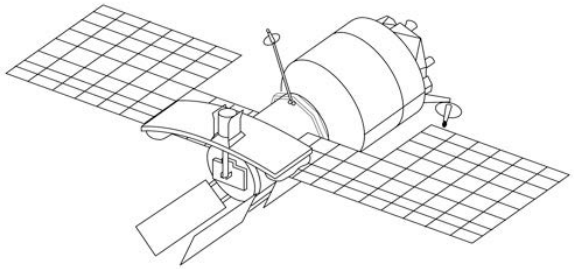
Building Capacity for a Centre of Excellence for EO-based monitoring of Natural Disasters

Δορυφορική και εναέρια παρακολούθηση γεωκινδύνων - BEYOND GeoHUB



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The Final BEYOND Workshop
17 May 2016
Athens, Electra Palace

FP7-Regpot-2012-23-1

Research Domains

Centre of Excellence for

EO-based monitoring of Natural Disasters

- Fires & Floods
- Geophysical hazards
- Atmospheric disasters
- Urban environment

GeoHUB

Data & methods tier

Sentinel Mirror Site | NSN | ENIGMA | NOANET | In-situ

Earth Observation - SAR Interferometry

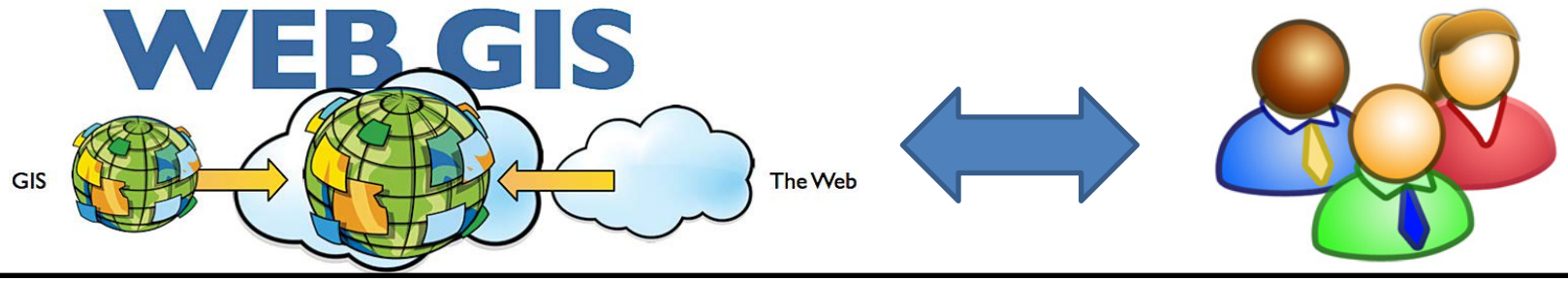
Services tier

Geodesy | Modeling | Hazard assessment | Large scale processing

Applications tier

Volcanoes | Tectonics | Landslides | Subsidence

Users tier



GeoHUB
An overview

Service	Status	Input data	Scale
Mapping of large-scale ground velocities & 3D decomposition	Operational	SAR, GPS	National
Estimation of earthquke 3D crustal deformation	Operational	multi-angle SAR, GPS	Local
Seismic risk estimation	pre-operational	SAR, in-situ, GIS	Local
UAV based damage assessement	Operational	Aerial data	Local
Mapping of tectonic hazard areas in subduction zones	Research	SAR, GPS	Regional
Monitoring of volcanic activity	Operational	SAR, GPS, in-situ	Local
Monitoring dispersion of volcanic ash	pre-operational	Weather data	Regional
Detection of new landslides	Operational	SAR	Local
Update of landslide inventory maps	pre-operational	SAR, in-situ	Regional
Estimation of landslide susceptibility	pre-operational	SAR, in-situ, GIS	Regional
Detection of subsidence in urban & peri-urban areas due to manmade activities & physical processes	Operational	SAR, GPS	Regional
Monitoring of construction activities in urban environment	Operational	SAR, GPS	Local

GeoHUB

Earthquake deformation mapping

Data

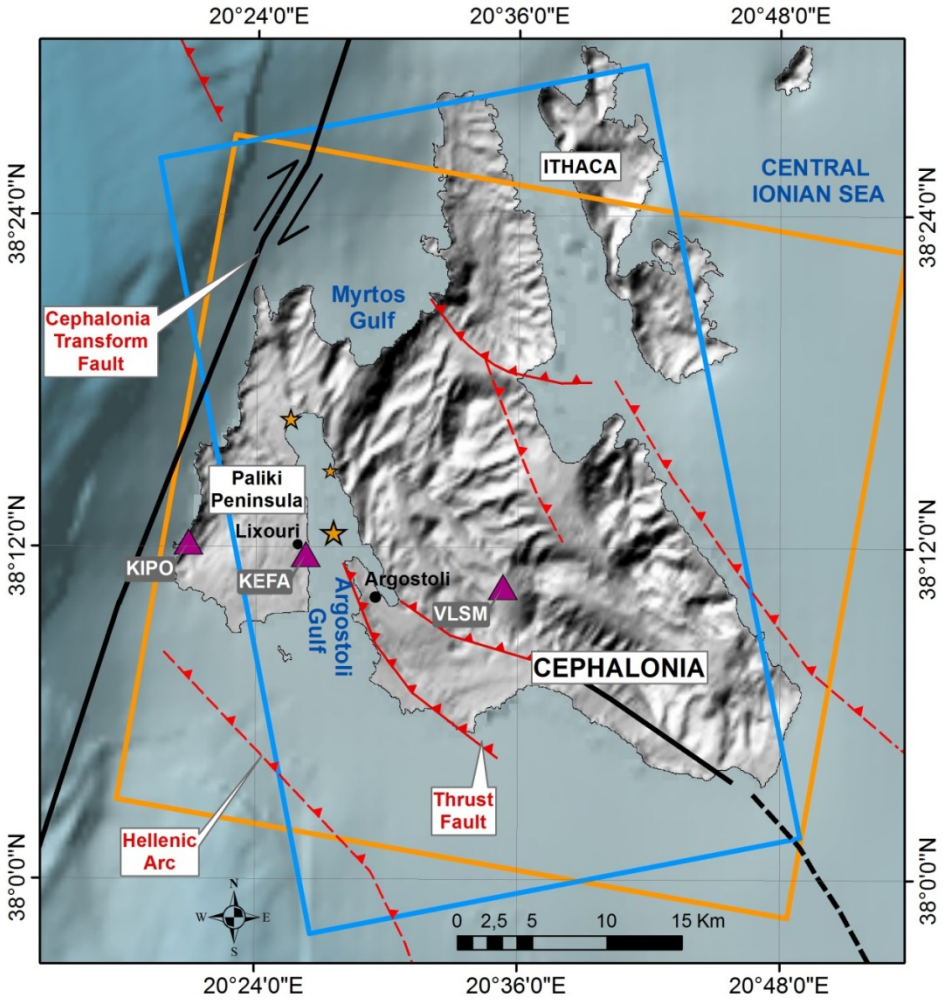
- NSN
- NOANET
- ENIGMA
- In-situ

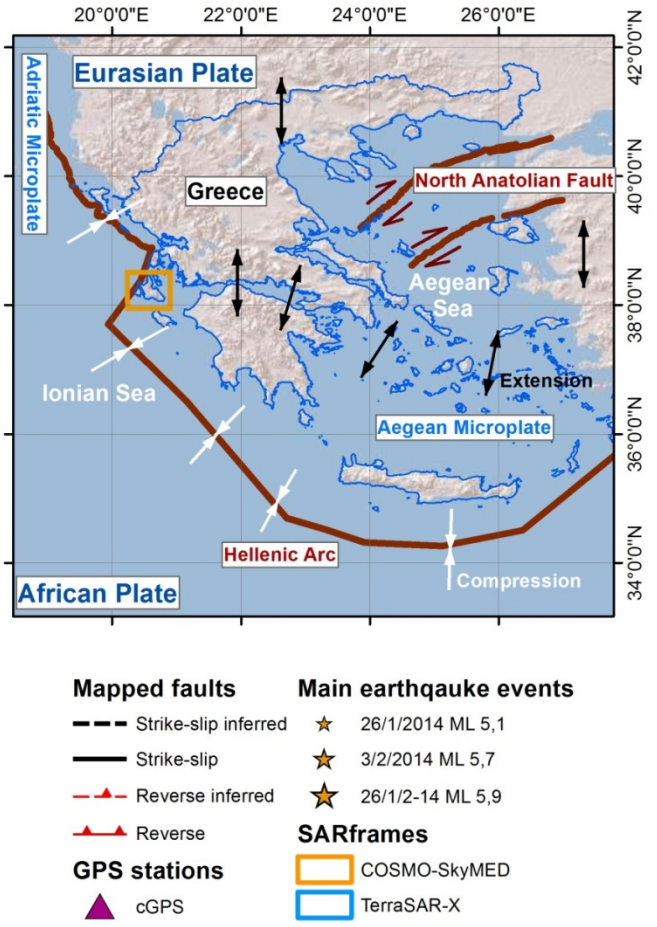
Services

- Geodesy
- Modeling
- Hazard Ass.
- Large Proc.

Applications

- Tectonics
- Volcanoes
- Landslides
- Subsidence

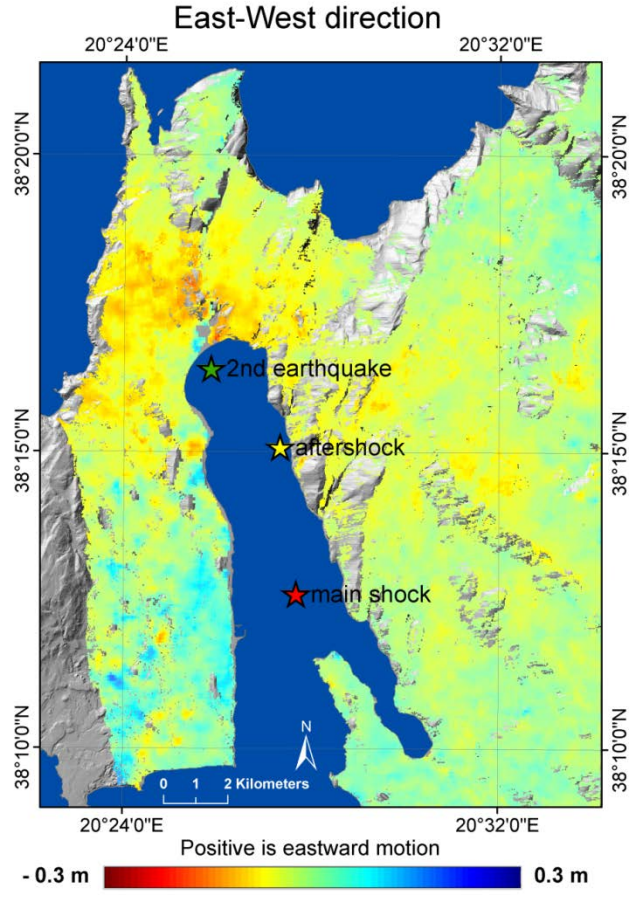


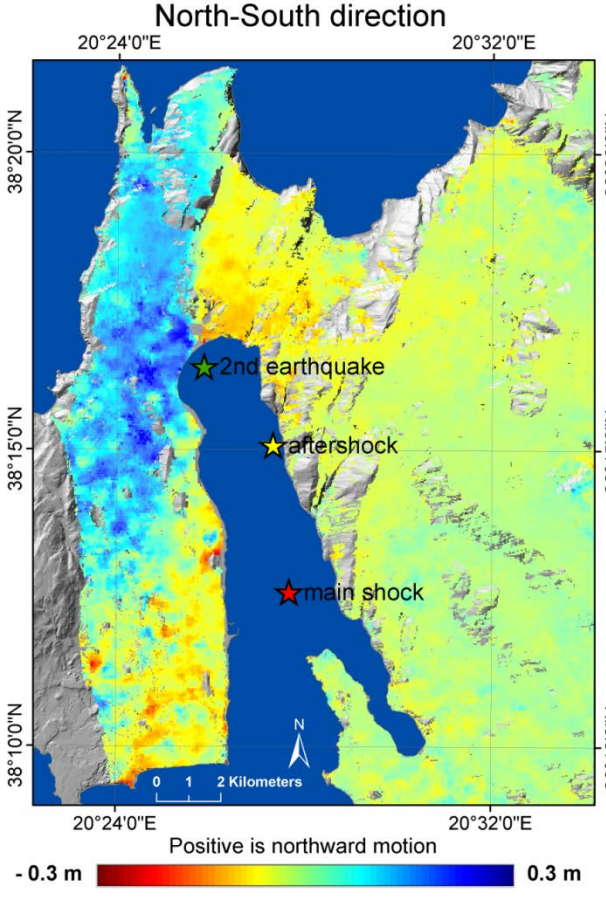


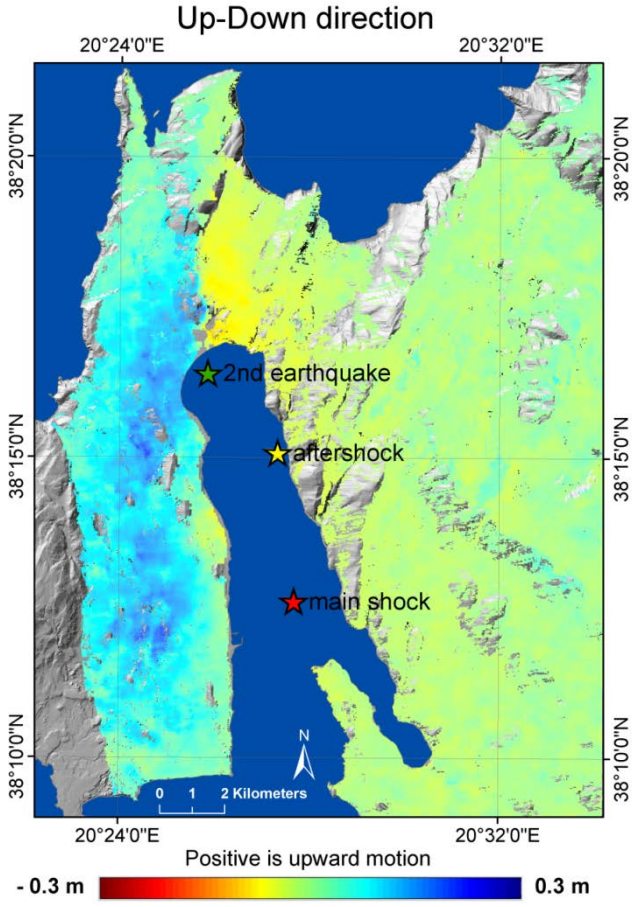
GeoHUB

Earthquake deformation mapping

- 3D crustal deformation from TerraSAR-X & COSMO-SkyMed data
- Inversion to estimate fault parameters





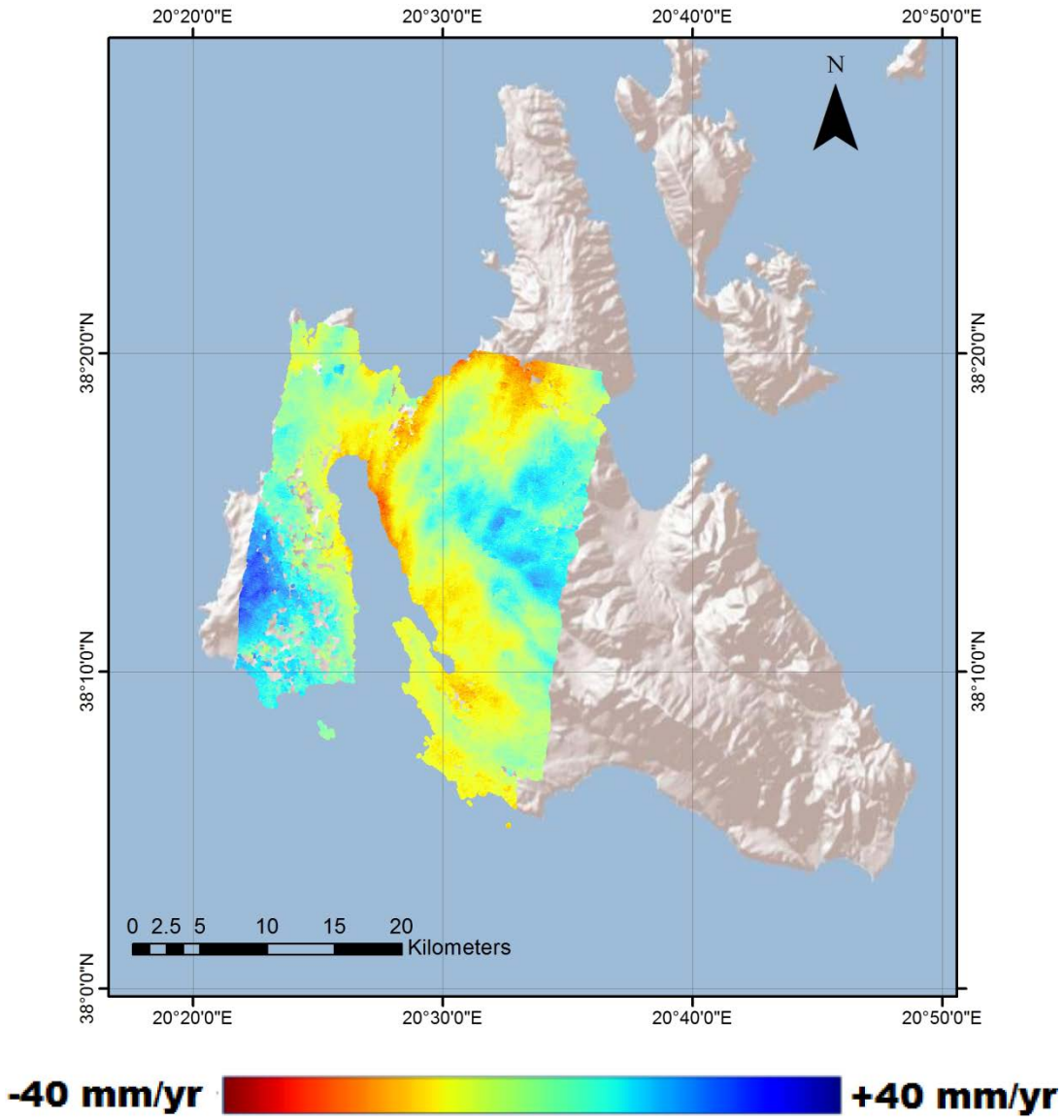


Merryman Boncori et al., SRL 2015

GeoHUB

Post-seismic earthquake monitoring

Post-seismic slip, measured with COSMO-SkyMed data



GeoHUB

Earthquake deformation mapping

Data

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- Volcanoes
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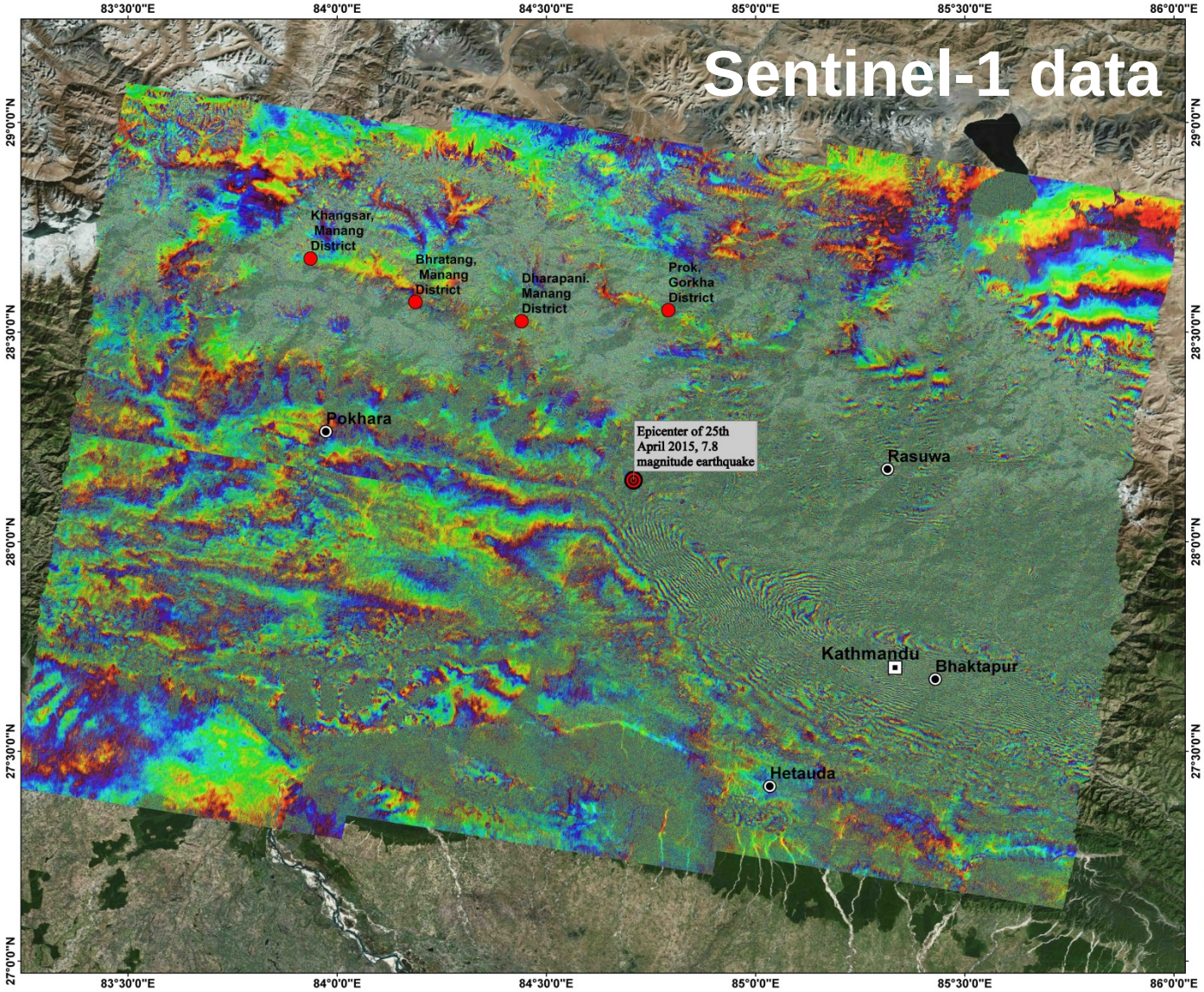
- Subsidence



GeoHUB

Earthquake deformation mapping

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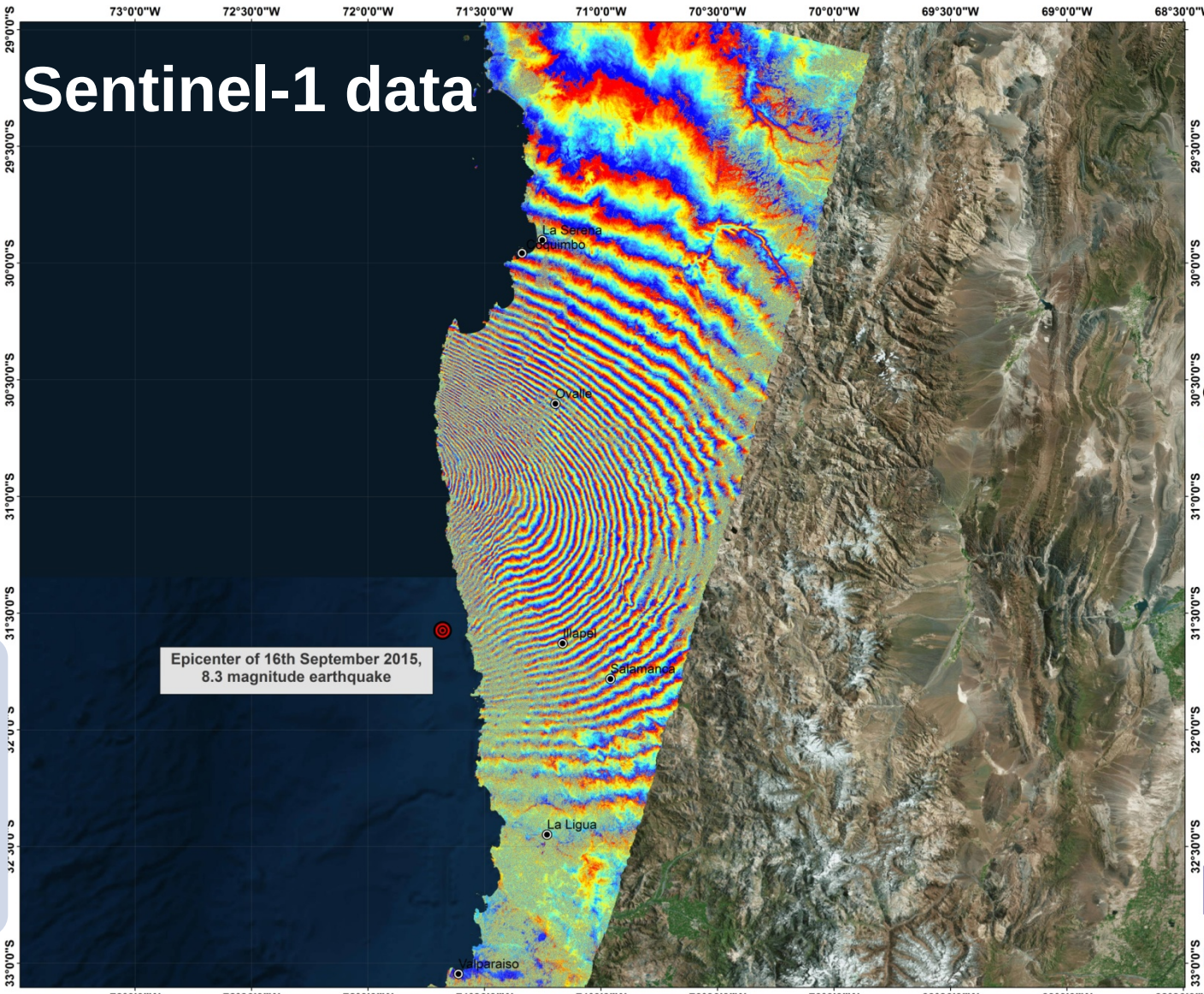

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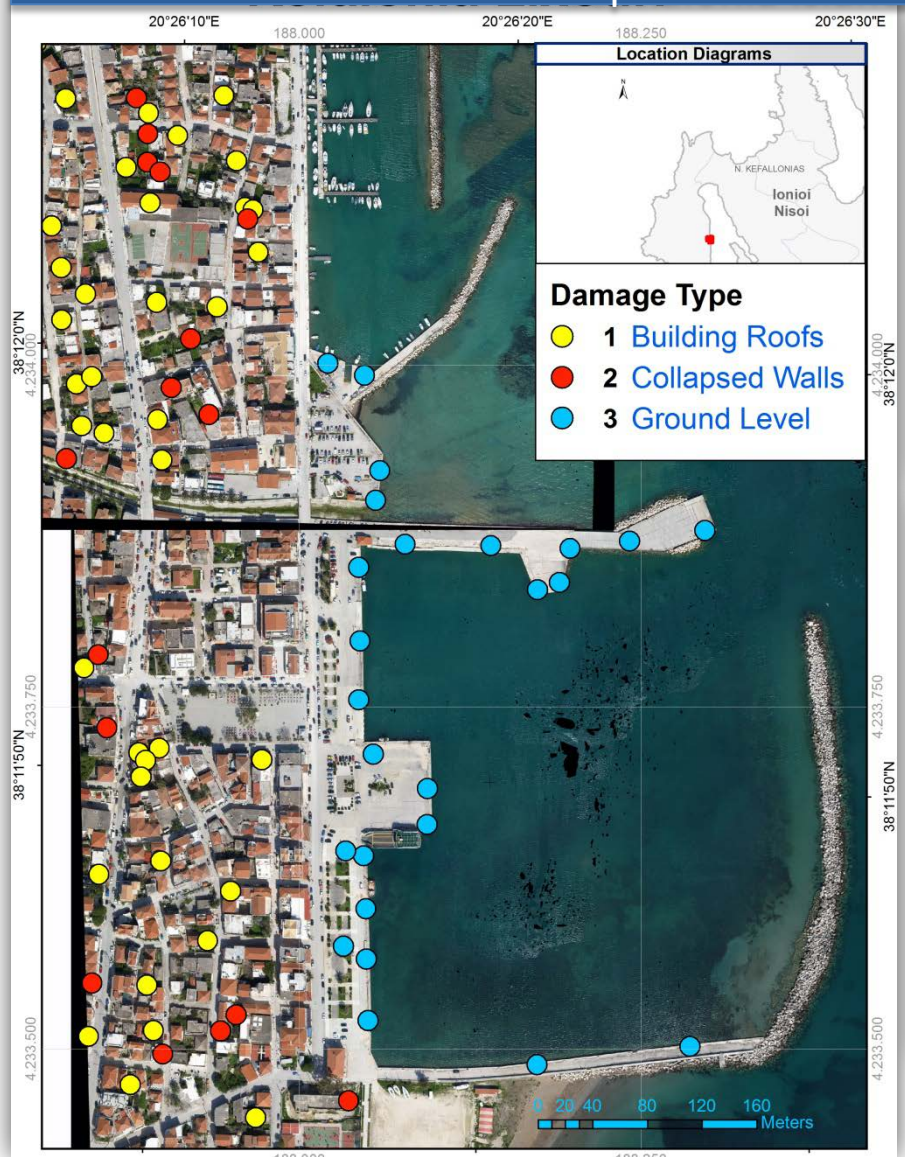
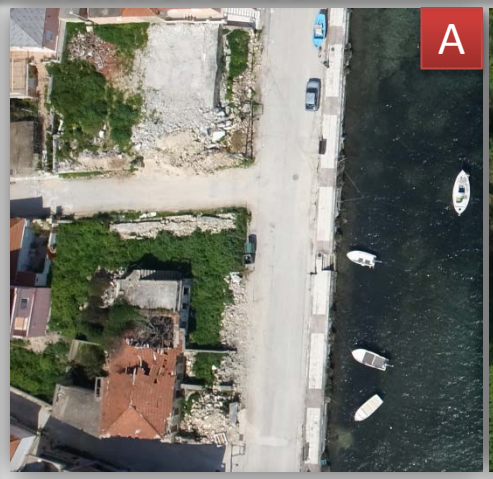
UAV damage assessment

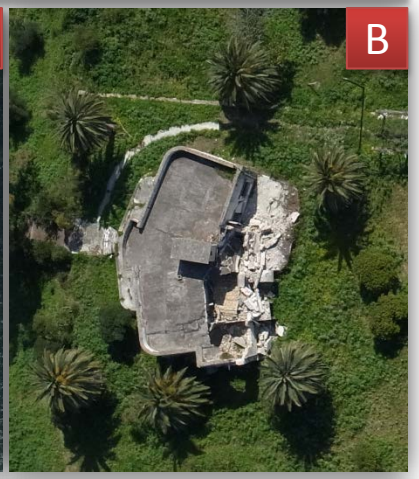
GeoHUB

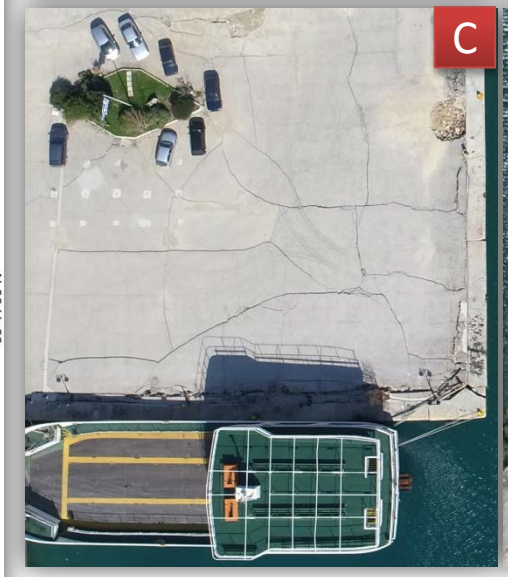
UAV damage assessment

Cephalonia Island – Town of Lixouri









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UAV octocopter

GeoHUB

Monitoring volcanic activity

Data

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- In-situ

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Applications

- Tectonics
- Volcanoes
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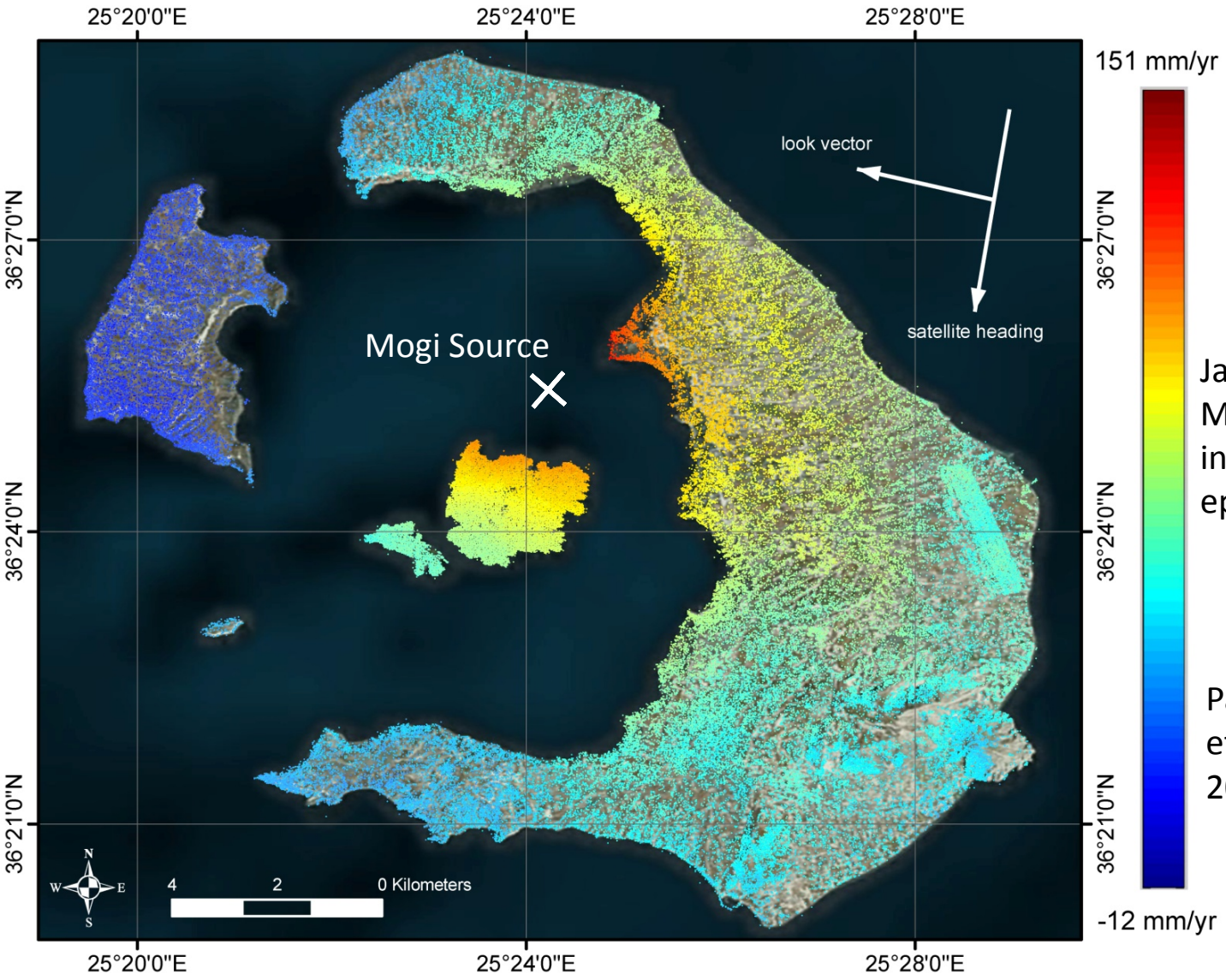
- Subsidence

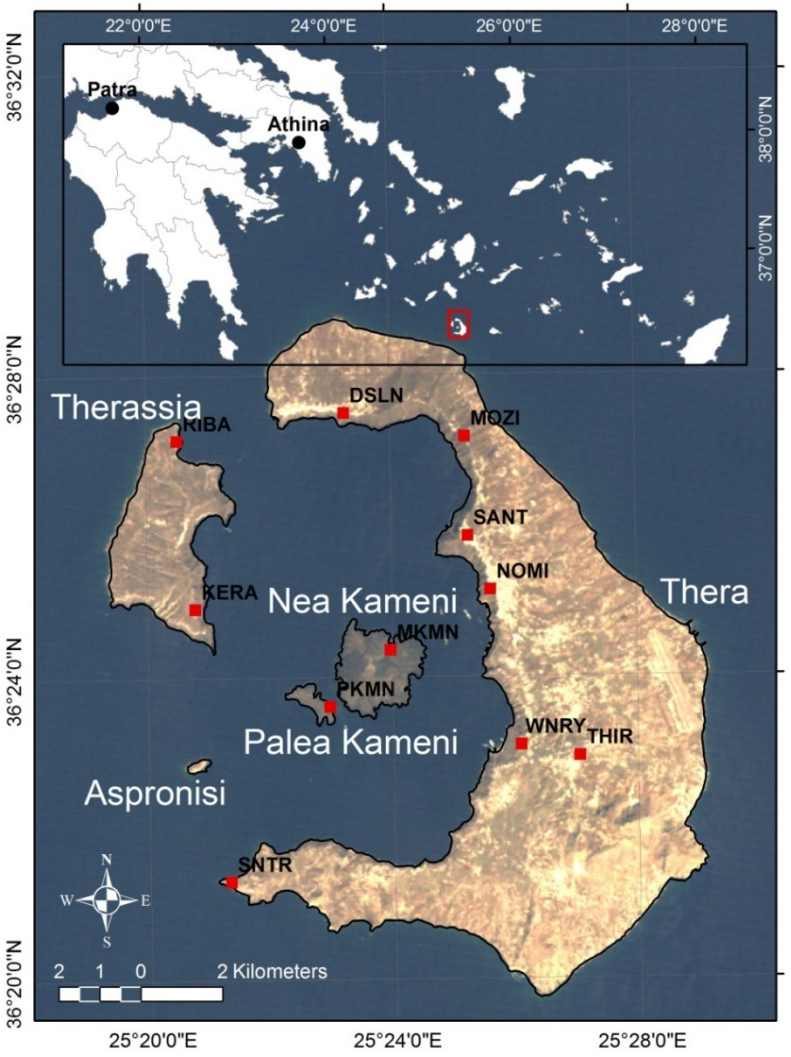


Jan. 2011 – Mar. 2012 inflation episode

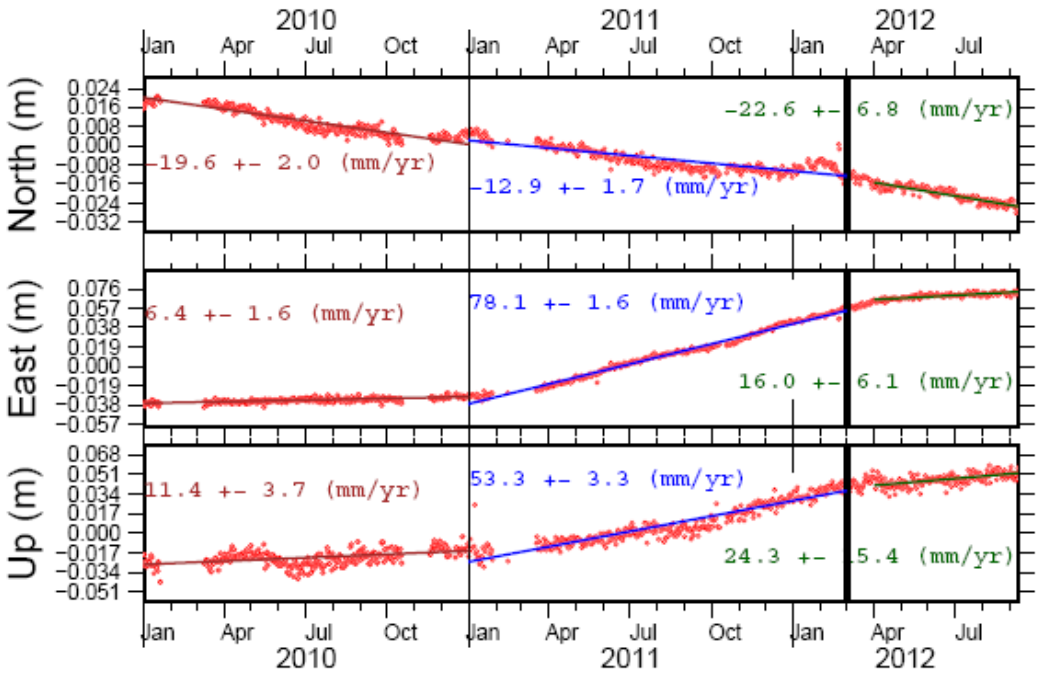
Papoutsis et al., GRL 2013

GeoHUB

Monitoring volcanic activity



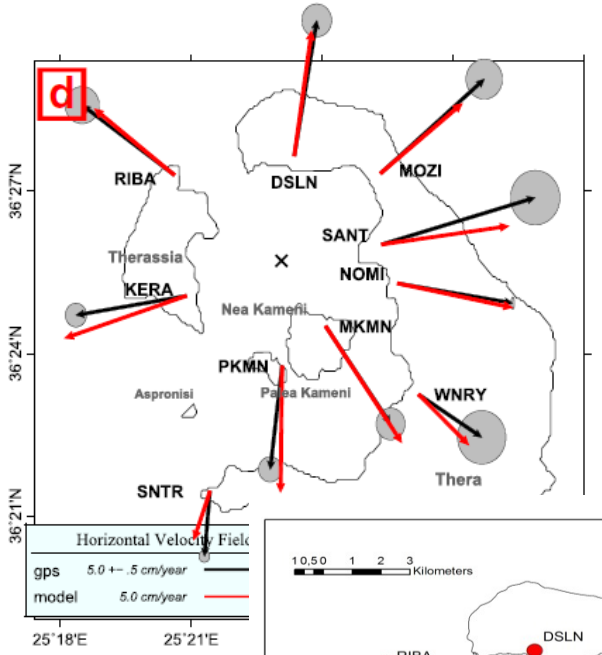
Time-series monitoring with in-situ GPS stations

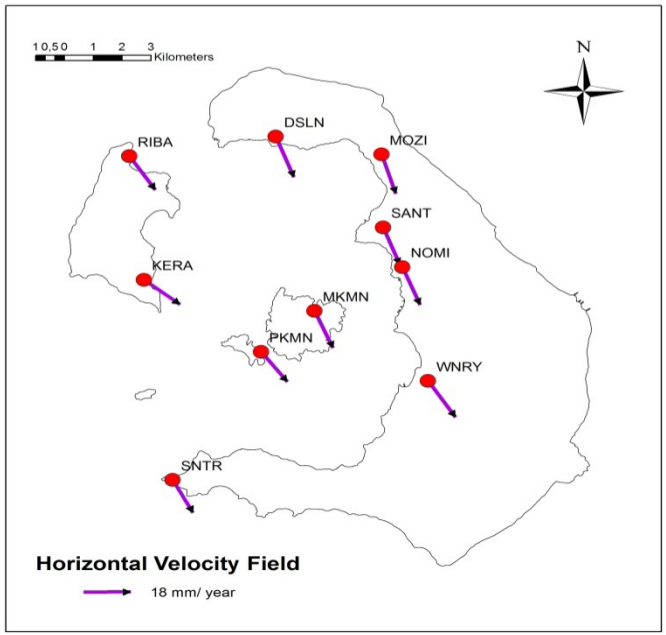


GPS data processing by Dionysos Satellite Observatory

GeoHUB

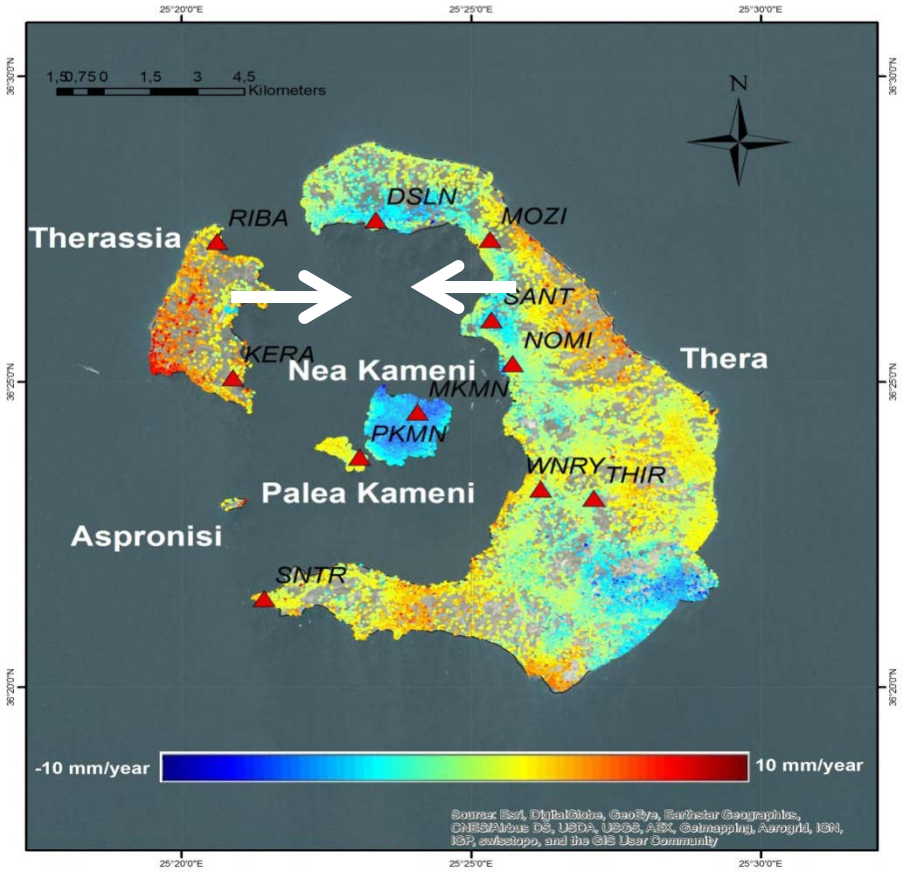
Monitoring volcanic activity





Kaskara et al., LPS 2016

Post-inflation monitoring



GeoHUB

Dispersion of volcanic ash

Data

- NSN
- NOANET
- ENIGMA
- In-situ

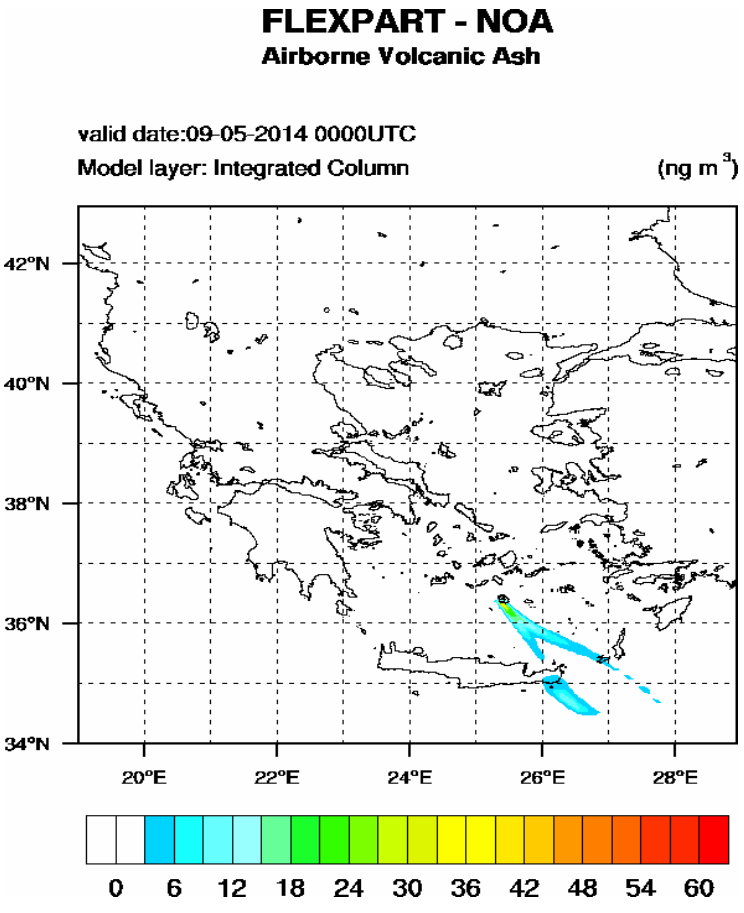
Services

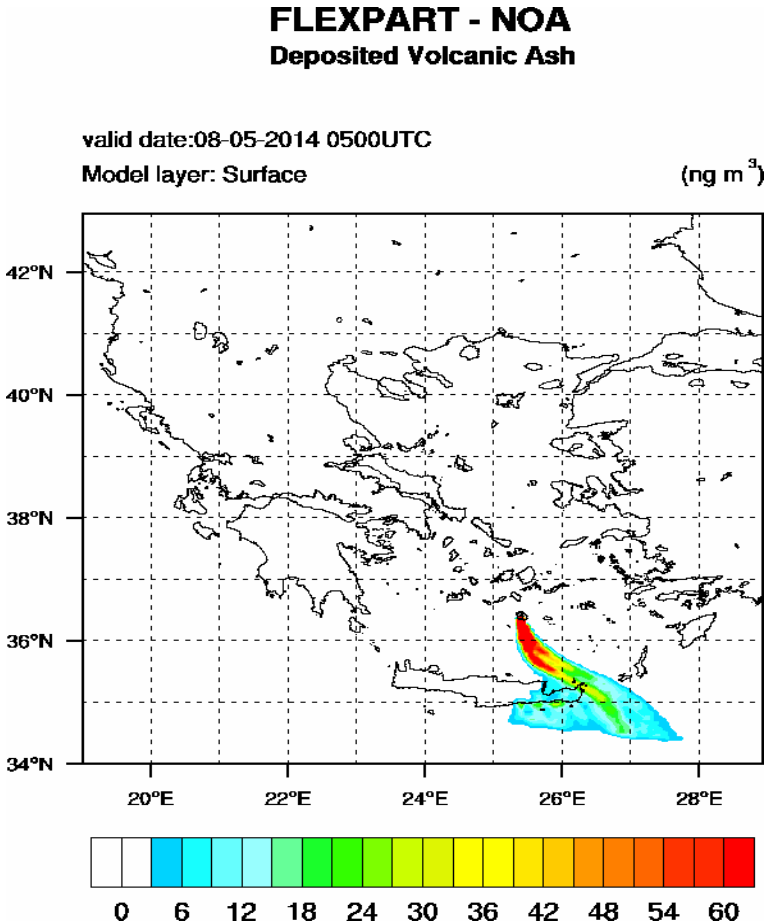
- Geodesy
- Modeling
- Hazard Ass.
- Large Proc.

Applications

- Tectonics
- Volcanoes
- Landslides
- Subsidence

- Early warning system being developed in the framework of BEYOND
- The specific hypothesis assumes 60 hours of continuous emissions at 1.5 km height column





GeoHUB

Urban subsidence & uplift tracking

Data

- NSN
- NOANET
- ENIGMA
- In-situ

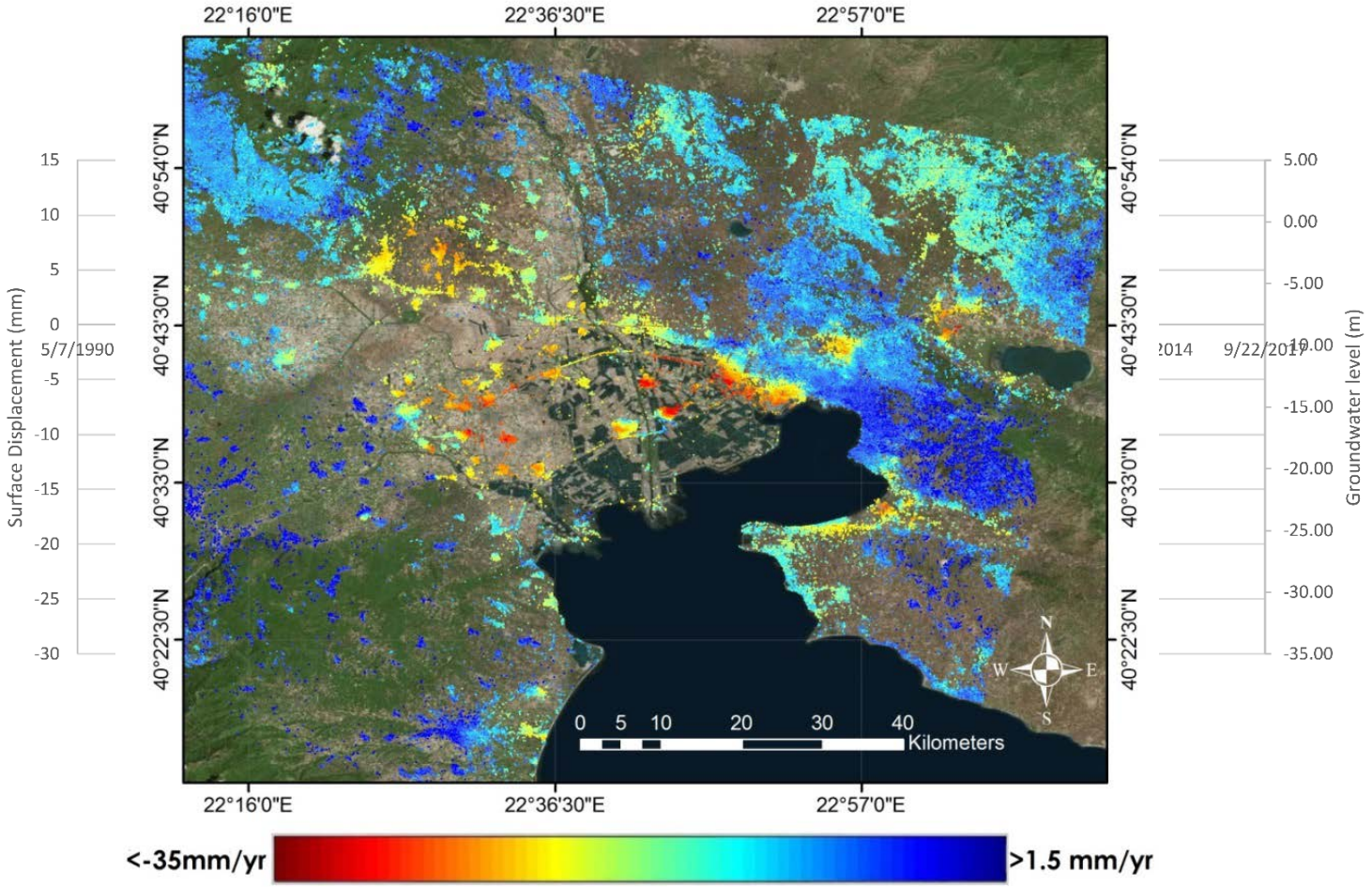
Services

- Geodesy
- Modeling
- Hazard Ass.
- Large Proc.

Applications

- Tectonics
- Volcanoes
- Landslides
- Subsidence

Thessaloniki (1992 - 2001, 2002 - 2010)



Driver: water over-pumping, Svigkas et al., Engineering Geology, Under review

GeoHUB

Seismic risk estimation

Data

- NSN
- NOANET
- ENIGMA
- In-situ

Services

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Applications

- Tectonics
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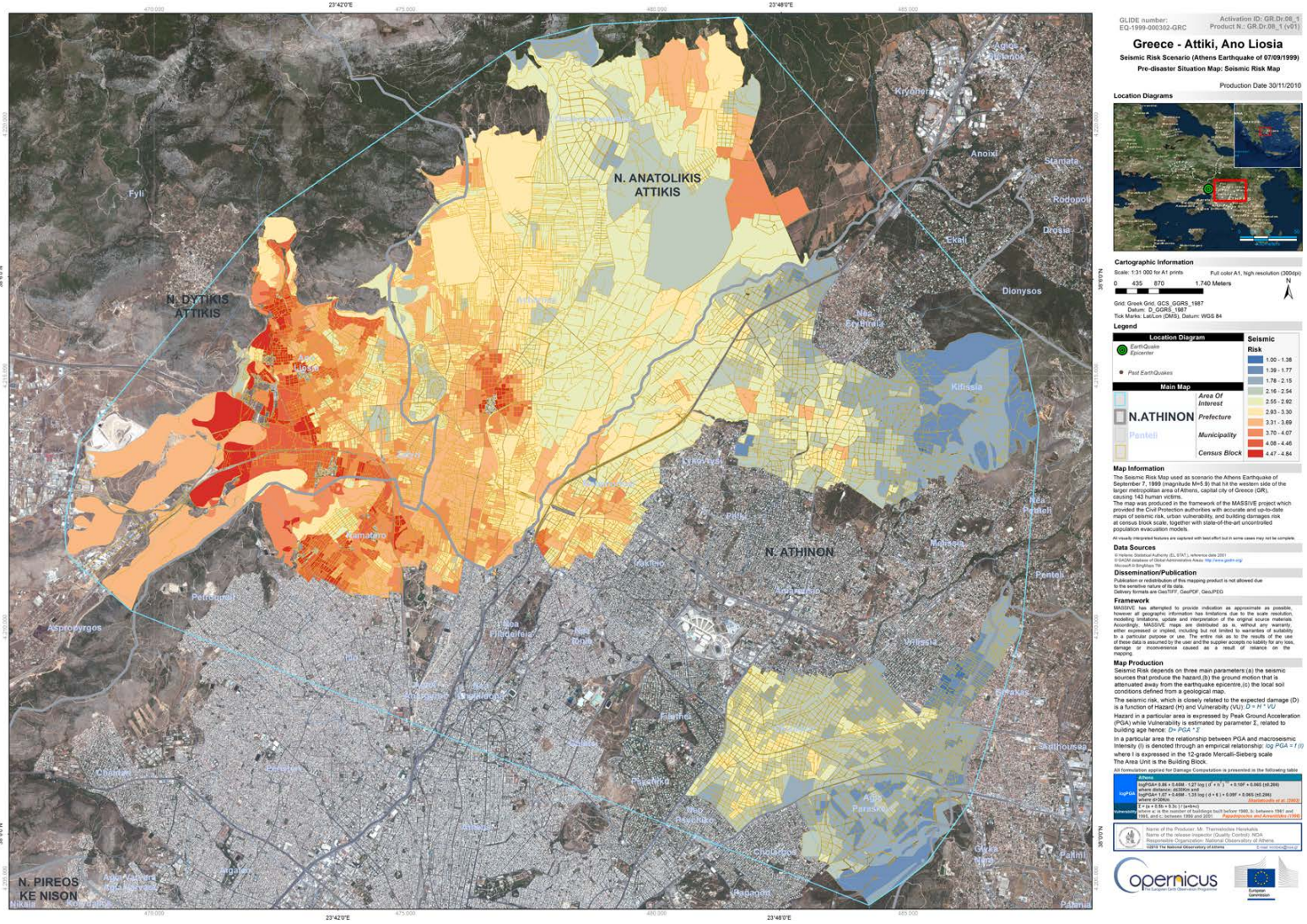

GeoHUB

Large scale ground velocity estimation

Data

- NSN
- NOANET
- ENIGMA
- In-situ

Services

- Geodesy
- Modeling
- Hazard Ass.
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Applications

- Tectonics
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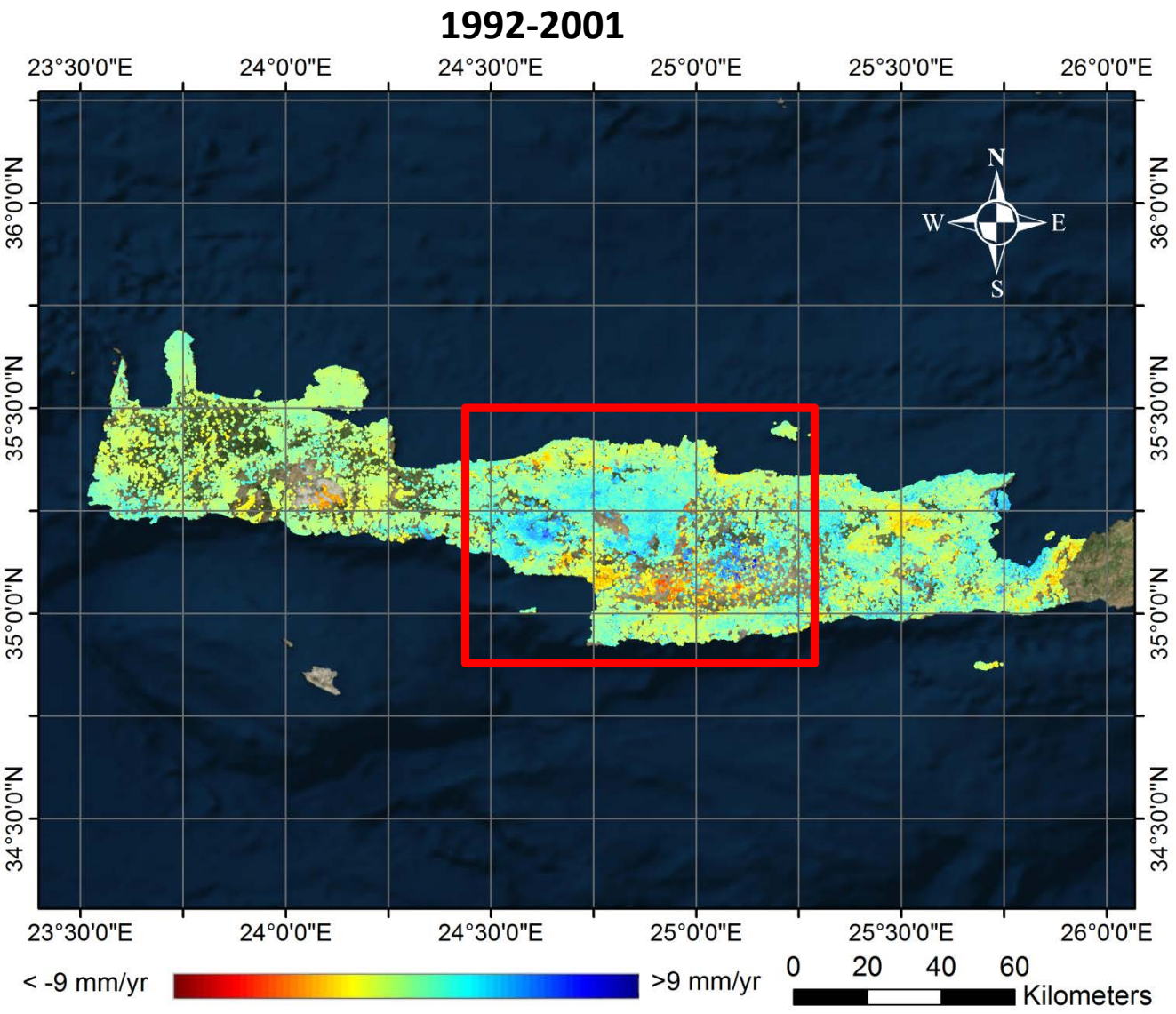

GeoHUB

Regional landslide hazard assessment

BE-OND

Hazard scale characterization of slow-moving landslides

Data
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Applications
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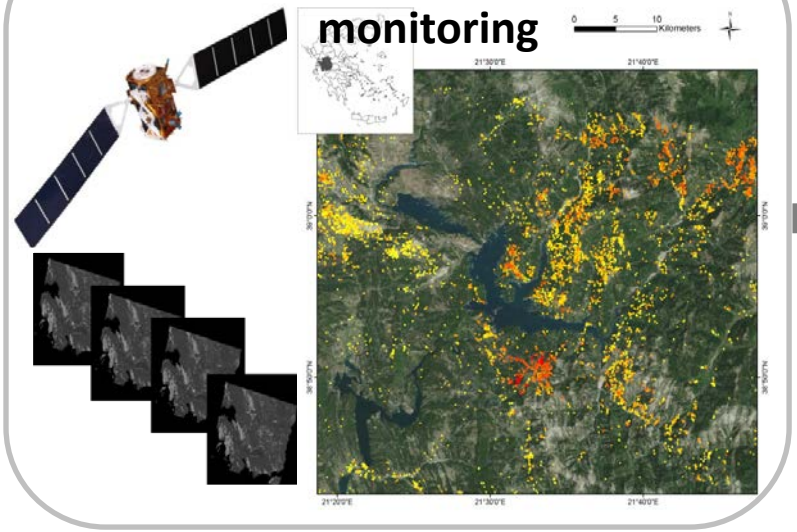
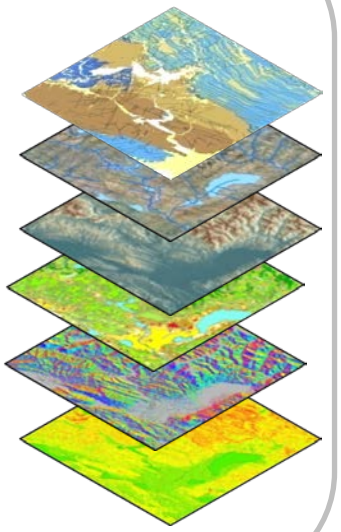
Multi temporal monitoring



Geospatial layers

Elevation
Slope angle
Slope aspect
Geology
Soil properties
LU/LC
Hydrology
Faults
Precipitation



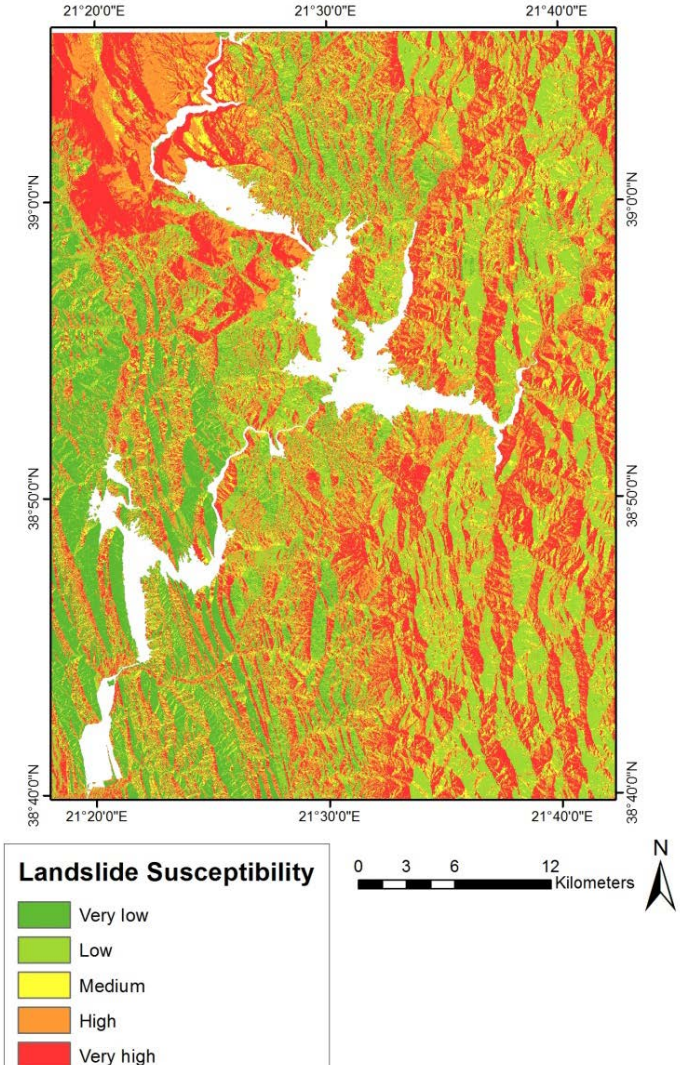
GIS-Statistical processing

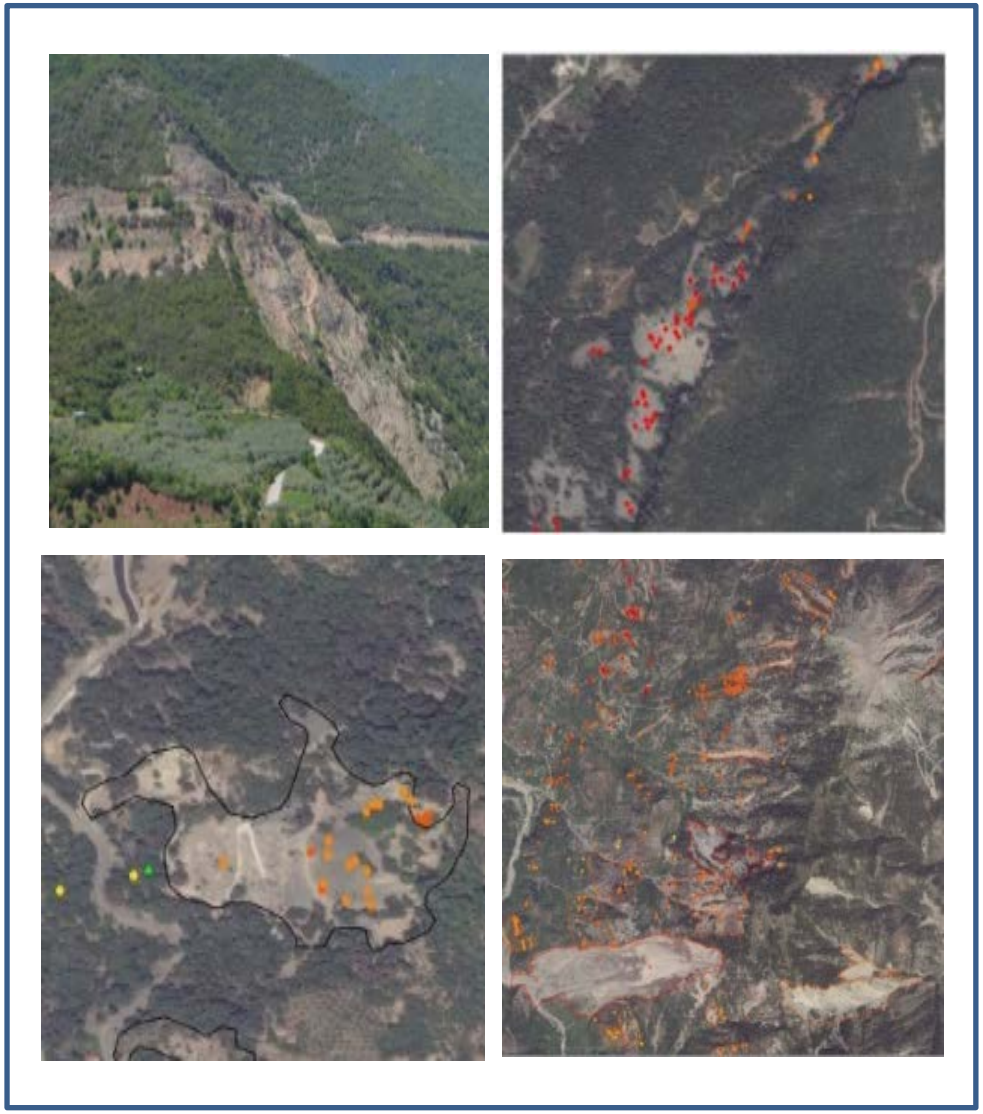
Probability models
- Weights of evidence
- Logistic regression
- Neural networks

GeoHUB

Regional landslide hazard assessment

Landslide Susceptibility map





GeoHUB
Outlook

NOA hosts a Sentinel Collaborative Ground Segment

- Adaptation of existing services, deployment of new services
- Dynamic ingestion of Sentinel data for real-time applications
- Big data management, exploitation of high revisit times
- Databases of geodetic observations

Thank you for your attention!

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