from 2000)
- Shoreline Change with error statistics accuracy between ~7-12m (validation average)

Shoreline Maps (SAR)

Coastline products derived from synthetic aperture radar (SAR) data (unaffected by cloud).

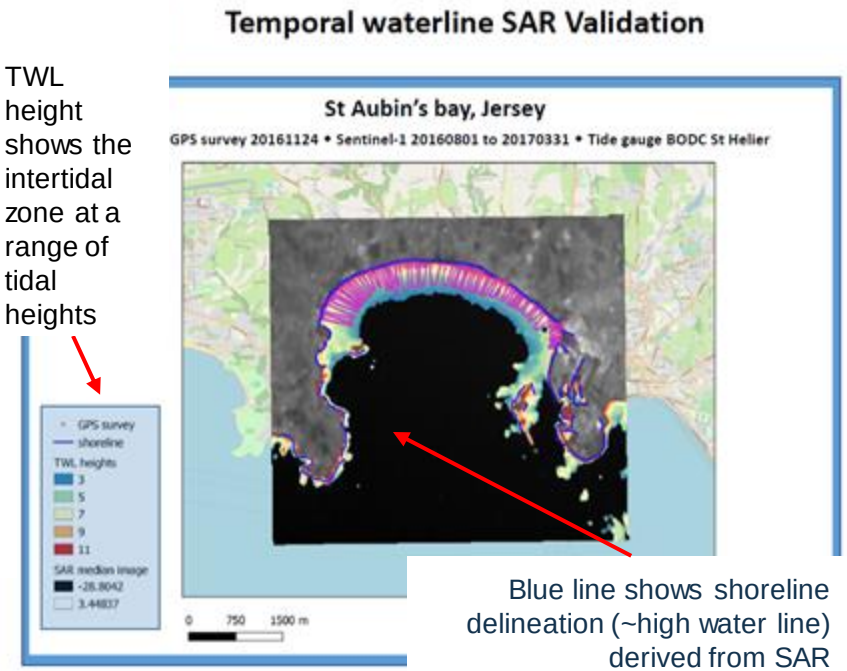
Sea level trends will be extracted from the ESA Sea Level CCI product, potentially supplemented using a specialist coastal processor, such as the NOC ALES processor.

Shoreline, TWL, wetness index mapping using optical and SAR data to provide an indication of the rate of changes being experience in the locations identified.

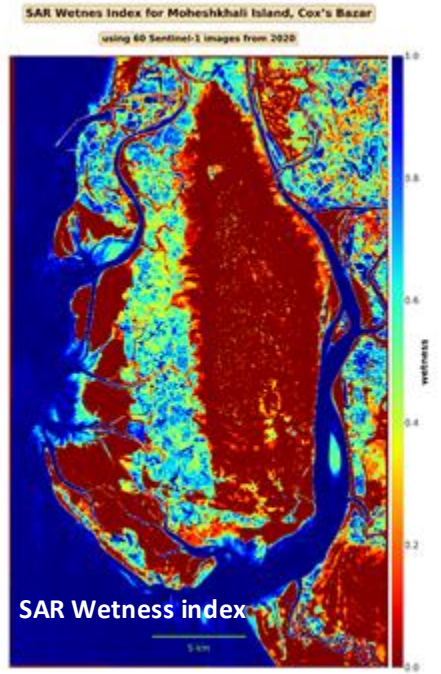


- 6.4m grid cell size
- heights from tidal datum

TWL height shows the intertidal zone at a range of tidal heights



Blue line shows shoreline delineation (~high water line) derived from SAR



Take Away from the Partnership with the European Space Agency

- Powerful platforms that influenced project design, engineering works, and implementation
- Very well received by government agencies as the partnership brings tools that are not available in country
- Supports strategic planning and prioritization of investments especially under fiscal pressure conditions
- Enables to transfer knowledge to counterpart agencies
- Allows to overcome COVID-19 field restrictions
- Leverages resources to do more in country (i.e. EOS component ($9 million) under the proposed Flood Management Loan)

A more systematic approach is needed to maximize the partnership, especially for transfer of knowledge and technology streamlining.

Terimah Kasi!
Thank you!