



GOBIERNO DE ESPAÑA

MINISTERIO DE TRANSPORTES Y MOVILIDAD SOSTENIBLE

INSTITUTO GEOGRÁFICO NACIONAL



A RADAR Service for Volcano Alert and Monitoring



Elena González

Instituto Geográfico Nacional



VOLCANOLOGIA



Satellite-based Services for Disaster Risk Management
26th February 2025, World Trade Center, Barcelona

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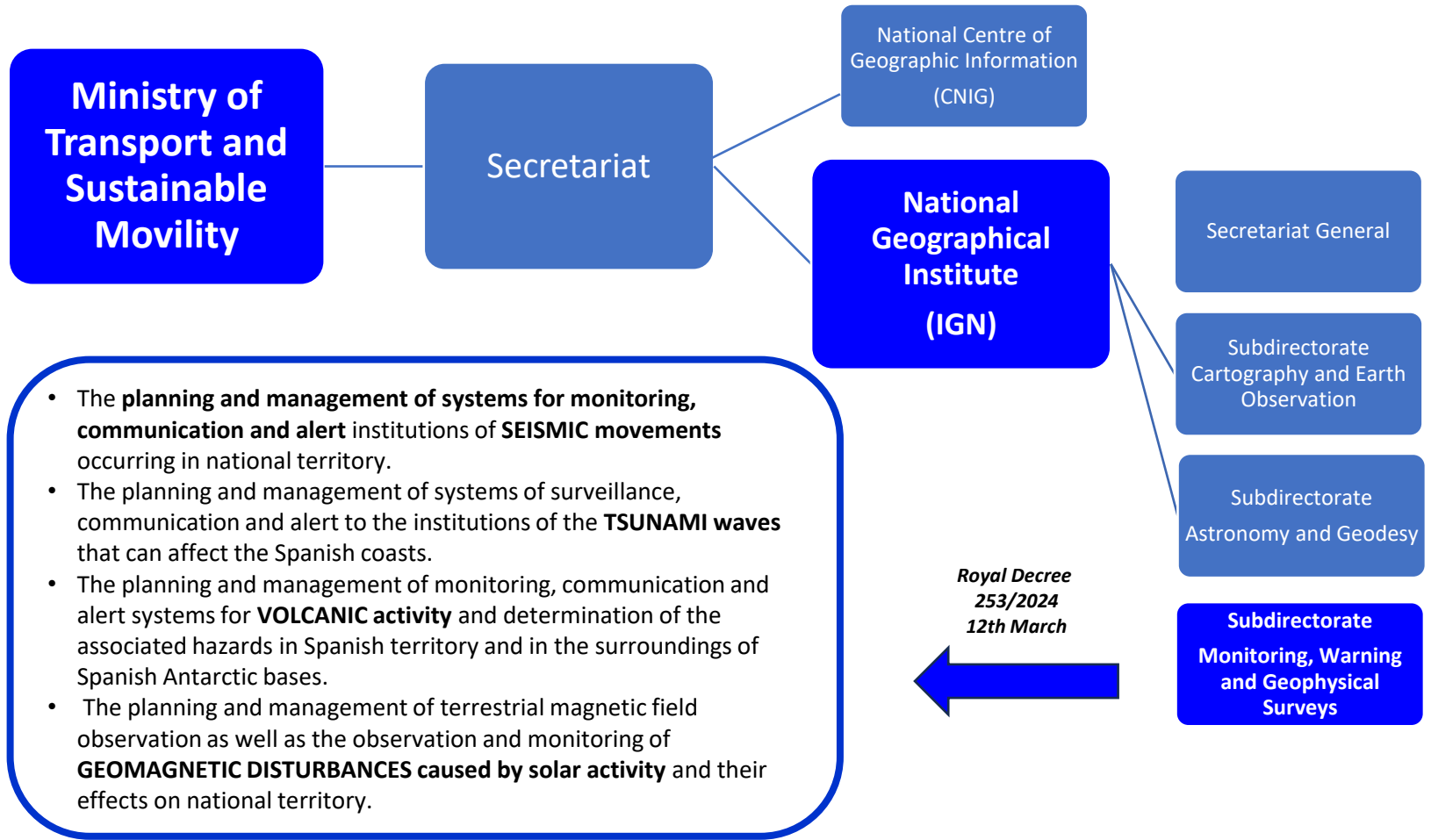
- IGN activities
- Volcanic Monitoring System and Alert
 - InSAR Service
- Satellite-based results during La Palma eruption 2021
- Challenges and opportunities





IGN activities

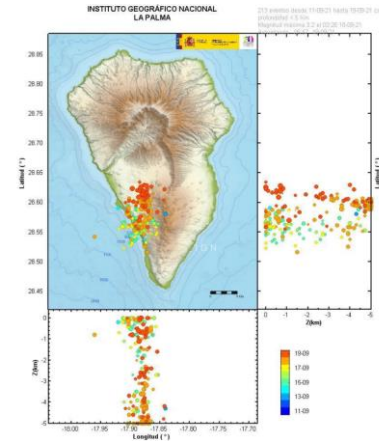
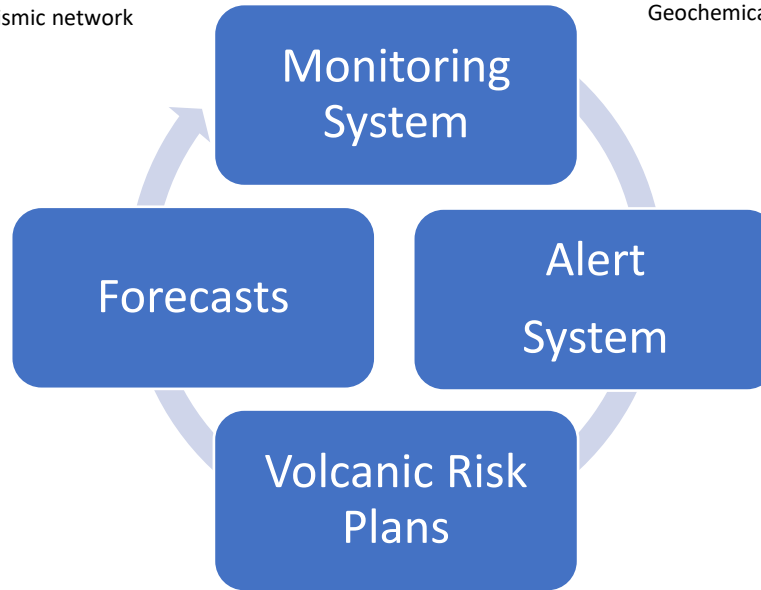
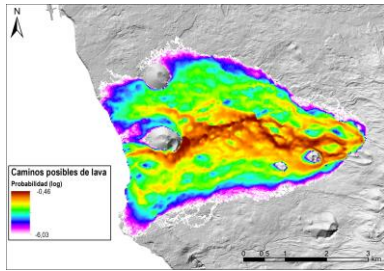
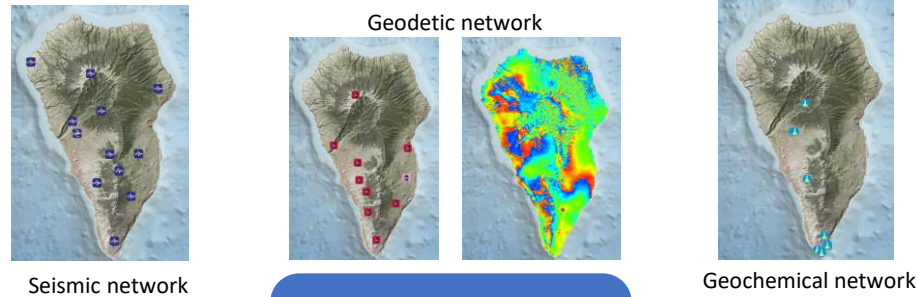
IGN activities



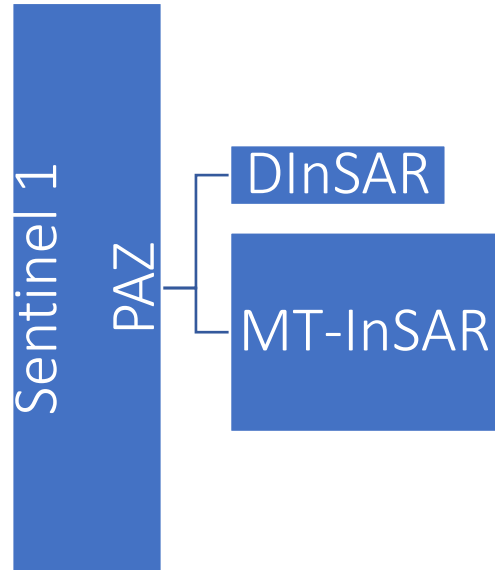


Volcanic Monitoring System and Alert

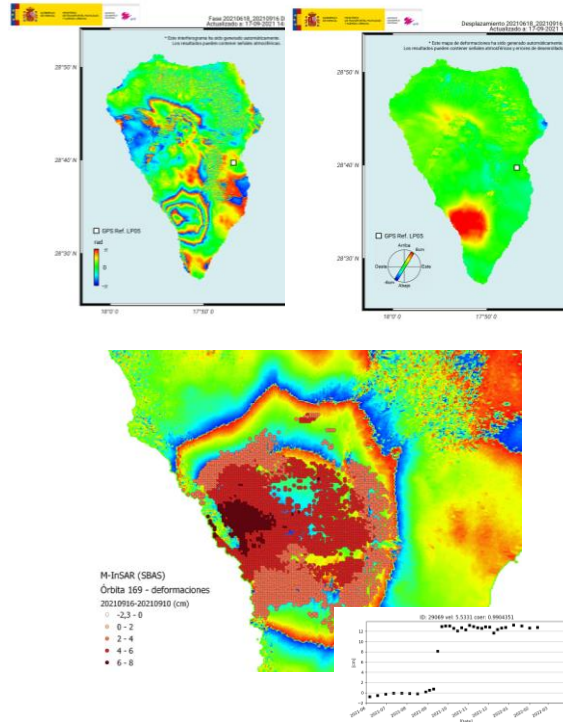
Volcanic Monitoring System and Alert



Volcanic Monitoring System and Alert: InSAR Service



Ground deformation products



Discover and tracking medium to large deformations.
 Fast and up-to-date results
EMERGENCY

Allow detection of slow deformation: precursors of volcanic activity.
PRE-EMERGENCY

RADAR IMAGES

METHODOLOGIES

RESULTS

MAIN USE OF RESULTS



Satellite-based results La Palma eruption 2021



Satellite-based results La Palma 2021: BEFORE THE ERUPTION

MAIN OBJECTIVE: Ensure Sentinel 1 results

DInSAR

- **New deformation maps** every 2 - 4 days
- Publication results **~2 h after image availability** in catalogue.

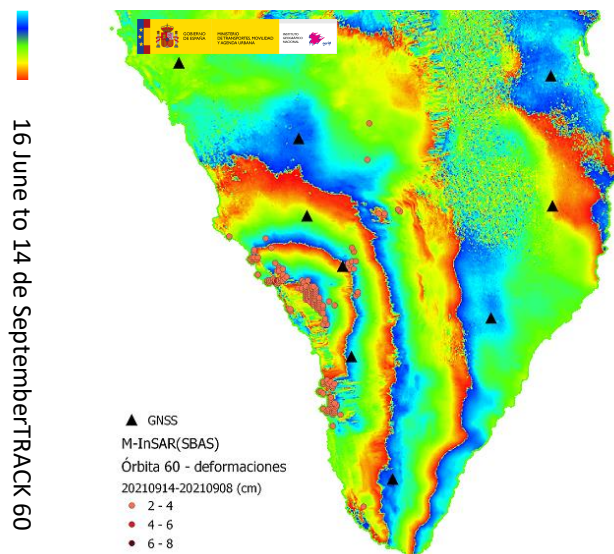
MT-InSAR

- Updated weekly.

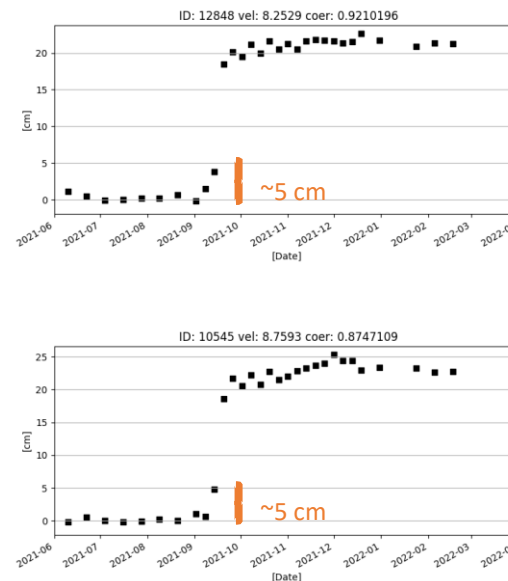


Satellite-based results La Palma 2021: BEFORE THE ERUPTION

DInSAR



MT-InSAR



Satellite-based results La Palma 2021: DURING THE ERUPTION

MAIN OBJECTIVE Increase coverage

External Resources

- Mapping Service - Copernicus Emergency: [EMSR546](#), [EMSN112](#) activations provide products and images: Cosmo SkyMed, TerraSAR-X.
- HISDESAT S.A: supply of PAZ images for the emergency

Internal Resources

- Sentinel 1 image processing, storage, analysis.
- Automatic workflow for CSK, PAZ, TSX processing.

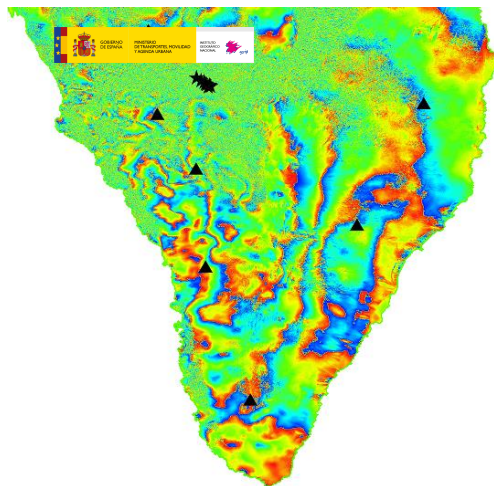


Satellite-based results La Palma 2021: DURING THE ERUPTION

EMSN112

Cosmo-SkyMed (CSK)

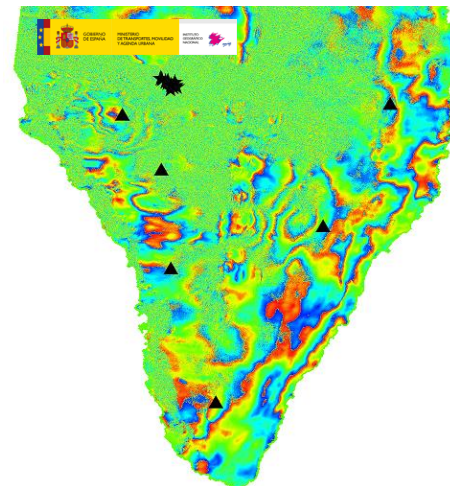
27 October 2021 – 4 November 2021



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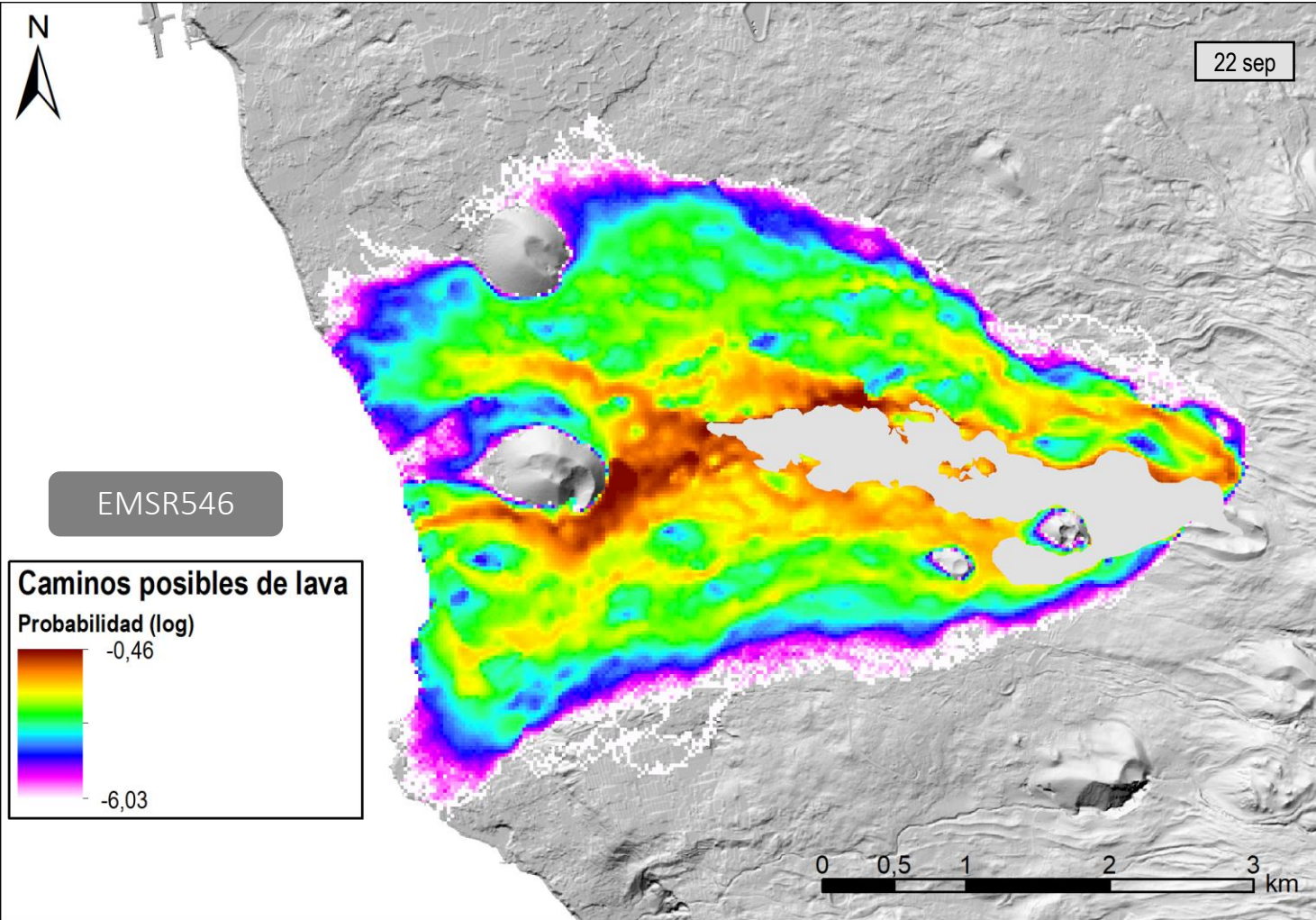
PAZ - TerraSAR-X (TSX)

October 2021, strip 026

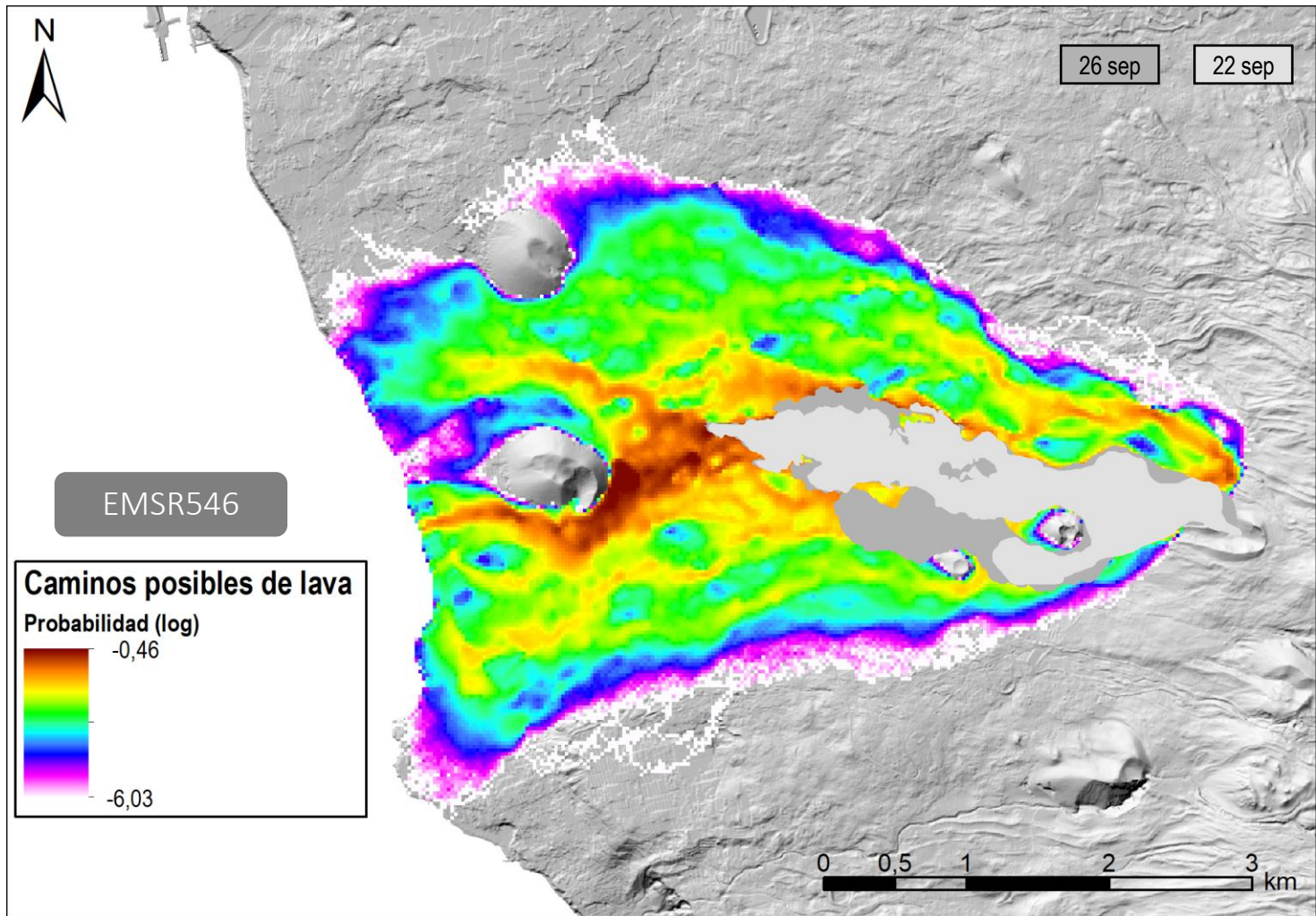


PAZ satellite image © Hisdesat servicios estratégicos S.A. 2021

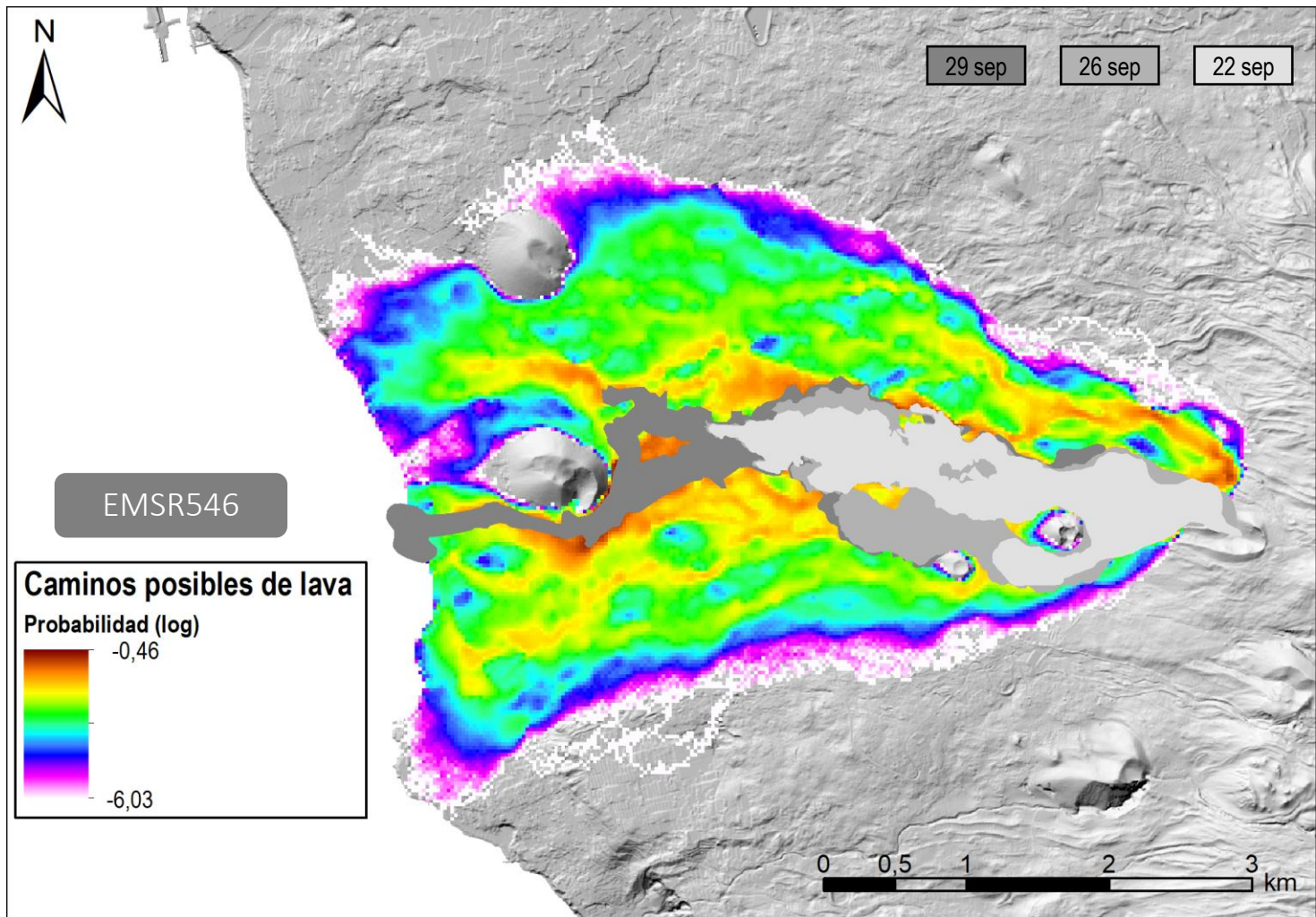
Satellite-based results La Palma 2021: DURING THE ERUPTION



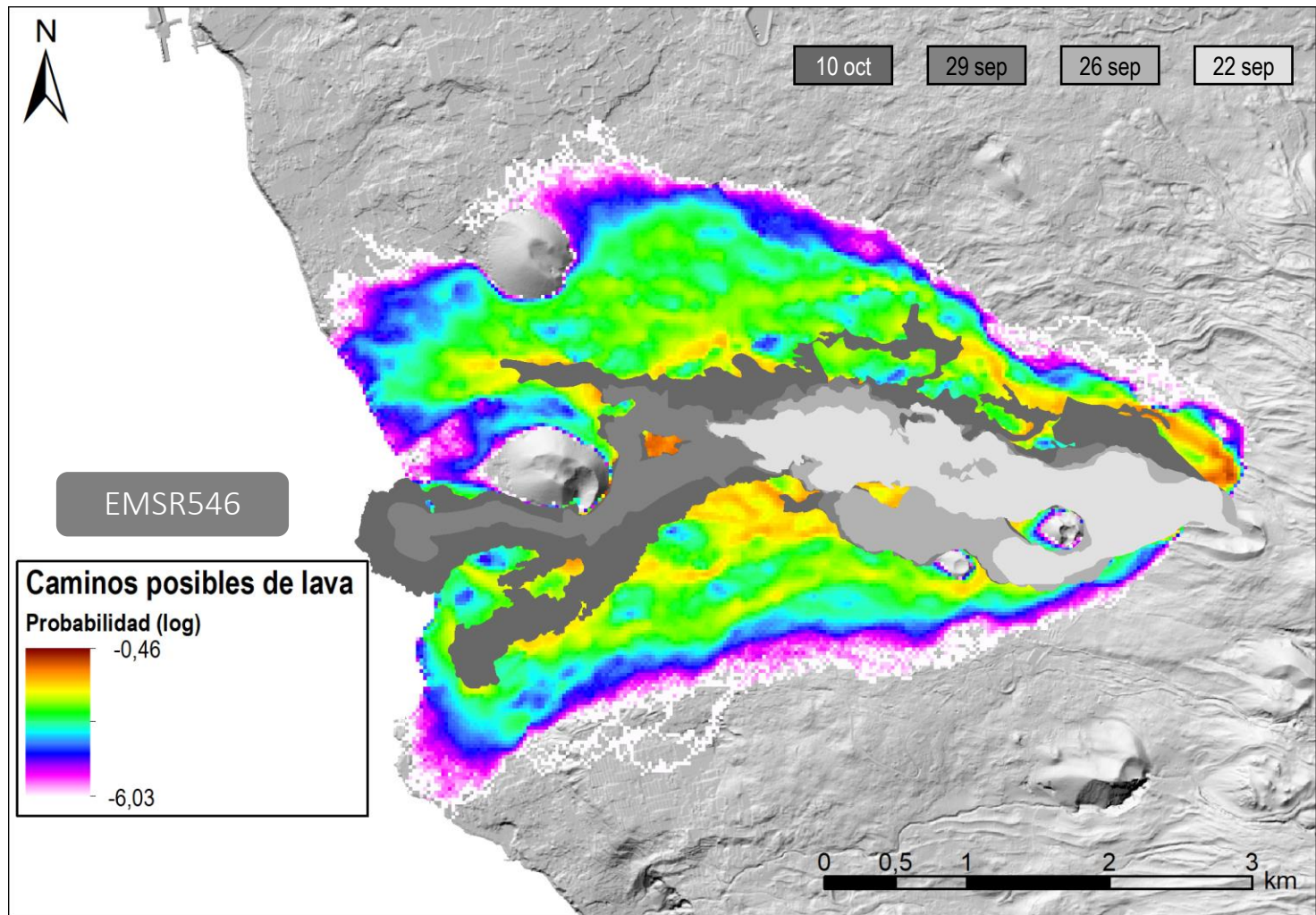
Satellite-based results La Palma 2021: DURING THE ERUPTION



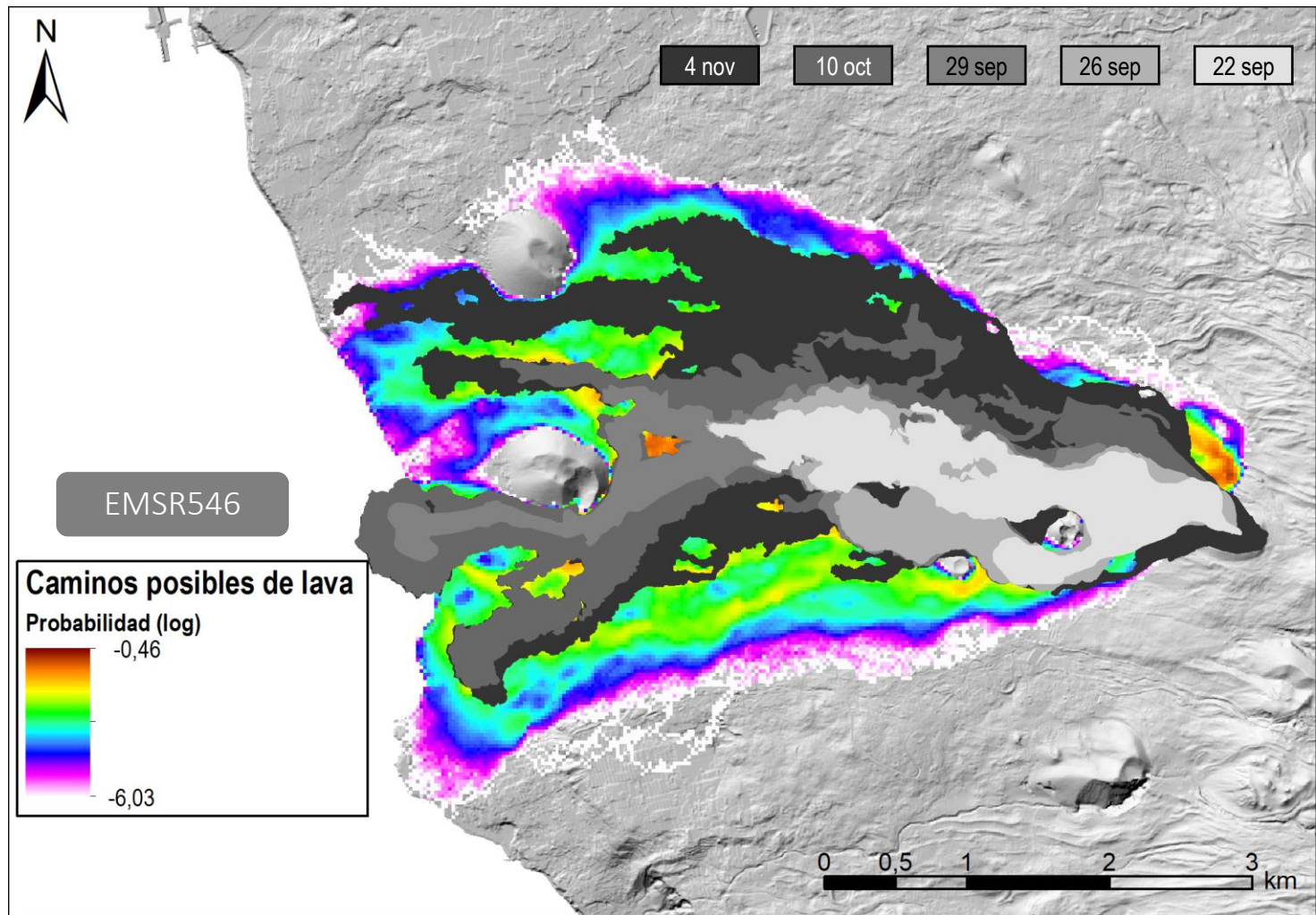
Satellite-based results La Palma 2021: DURING THE ERUPTION



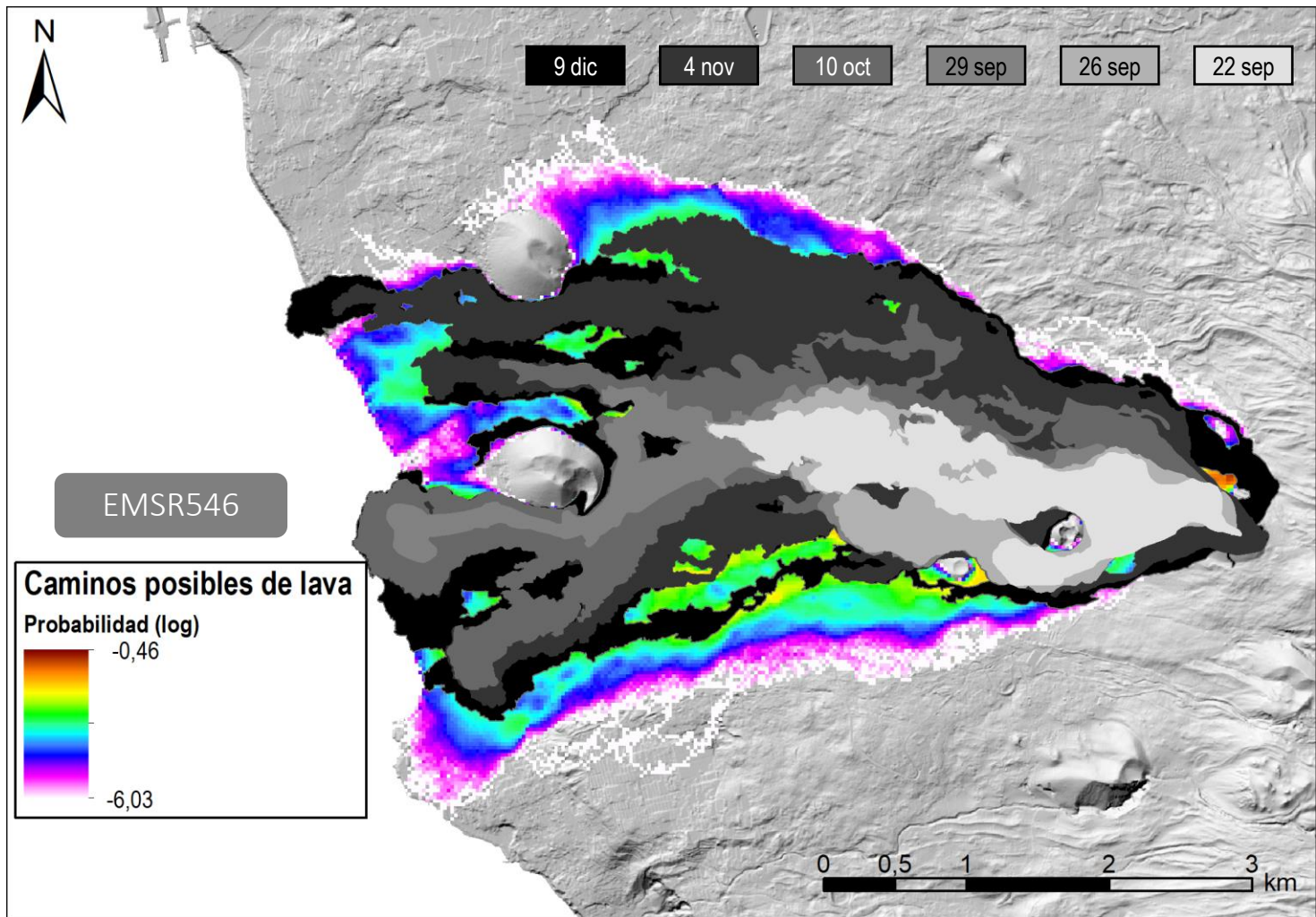
Satellite-based results La Palma 2021: DURING THE ERUPTION



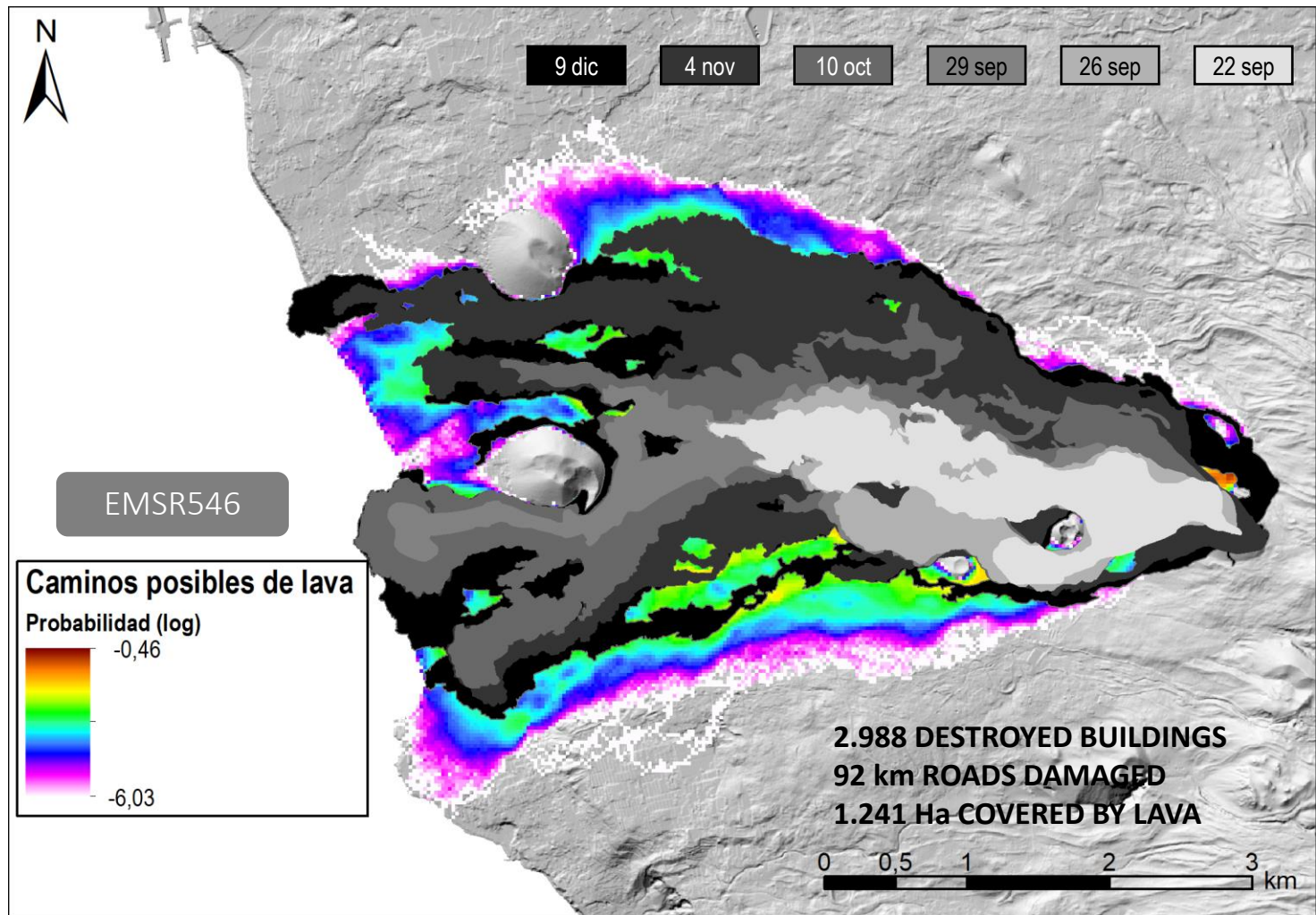
Satellite-based results La Palma 2021: DURING THE ERUPTION



Satellite-based results La Palma 2021: DURING THE ERUPTION



Satellite-based results La Palma 2021: DURING THE ERUPTION



Satellite-based results La Palma 2021: AFTER THE ERUPTION

MAIN OBJECTIVE
Increase coverage
Reprocess, Analysis

External
Resources

- Mapping Service - Copernicus Emergency: [EMSN124](#), [EMSN119](#) activations provide products and images: TerraSAR-X, PAZ.
- HISDESAT S.A: supply of PAZ images

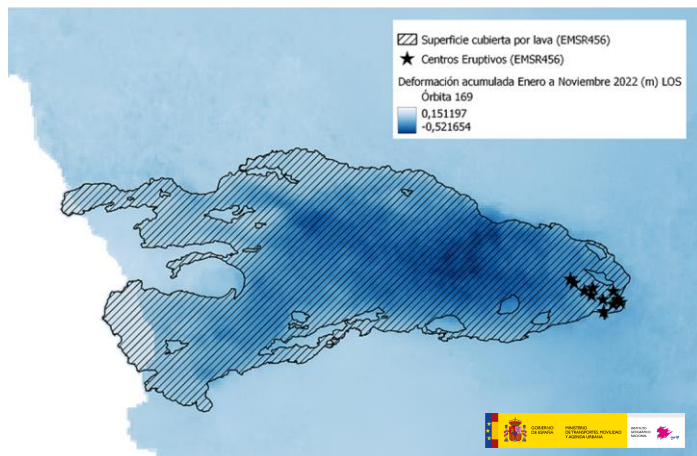
Internal
Resources

- Sentinel 1, PAZ, TSX image processing, storage, analysis.

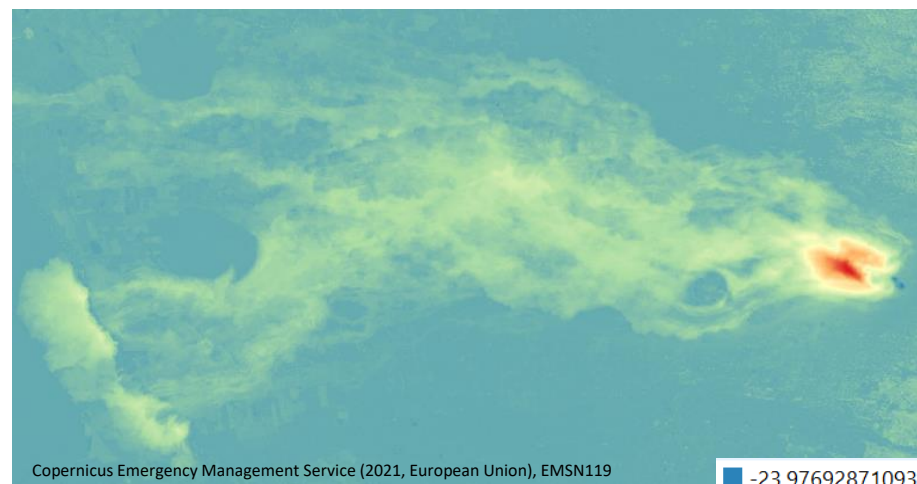


Satellite-based results La Palma 2021: AFTER THE ERUPTION

EMSN119



Deformation due to lava cooling and compaction



Elevation Change



Challenges and opportunities

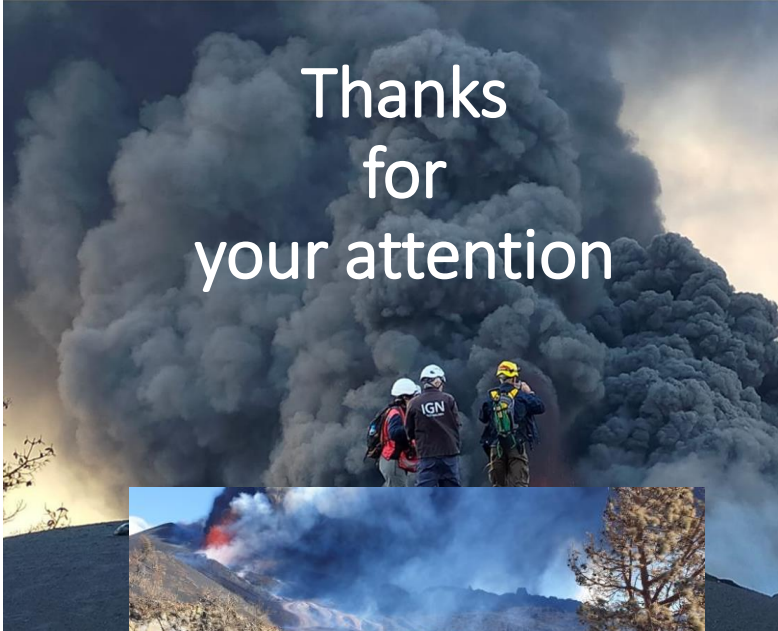


Challenges and Opportunities

- **Increase coverage**
 - By using different sensors
 - Sentinel 1C, 1D, NISAR
 - By increasing acquisition frequency by demand
 - New RADAR commercial missions
- **Rapid image availability**
 - From days to real time
- **Atmospheric effects and ash** can seriously affect InSAR derived products
- **Automated workflows**, tested in advanced!
- **Processing and storage capacities**
- **EMS Copernicus**: quick activation process and results



egalonso@transportes.gob.es



Thanks
for
your attention



Volcanic Monitoring Service

InSAR service

<https://www.ign.es/web/ign/portal/vlc-area-volcanologia>

www.ign.es/web/insar

