

From Earth Observation to Institutional Decisions

Rheticus[®] Services for Disaster Resilience in Developing Countries

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Why disaster-risk decisions needed operational EO services

SPARSE EVIDENCE

- Ground surveys covered only selected benchmarks and buildings
- No consistent wall-to-wall baseline before or after an event

SLOW AND EPISODIC

- Field mobilisation and project-specific surveys took time and resources
- Snapshots could not reveal trends or rapidly reprioritise inspections

FRAGMENTED FOR DECISIONS

- Hazard, buildings, population and field evidence remained in separate systems
- Authorities lacked one shared basis to prioritise action and investment

EO adds repeatable spatial evidence — but becomes operational only when connected to users, field validation and a decision workflow.

From EO4SD to ESA GDA: services supporting decisions since 2018

ESA EO4SD DRR · 2018–2022

Palu, Indonesia

Ground deformation after the 2018 earthquake
Recovery and reconstruction · Sentinel-1 InSAR
National and local authorities

ESA GDA — ADB · 2022–2023

Cox's Bazar, Bangladesh

Flood, landslide and ground instability
Preparedness and investment planning ·
multisource EO
ADB Bangladesh Resident Mission

ESA GDA — ADB · 2021–2024

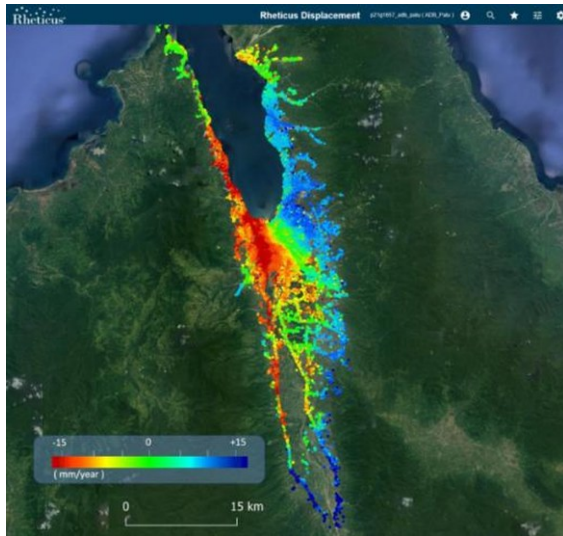
North Java, Indonesia

Subsidence and exposure across five cities
Prevention and adaptation · Sentinel-1 + WSF
3D
ADB, BRIN and BPPOPJ

Progression: EO4SD established and validated the services; ESA GDA transferred them into IFI-driven operational decision contexts.

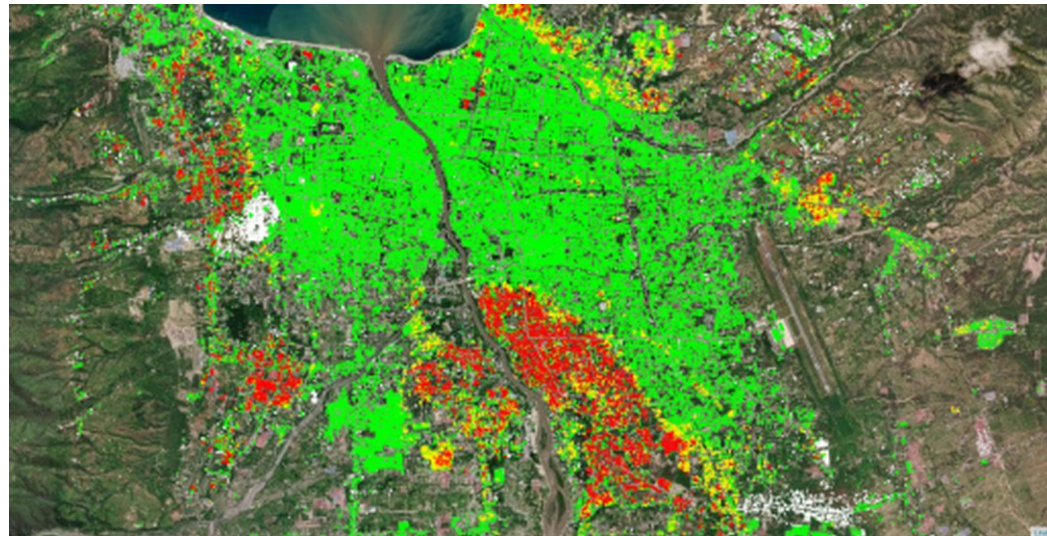
Palu | Recovery: ground motion guides redevelopment investigations

Sentinel-1 ground motion and building-level screening supported national and local authorities in prioritising field investigations for post-earthquake redevelopment.



Rheticus® Displacement — post-earthquake ground motion map (Mw 7.5, 28 September 2018)

Sentinel-1 PS/DS ground motion map, 2020–2022



Rheticus® Building Check — building-level motion score [0–1]

■ critical — inspect first ■ to monitor ■ stable

Palu | Recovery: training and field validation support uptake

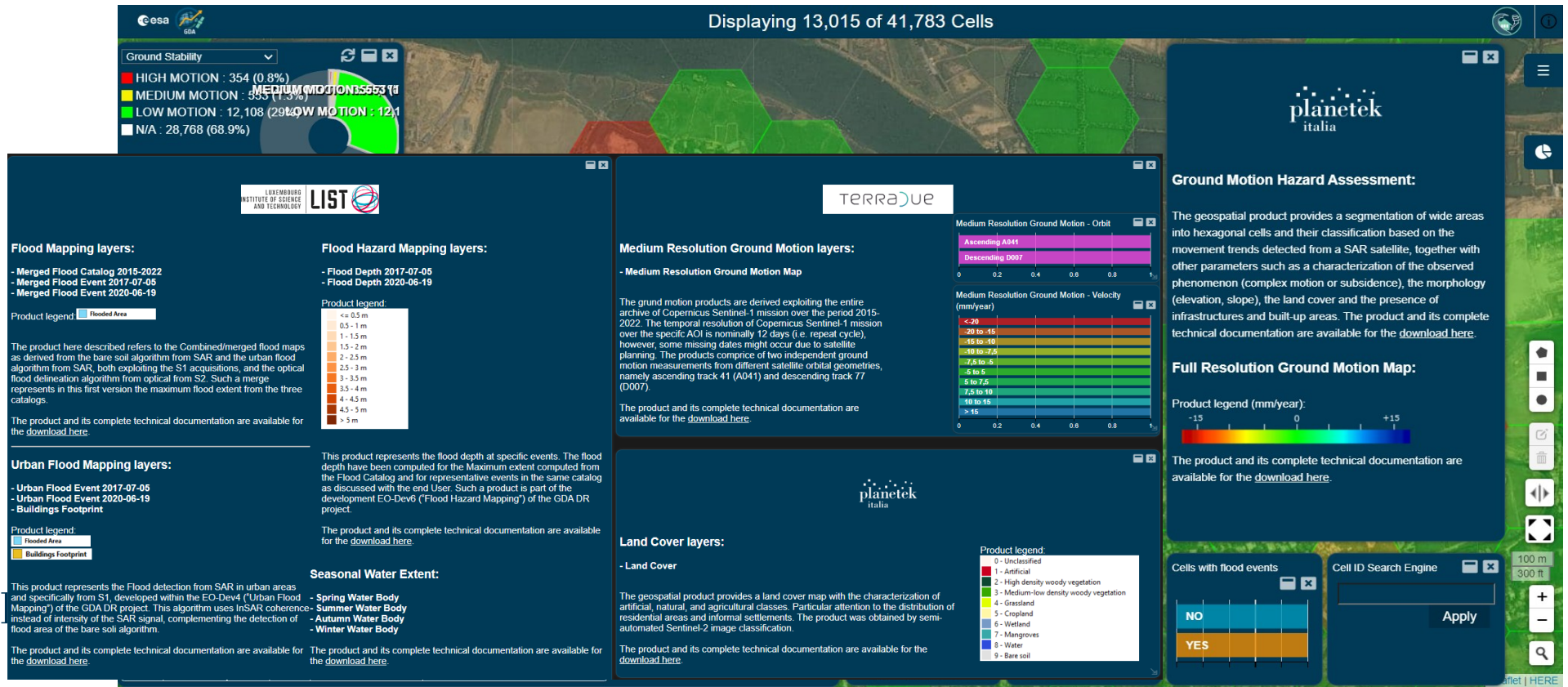
Capacity building and skills transfer under ESA EO4SD DRR: training activities and joint interpretation of Rheticus® ground-motion and Building Check services.

Training in Jakarta and a field trip to Palu supported local partners in connecting satellite evidence with post-earthquake field inspection and redevelopment priorities (2019–2020).



Cox's Bazar | Preparedness: multisource EO screens investment constraints

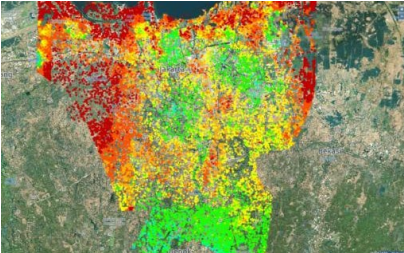
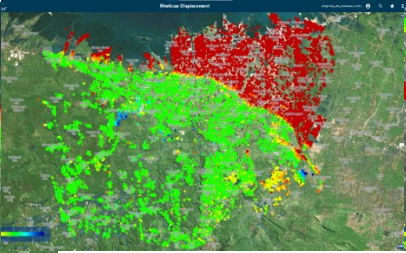
- 2,500 km² for the ADB Bangladesh Resident Mission, combining GEP/SNAPPING, WASDI and Rheticus® services for ground motion, floods, seasonal water trends and land cover
- Supports site selection and safeguards while identifying where field investigation is still required



North Java | Prevention and preparedness: evidence informs adaptation choices

- ESA GDA and ADB addressed long-term subsidence and flood exposure across five North Java cities
- Rheticus® Sentinel-1 ground motion was combined with DLR's World Settlement Footprint 3D to assess buildings and exposed population
- The evidence supports protective works, resilient infrastructure and alternative development pathways

North Java | Outcome: five cities require different priorities

Jakarta	Cirebon	Pekalongan	Semarang	Surabaya
Mean -7.3 mm/yr Max -103.7 mm/yr Coastal belt subsiding, fastest in the harbour area	Mean -1.4 mm/yr Max -24.7 mm/yr Localised subsidence hot- spot along the coast	Mean -47.6 mm/yr Max -145.2 mm/yr Urban area mean -70.5 mm/yr	Mean -49.8 mm/yr Max -134.5 mm/yr Stable SW city against a subsiding NE coastal belt	Mean -10.5mm/yr max -72.6 mm/yr Subsidence confined to the northern coastal area
				

Workflow | Rheticus[®] combines InSAR and exposure at building level

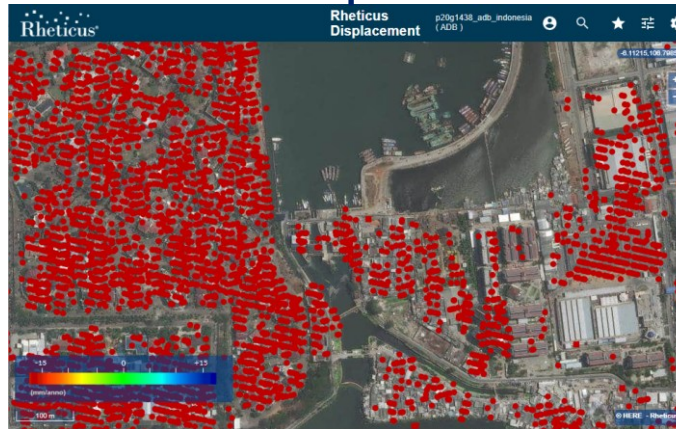
Each building receives a normalised ground-motion score from 0 to 1. Motion indicators remain distinct from exposure attributes and do not replace structural assessment.

FROM THE DISPLACEMENT MEASUREMENTS

BUILDING SCREENING AND EXPOSURE

Input:

- PS/DS velocity
- PS/DS coherence
- Building footprint, height, population



Output:

- Building velocity
- Differential velocity
- Building attributes
- Risk motion score [0-1]

What turns EO maps into institutional decisions

Start with a decision and an accountable institution.

Co-design analytics that combine trusted EO with exposure and field evidence.

Treat uncertainty explicitly: screening prioritises — it does not replace inspection.

Leave cloud access, skills and operational ownership in place after the project.

Thank you

Questions?

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