



Consiglio Nazionale delle Ricerche



istituto per il rilevamento
elettromagnetico
dell'ambiente



Interferometría Diferencial de Radar de Apertura Sintética -DinSAR-, retos y oportunidades para Guatemala

Istituto per il Rilevamento Elettromagnetico dell'Ambiente,
Consiglio Nazionale delle Ricerche IREA-CNR
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Contenido

- Radar de Apertura Sintética
- Interferometria Diferencial de Radar de Apertura Sintética (DInSAR)
- Técnicas avanzadas de DInSAR (SBAS)
- Plataformas de explotación (ESA G-POD y GEP).
- Retos y Experiencias para Guatemala.

Teledetección (Remote Sensing)

PASSIVE SYSTEMS



ACTIVE SYSTEMS



Capacidad de “Observar” incluso en presencia de nubes

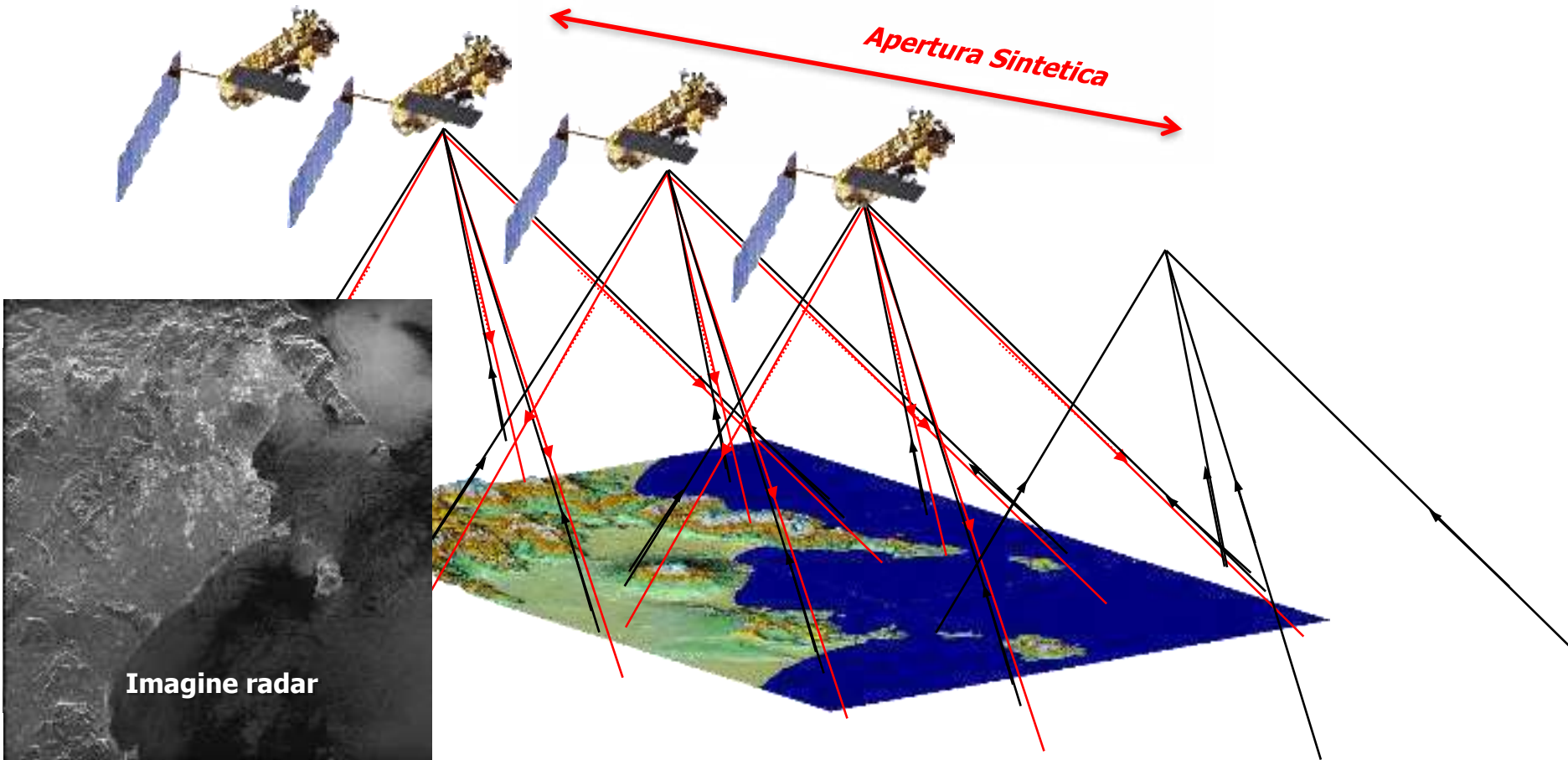


Imagen óptica



Imagen Radar SIR-C/X-SAR

Radar de Apertura Sintética



Kilauea caldera, Hawaii



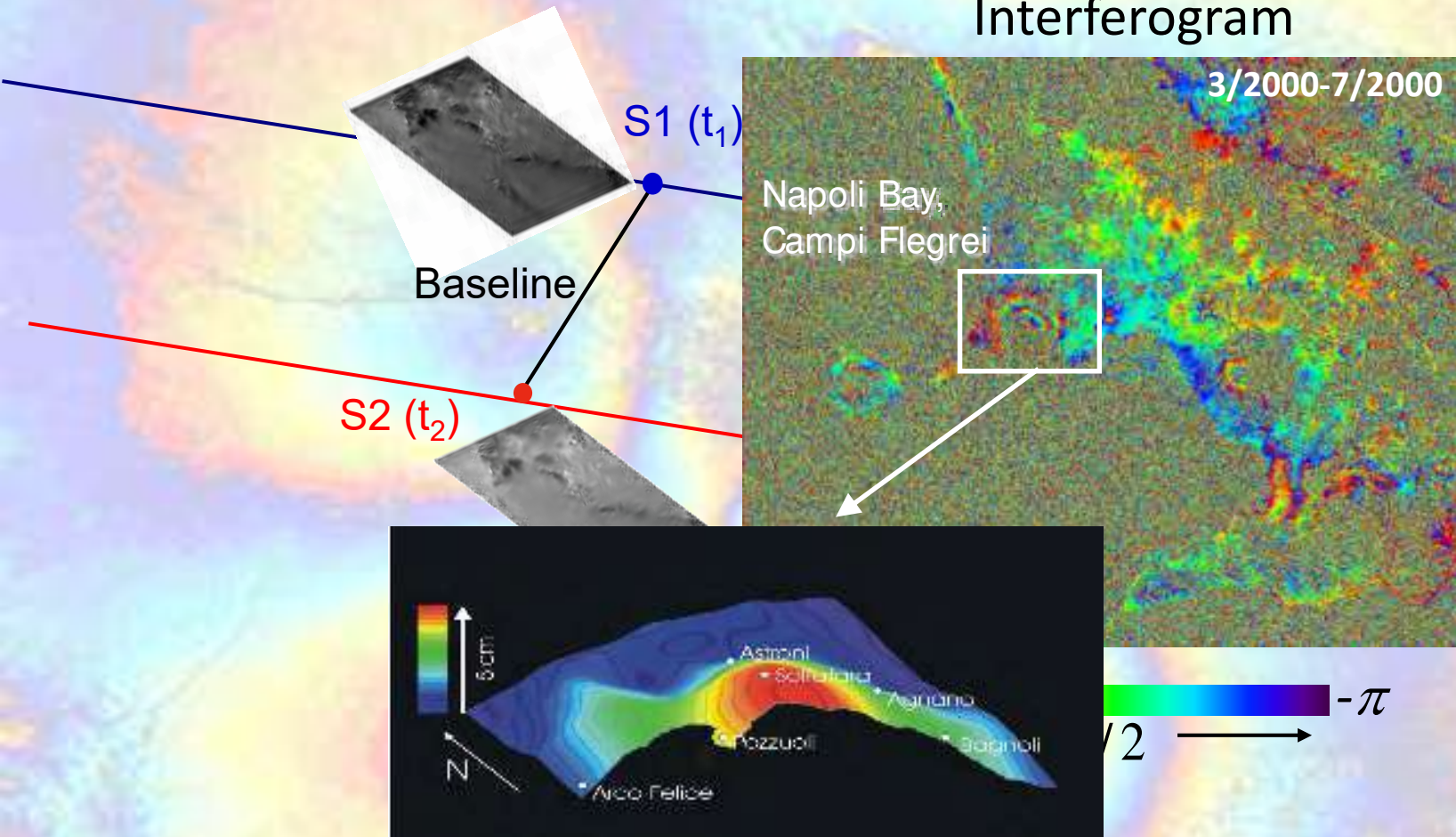
Flight direction
Look direction

Retrodispersión
oscura y / o
sombreado

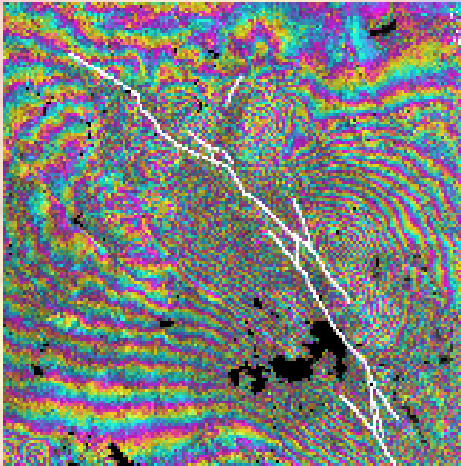
Las pendientes orientadas
hacia el satélite tienen una
retrodispersión brillante

Escenario DInSAR

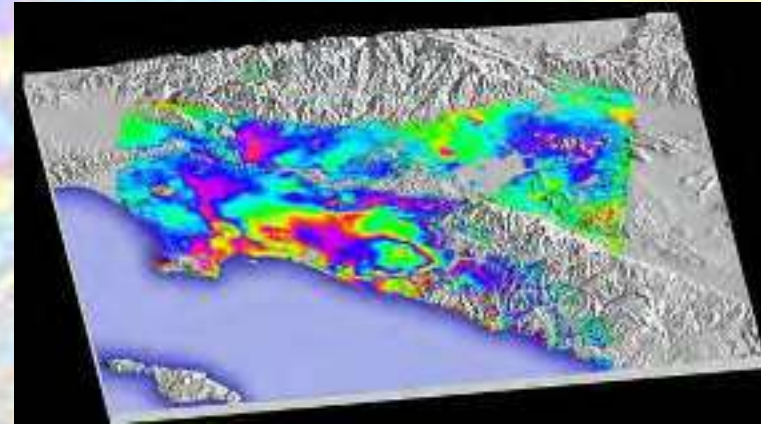
Interferogram



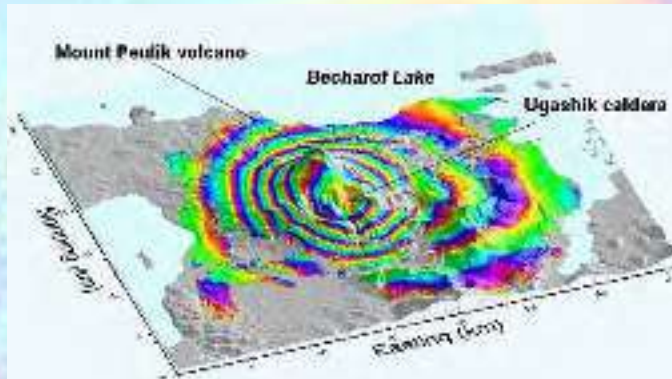
Principales Aplicaciones



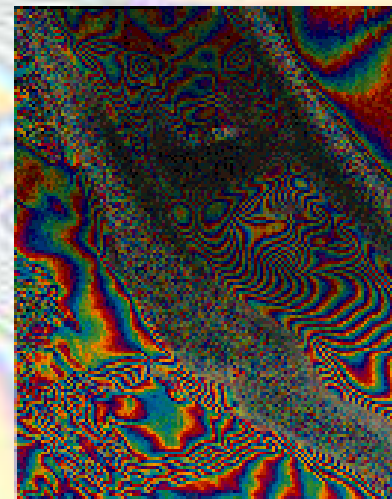
Earthquake deformation



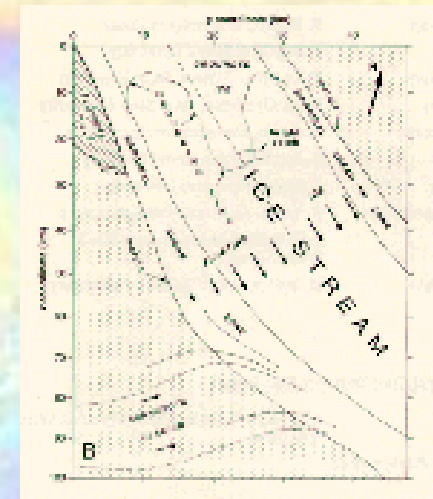
Land subsidence



Volcano inflation

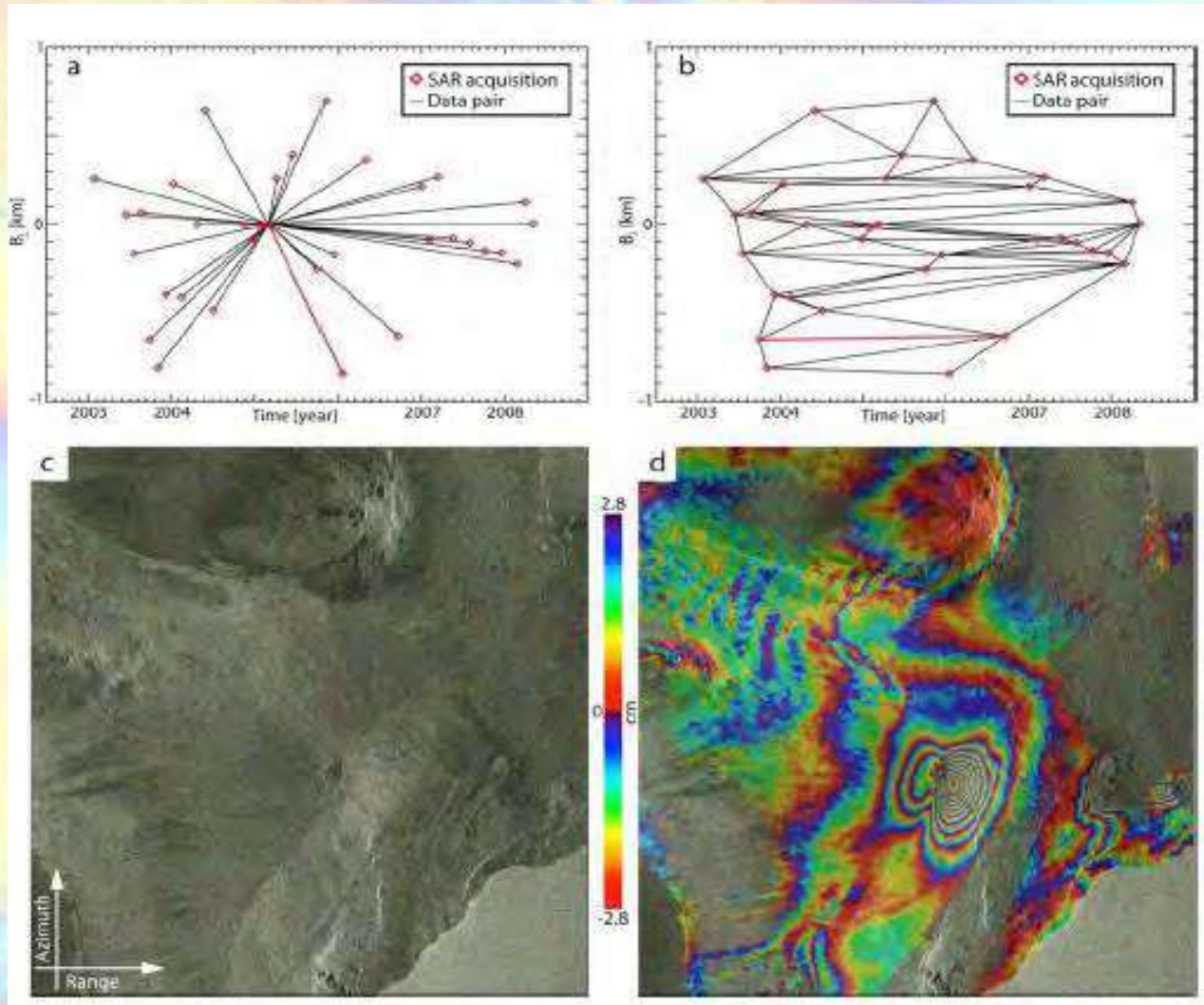


Glacial movement



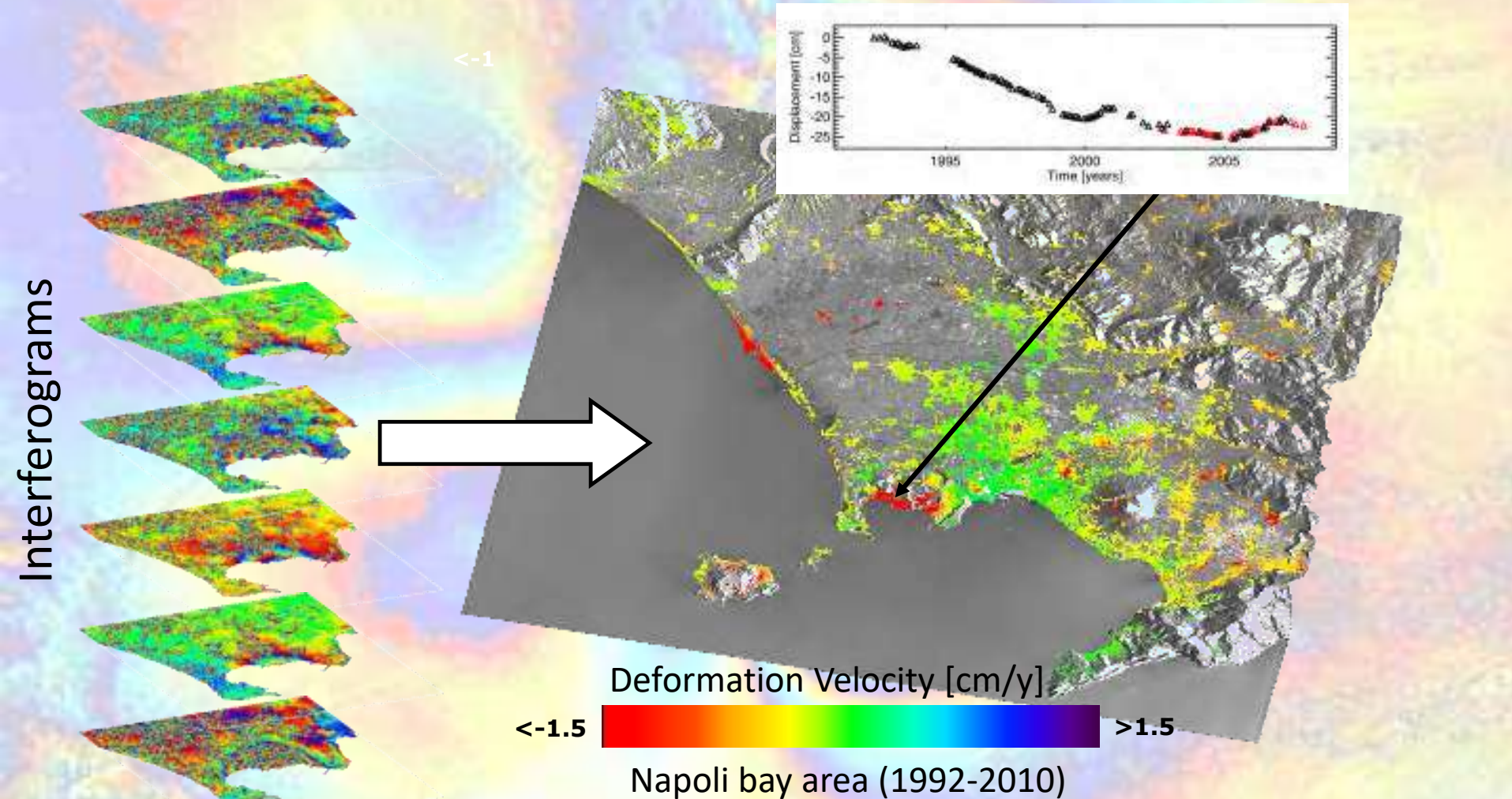
Técnicas Avanzadas de DInSAR

Persistent Scatter (PS) y Small Base Line (SBAS)



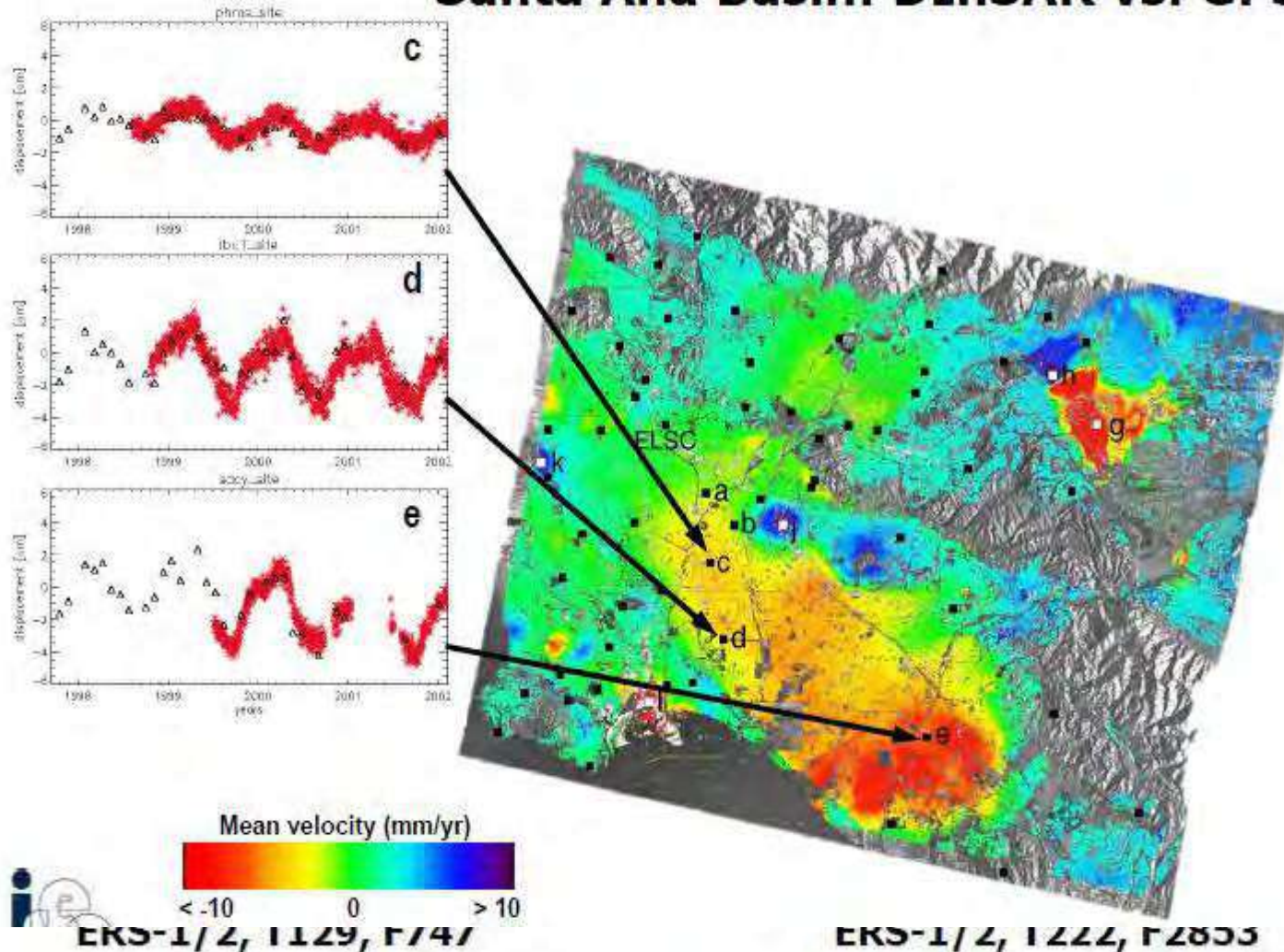
The SBAS algorithm

Exploiting the existing SAR huge data archives, we can move **from** the analysis of **single** deformation **events** **to** the generation of **time-series**.



Algunos ejemplos de análisis de deformación

Santa Ana Basin: DInSAR vs. GPS



Pasado, presente y futuro

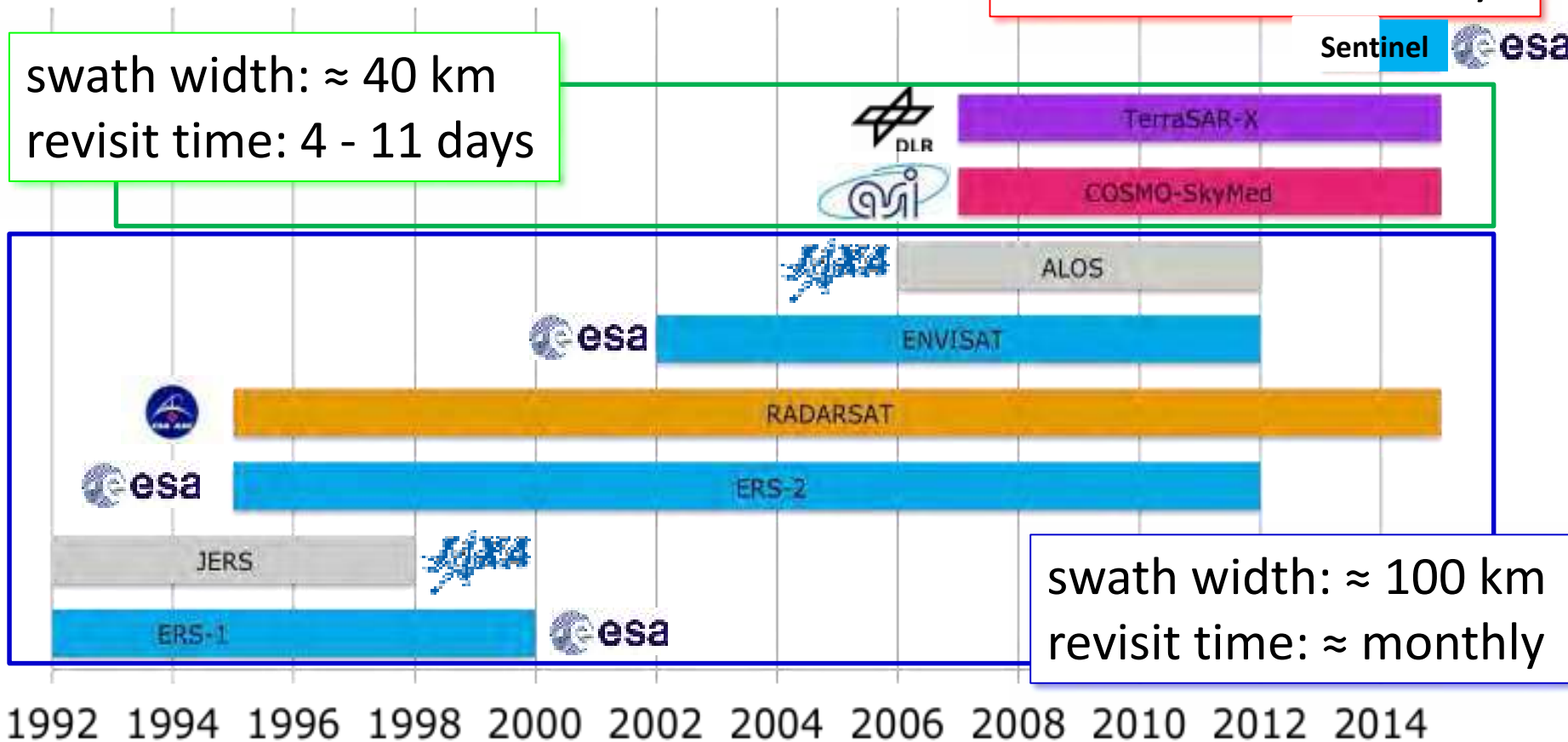
Constelaciones de Satélites de Radar



swath width: ≈ 250 km
revisit time: 12 - 6 days

swath width: ≈ 40 km
revisit time: 4 - 11 days

Sentinel 



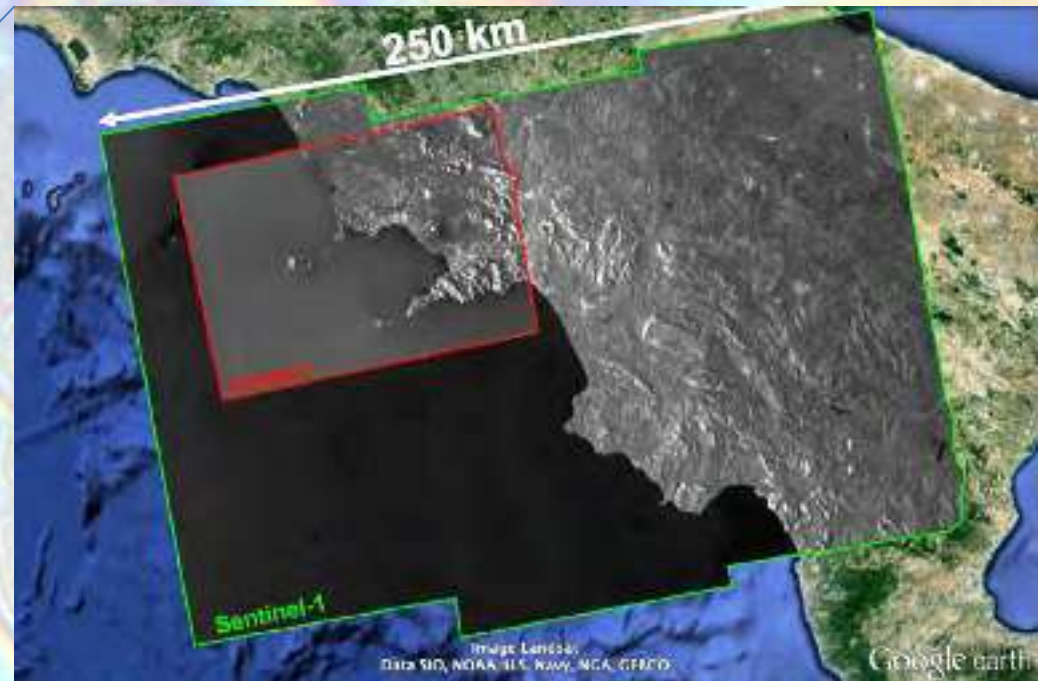
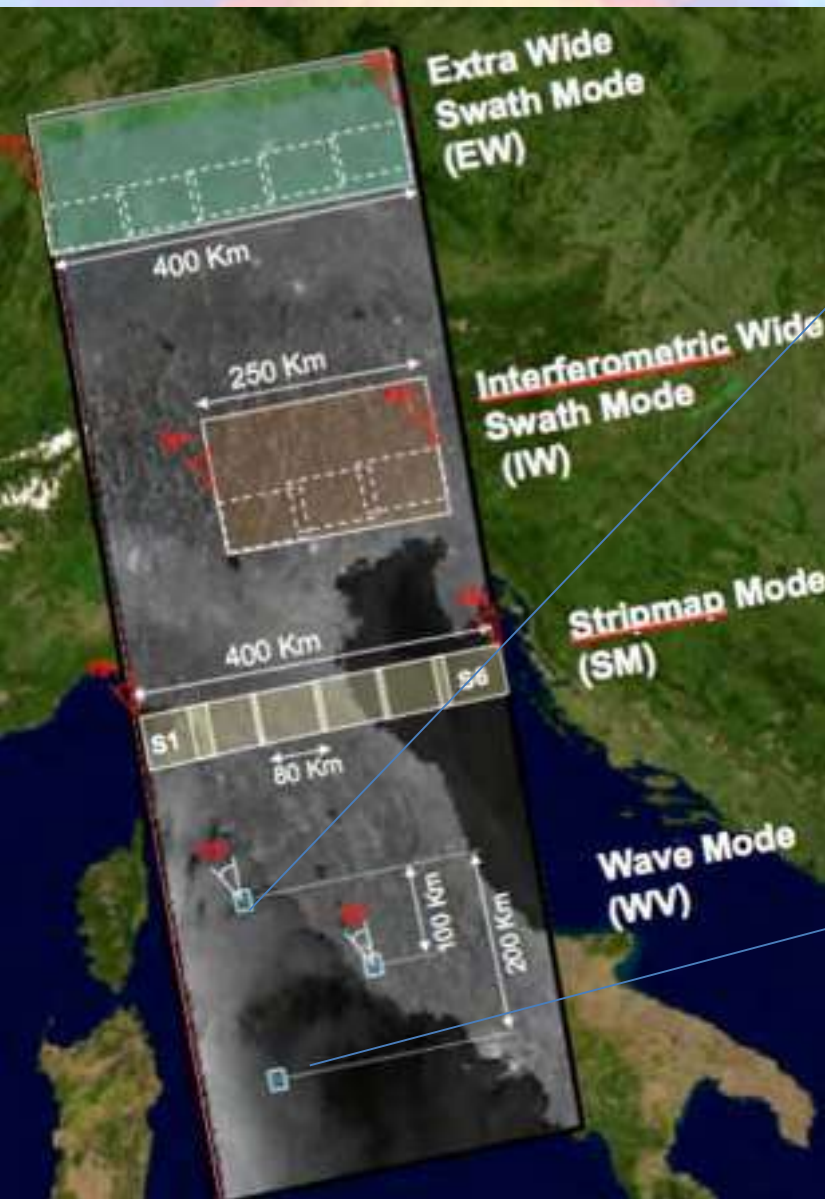
swath width: ≈ 100 km
revisit time: $\approx$ monthly

Sentinel-1 constellation

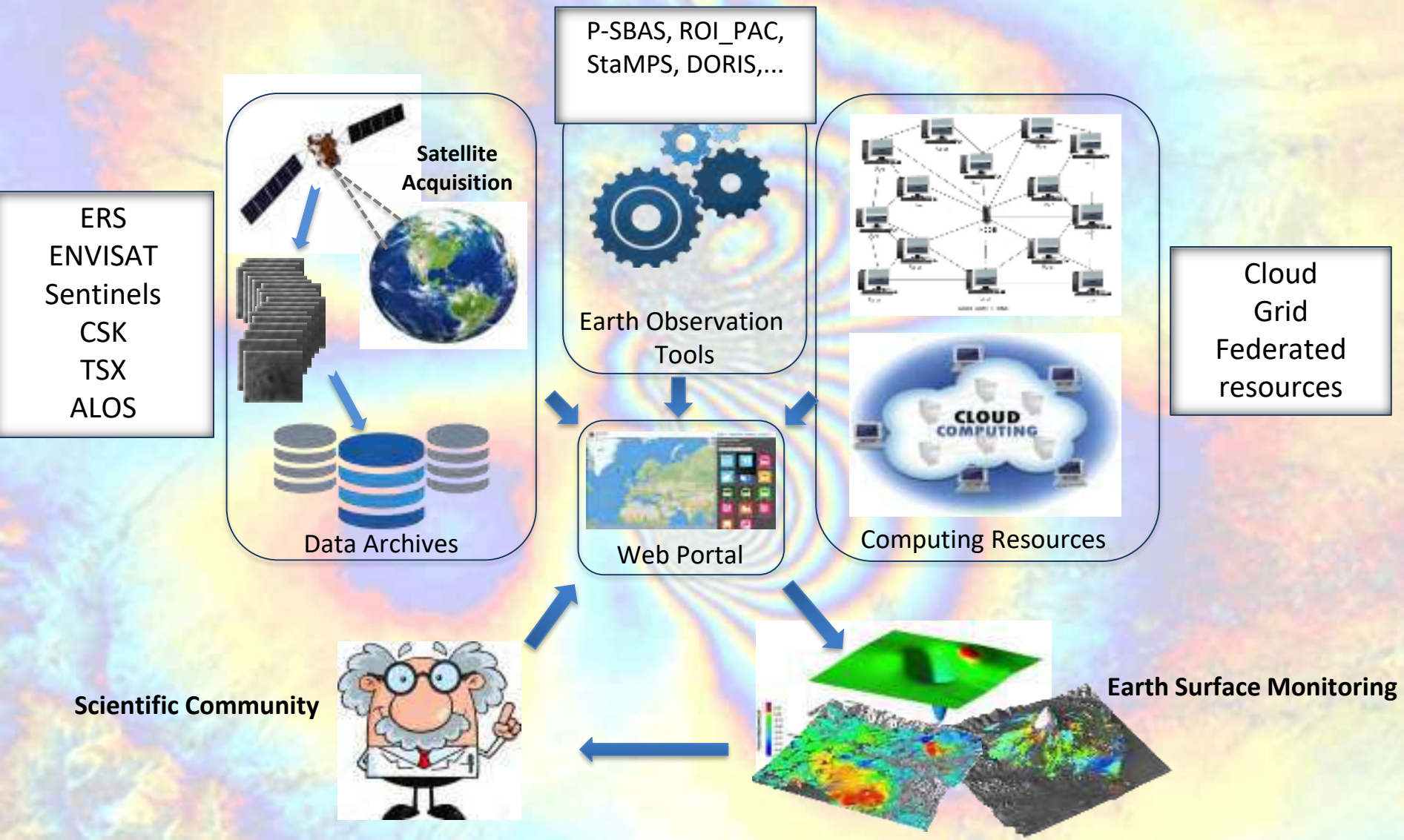


- Sensor spatial resolution: **15x4m**
- Spatial coverage: ~**250x250km** (for IWS)
- **C-band**
- **Global coverage**
- **Free and open data access**

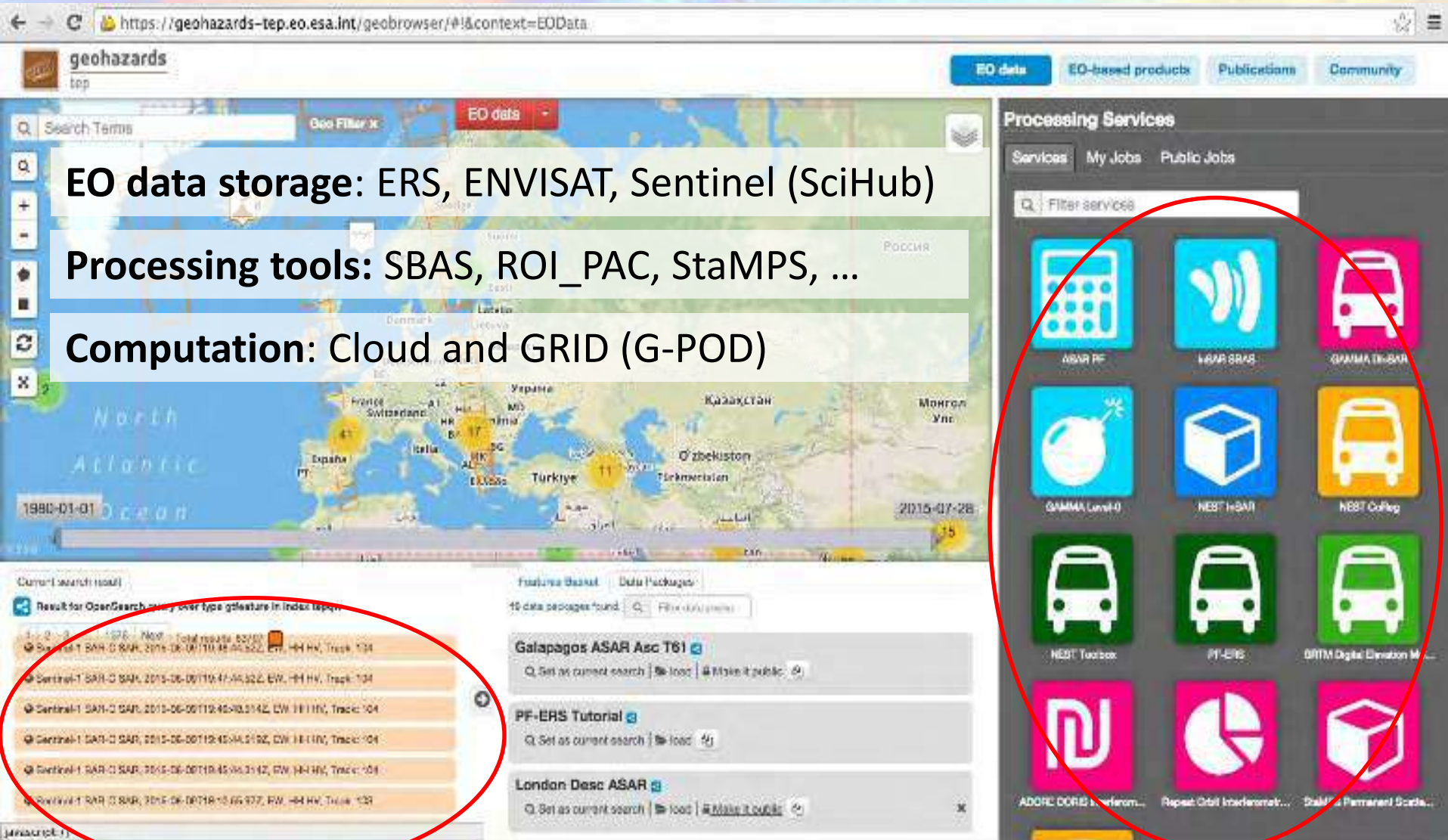
Sentinel-1 constellation



Exploitation Platforms: the ESA Grid Processing On-Demand (G-POD) and Geohazards Exploitation Platform (GEP).



ESA Geohazard Exploitation Platform (GEP)



EO data storage: ERS, ENVISAT, Sentinel (SciHub)

Processing tools: SBAS, ROI_PAC, StaMPS, ...

Computation: Cloud and GRID (G-POD)

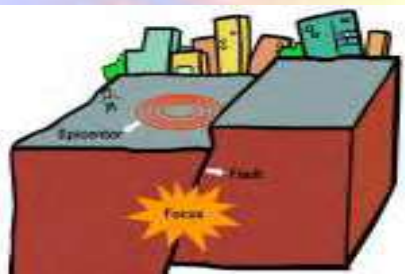
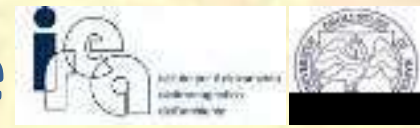
Processing Services:

- ASAR PF
- ASAR SBAS
- GAMMA TC-SAR
- GAMMA Level-0
- NEST-HSAR
- NEST Outlog
- NEST Toolbox
- PF-ERS
- ORFIM Digital Elevation M...
- ADORE COR2 Interferom...
- Repeat Orbit Interferomet...
- SBAS Permanent Scat...

Results provided by P-SBAS service within G-POD (Sentinel-1)



Generación automática de mapas de desplazamiento



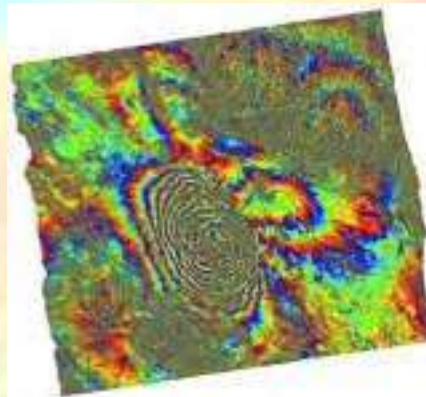
The earthquake occurs



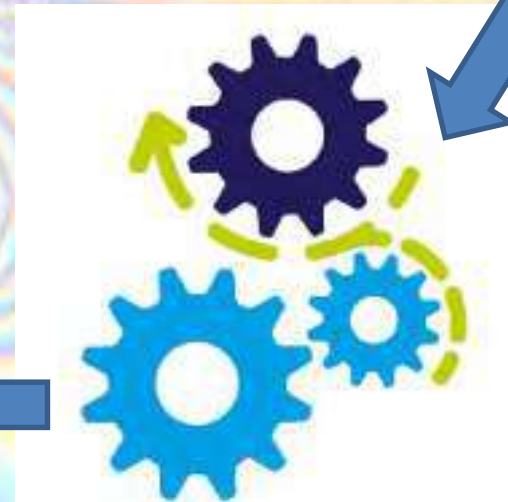
Check the earthquake catalogues



Check the Sentinel-1 archives

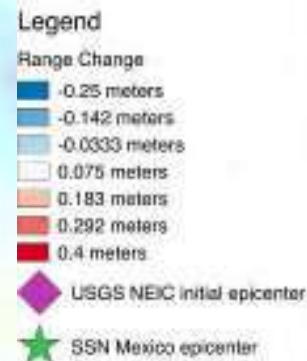
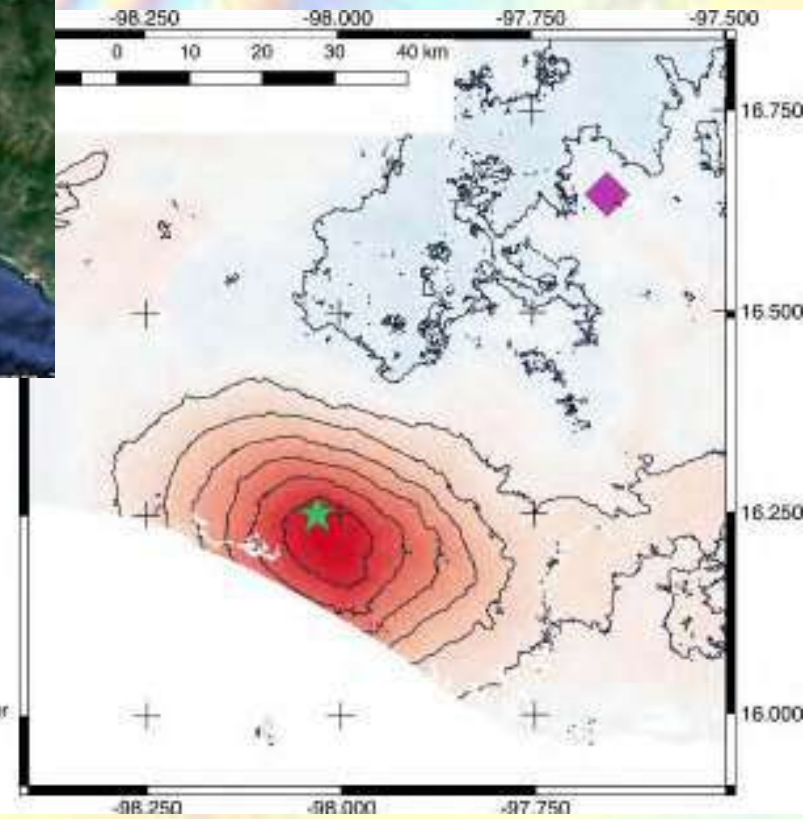
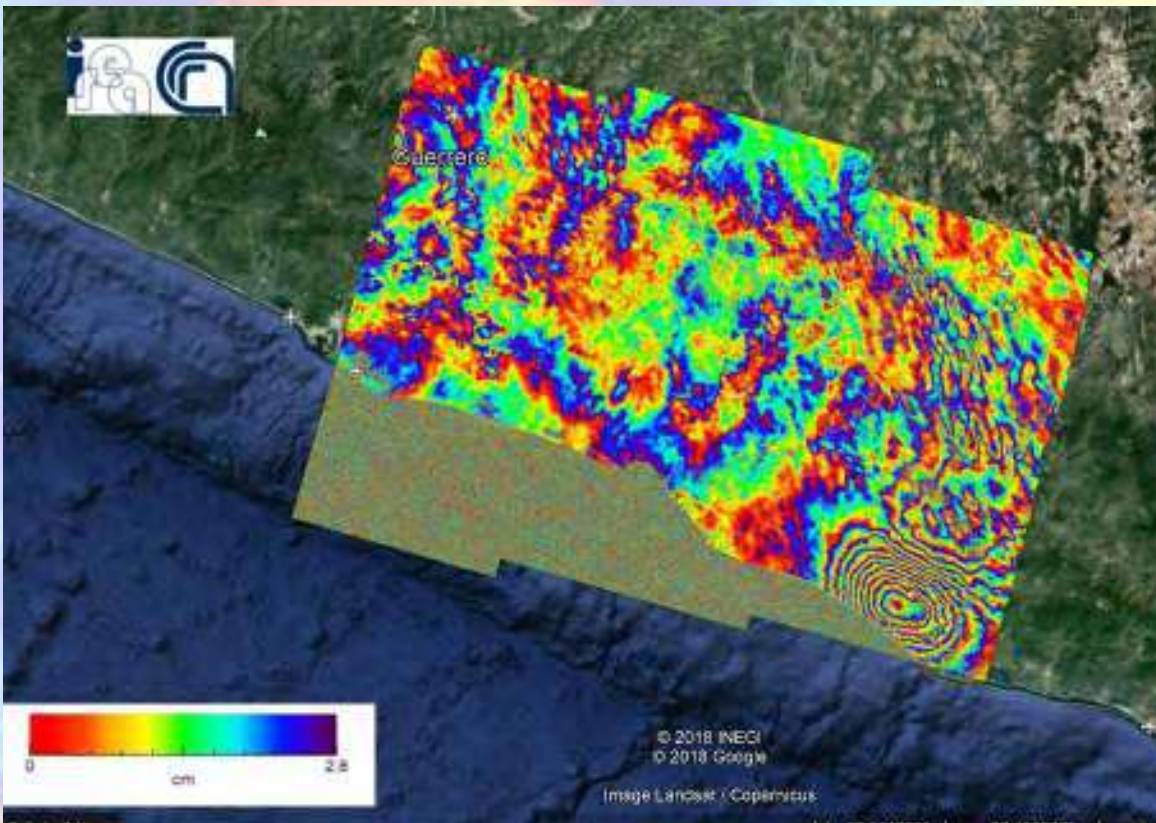


Publish Results (Interferograms and Displacement maps)



Automatic start the P-SBAS process (e.g. on ESA platforms)

Co-Seismic Interferograms for Oaxaca, Mexico Earthquake Mw 7.2 (2018)



Retos y experiencias para Guatemala



25052018-06062018

27052018-08062018



contains Copernicus data (2015)

Sacatepéquez

ango

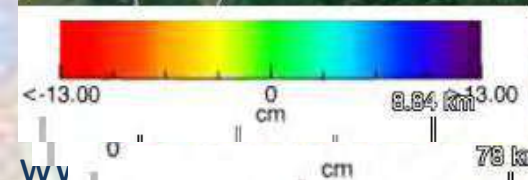
Escuintla

Image © 2018 DigitalGlobe
Image Landsat / Copernicus
Image © 2018 CNES / Airbus
Image © 2018 DigitalGlobe

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Google Earth

Ahuachapán



JPL NASA UAVSAR

Product: Guatml_11201_10020-100_11017-129_0439d_s01_L090_01

RP InSAR Pair images of Fuego Volcano, Guatemala (acquired Feb 11, 2010 and Apr 26, 2011)

Flight line comments: Guatemala volcanoes (PI: Paul Lundgren)

This product: Version 1 (processor version v1.24.10. Overall range ramp exists in the interferogram, but fringes around Pacaya Volcano appear real.)

Other versions: Version 2 (processor version 111e13e8) RP InSAR Browse Image

Instrument: L-band

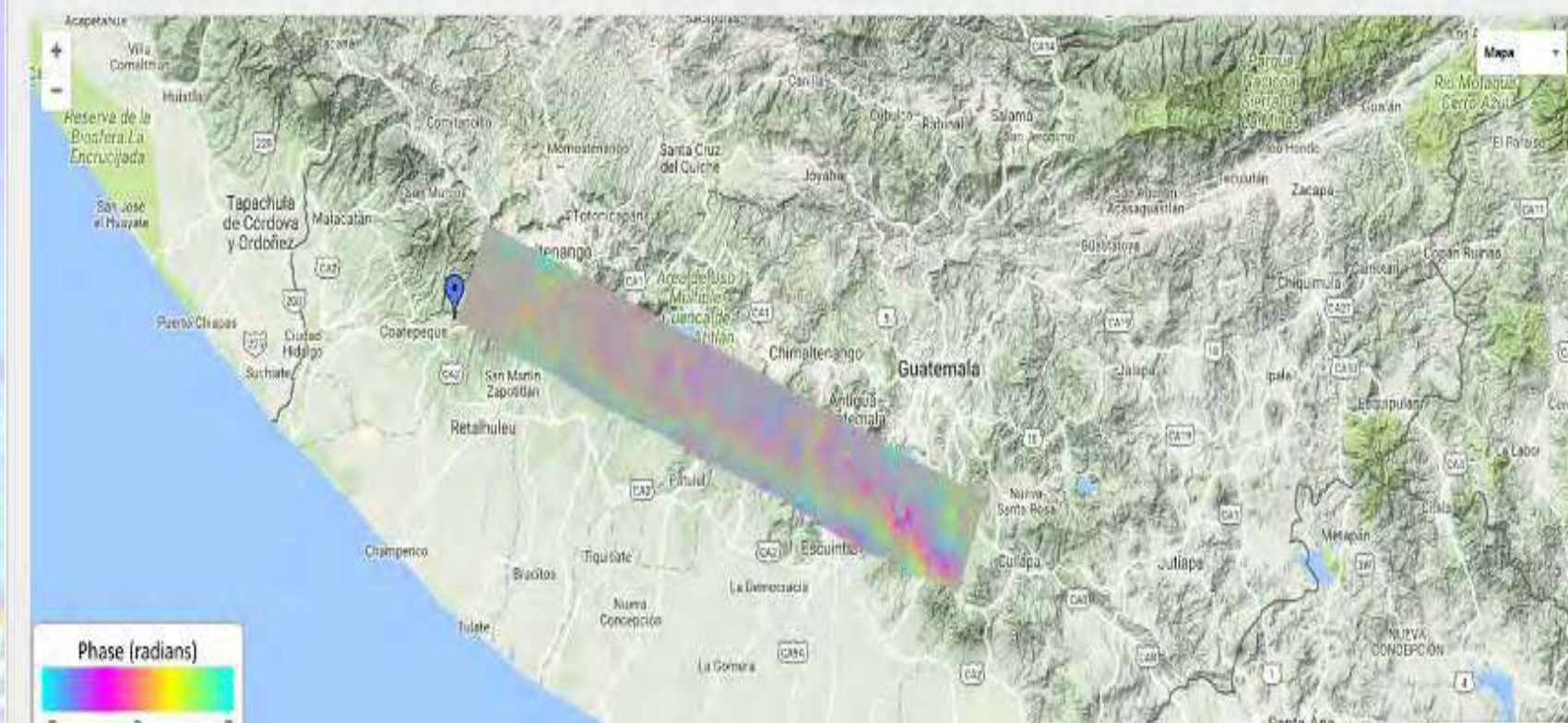
Flight line ID: 11201

Flight request ID: 11G019

Baseline: Corrected

Download

Related Data



Gracias

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