SEOM - Sentinel-1 InSAR Performance Study with TOPS Data

Team B: First Results

Contributions:

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Outline

- Consortium mission
- Our approach to Sentinel-1
- From Napa quake ifg to stacks and back
- Concluding remarks and future plans

Why are we here?

The extremely interesting and challenging questions addressed in the InSARap ITT call was a perfect match for the research interests of all the partners – both on short and long term.

Our approach to S-1 TOPS InSAR

- **Algorithmic & Software development**
- **Validation & Quality control**
- **Application & Interpretation**

Our approach to S-1 TOPS InSAR

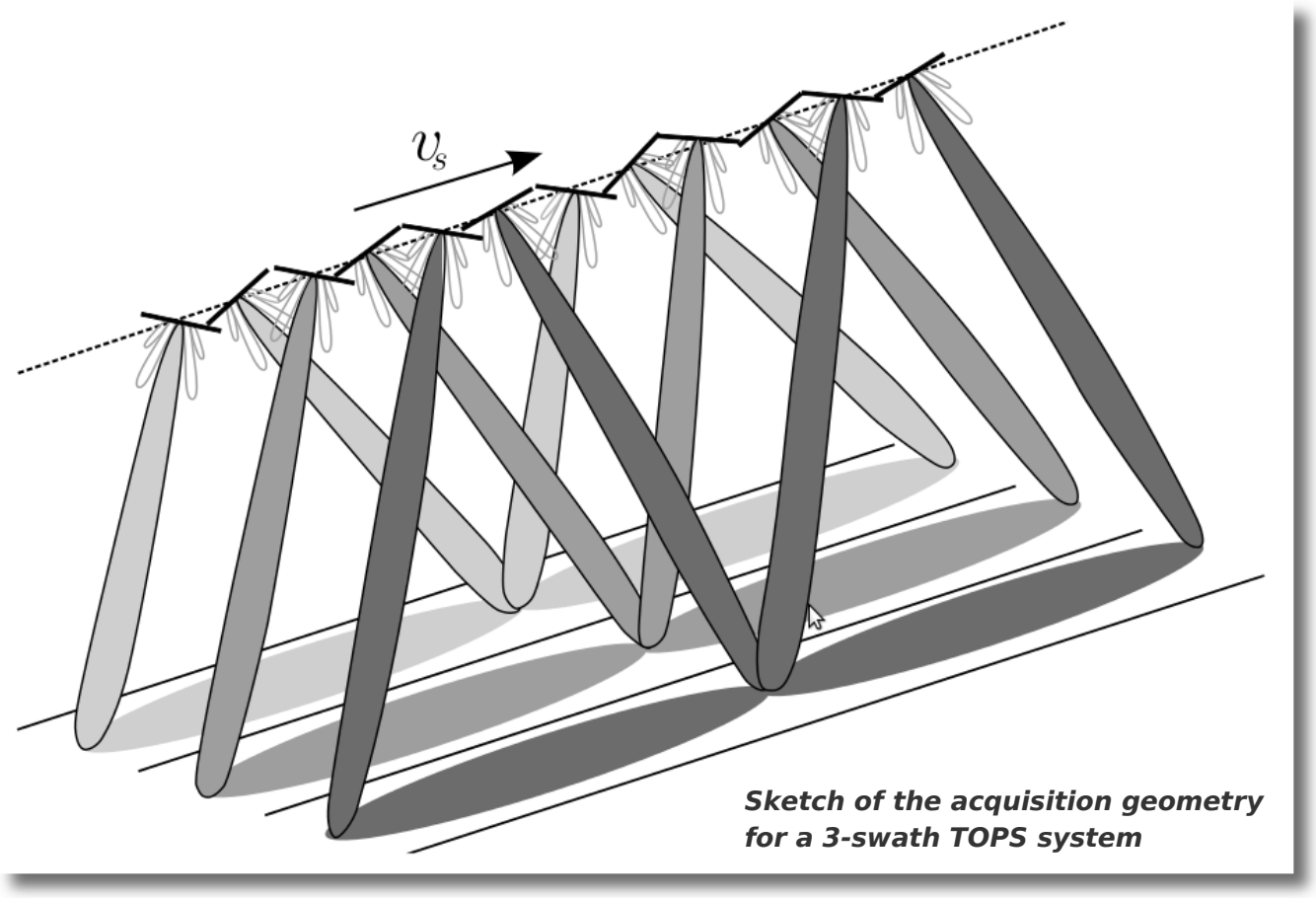
- **Algorithmic & Software development**
  - Coregistration
  - Stacks
- **Validation & Quality control**
  - CR experiment
- **Application & Interpretation**
  - Geophysical applications

Proposed test sites

- **Urban *(pre-defined)*** : **Mexico City**
- **Tectonics** : **NAFZ, Turkey**
- **Landslides *(from cm to dm)*** : **Norway**
- **Validation** : **Poland CR Sites**

- **Non-Stationary** : **Ice Motion**

Sentinel-1 TOPS Acquisition Mode



Sketch of the acquisition geometry for a 3-swath TOPS system

"The TOPS is a wide swath mode that has the same coverage and resolution as of the ScanSAR mode, but without scalloping effect"

Our approach to S-1 TOPS InSAR

It's all about knowing how to answer these technical questions/challenges:

- **Doppler sweep → use Spot algorithms**
- **Burst mode → how to coregister**
- **Burst mode → when to stitch**
- **Burst mode → how to stitch**
- **Burst mode → what can be corrected by exploiting the small burst overlap**

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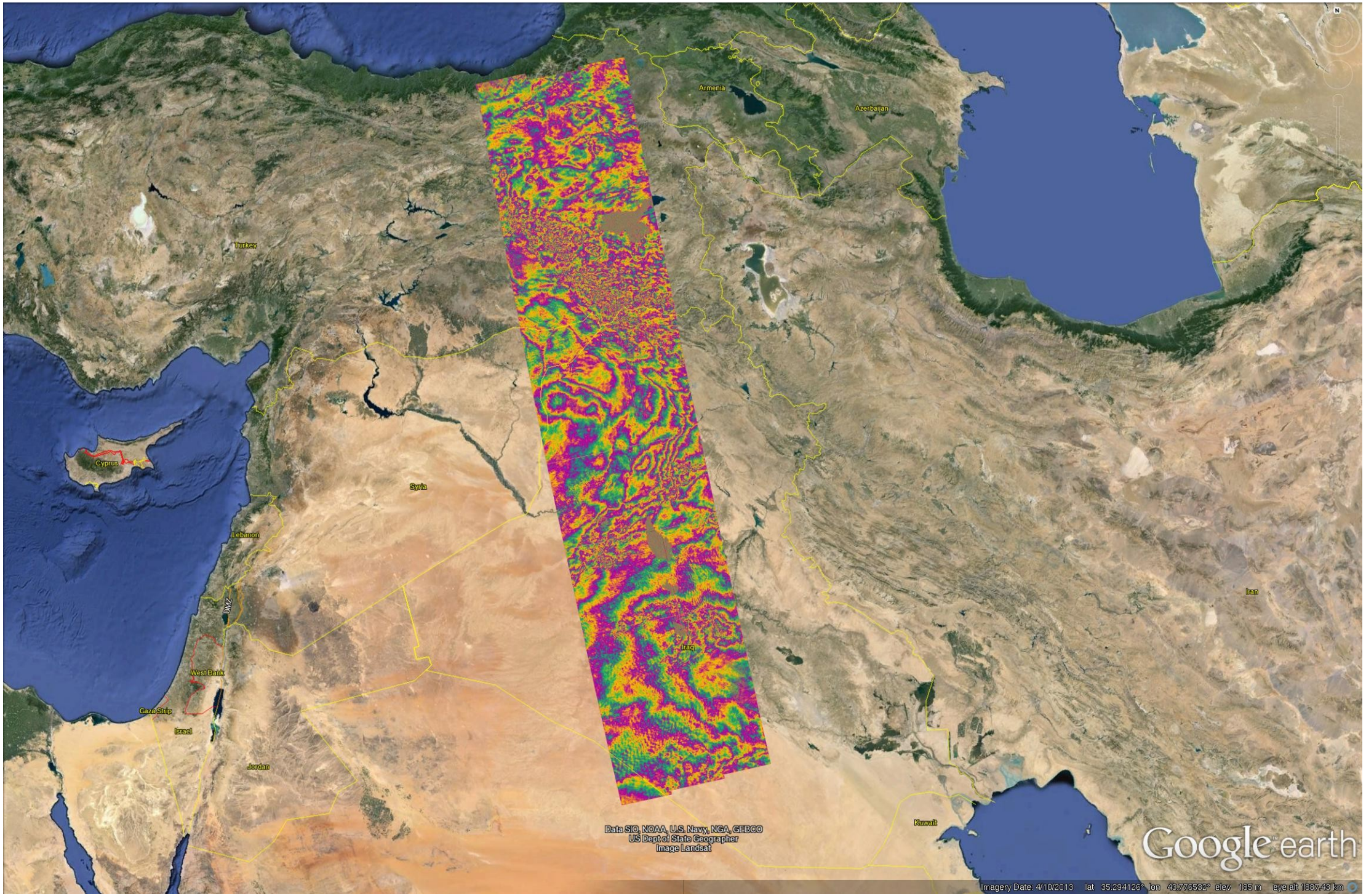
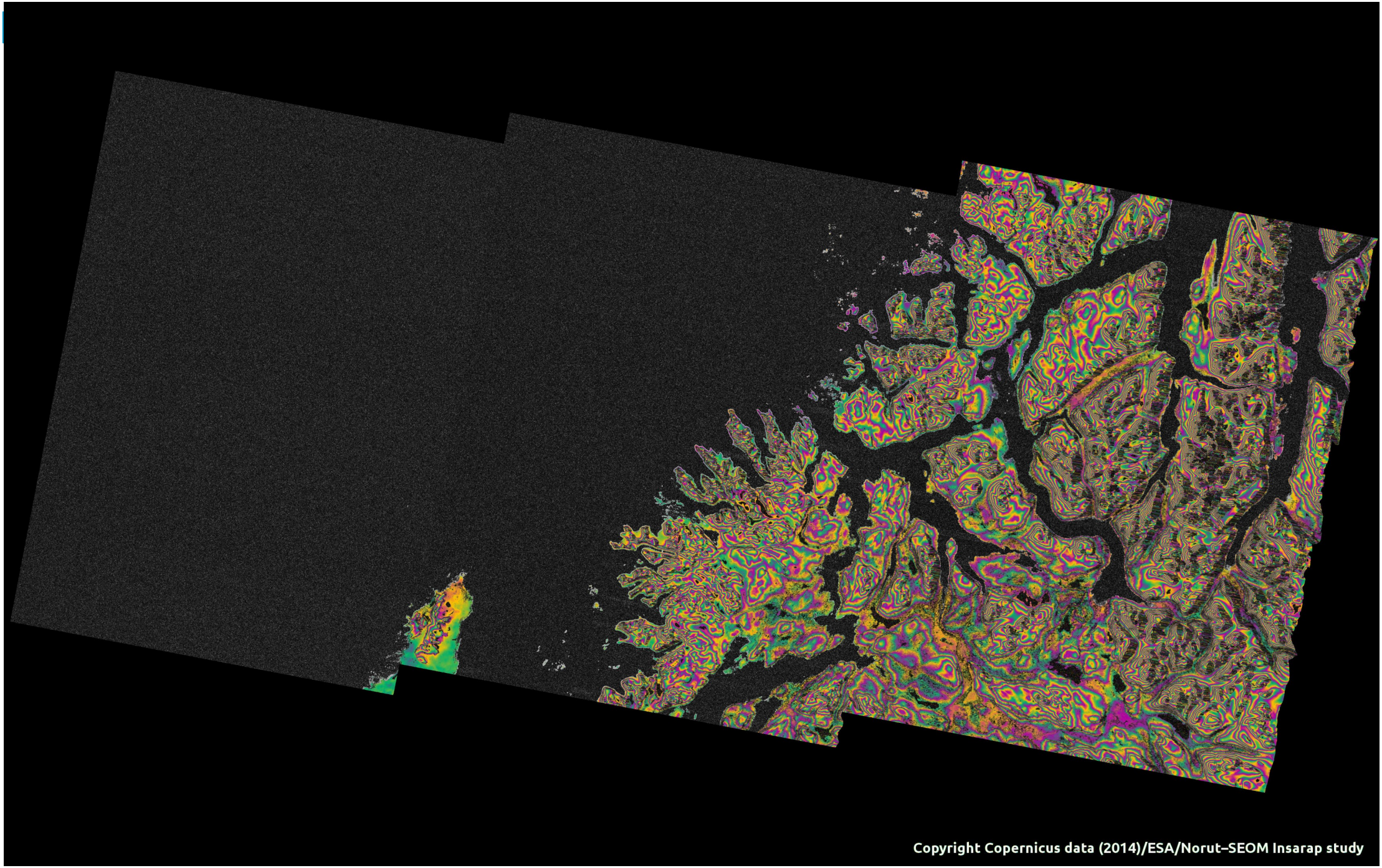
…and how to interpret TOPS InSAR signals


Armenia
Azerbaijan
Turkey
Cyprus
Syria
Lebanon
UNIFIL
West Bank
Gaza Strip
Israel
Jordan
Iraq
Iran
Kuwait
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
US Dept of State Geographer
Image Landsat
Google earth
Imagery Date: 4/10/2013 lat 35.294126° lon 43.776582° elev 185 m eye alt 1887.43 km

First interferograms

- Tromso
- Napa quake
- Fogo eruption
- Netherlands
- Mexico City preliminary results
- Iceland Volcanoes
- Svalbard ice motion
- Polish Test sites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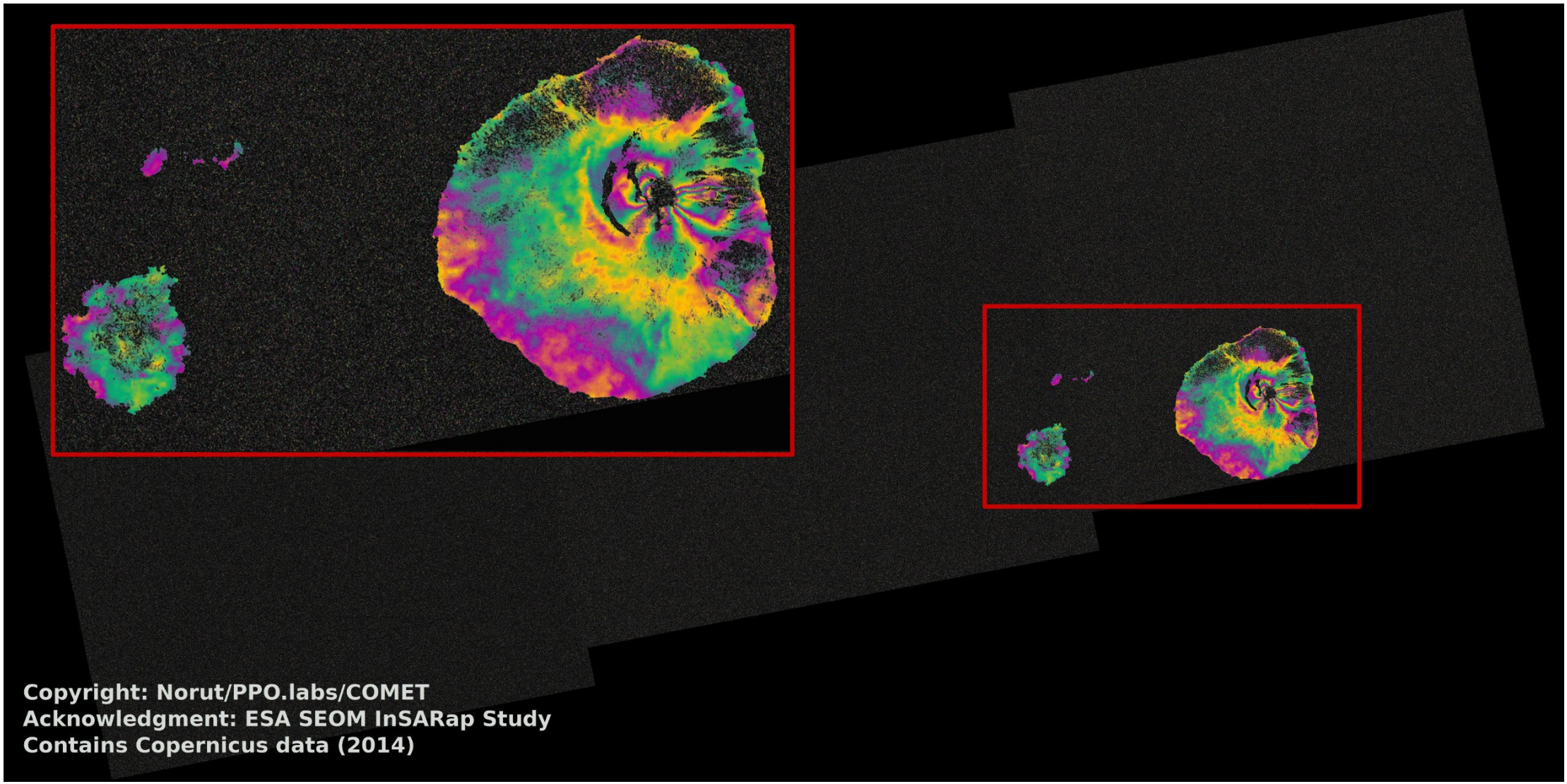
You've seen too much of it already...



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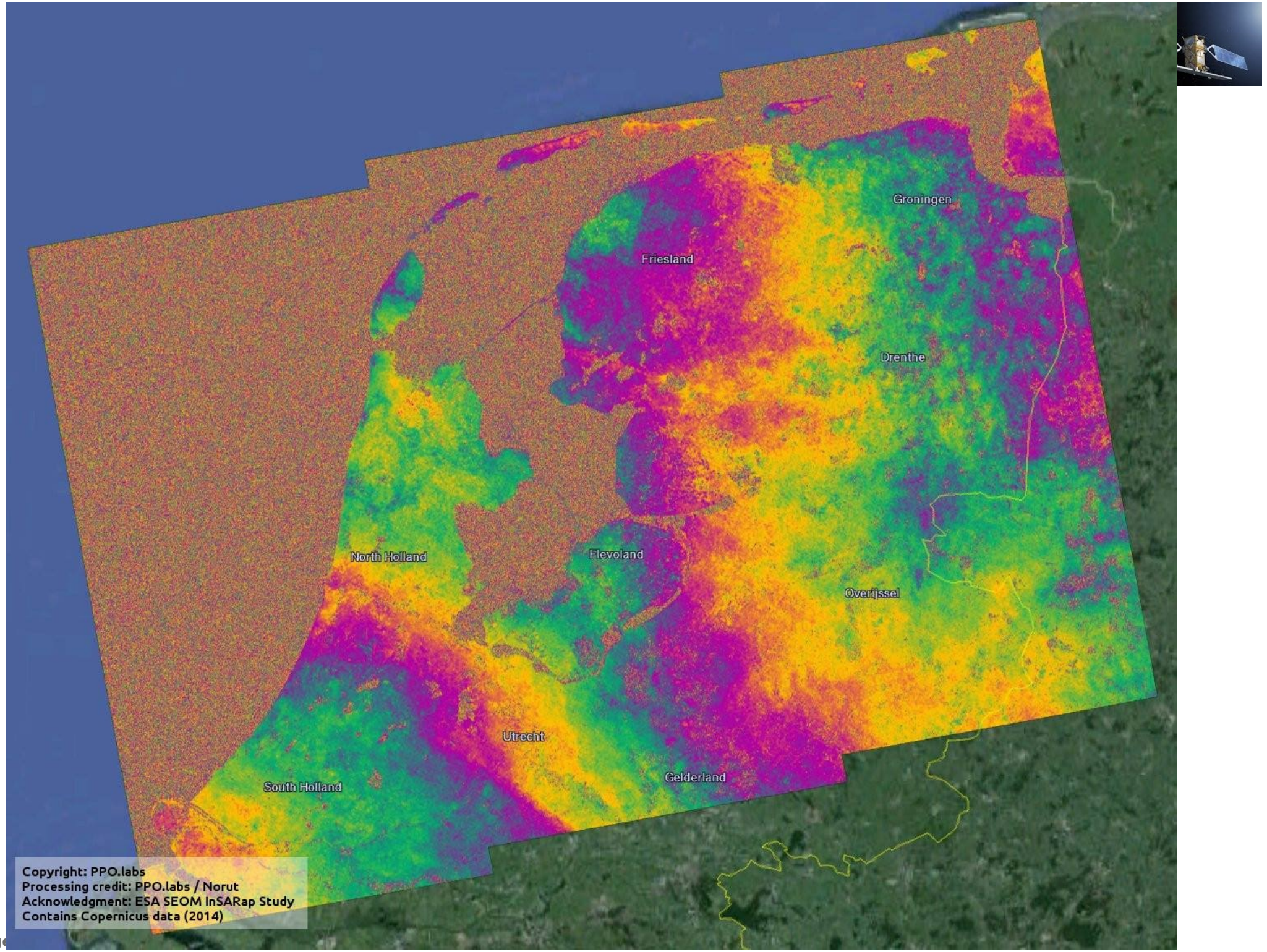
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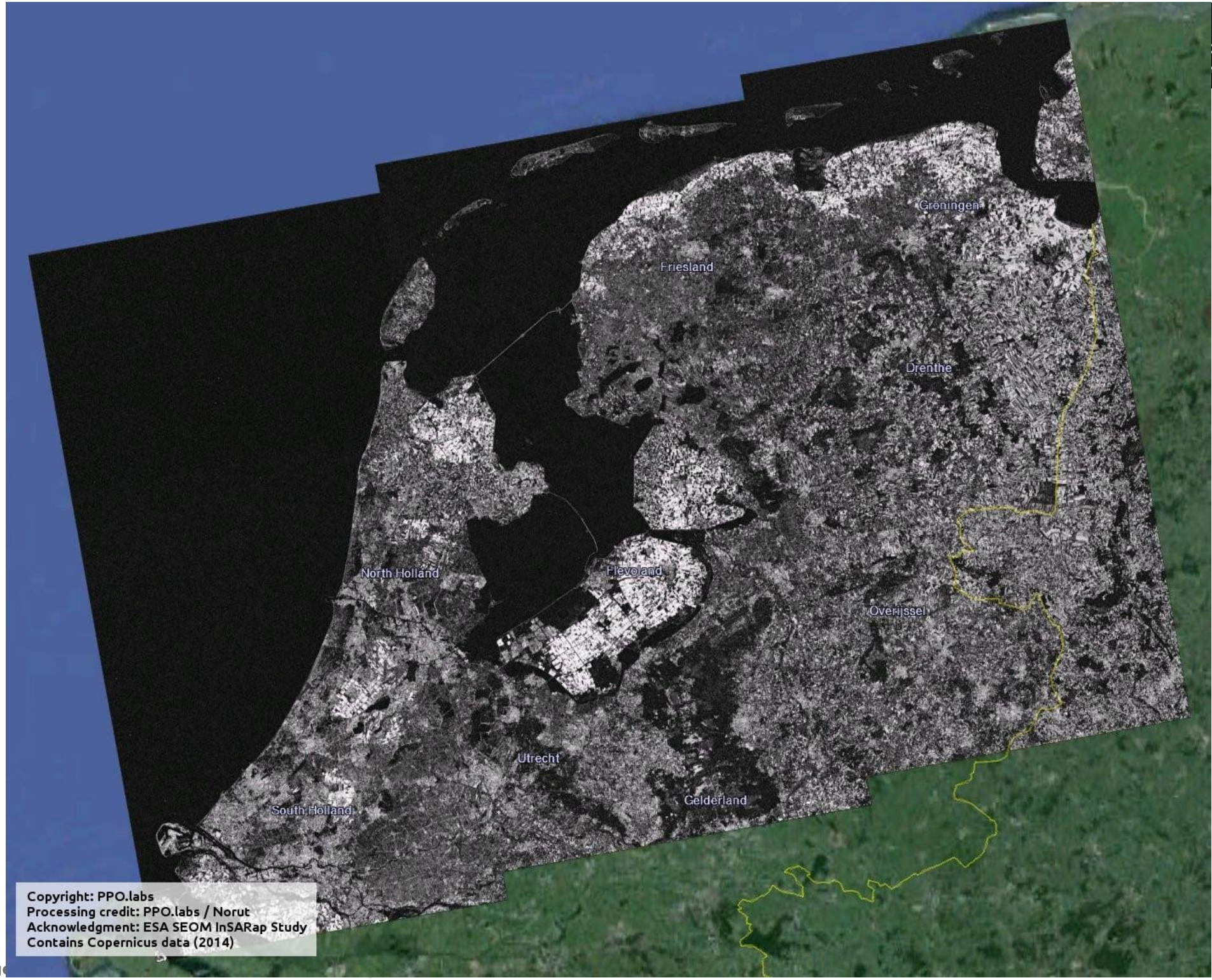

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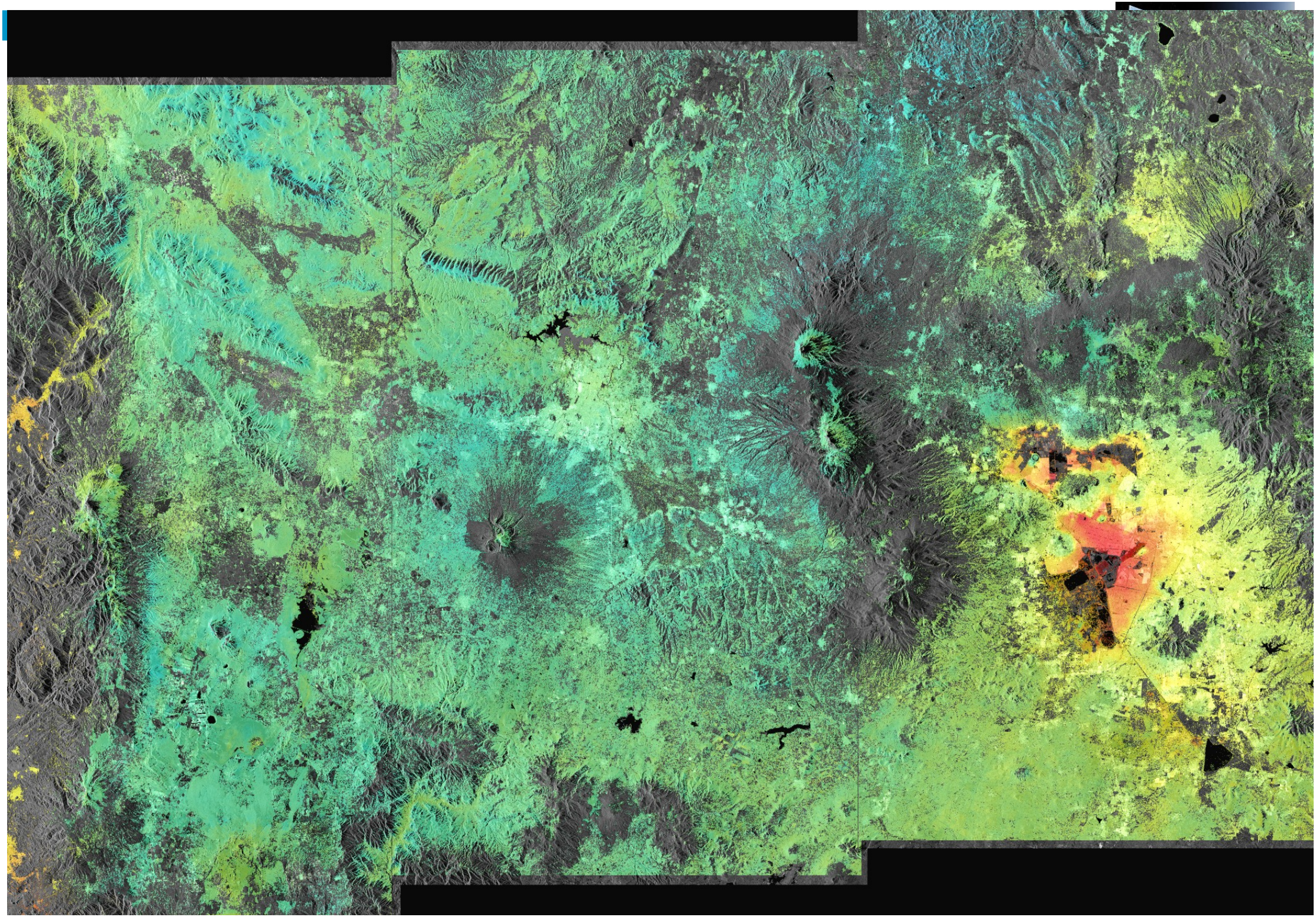

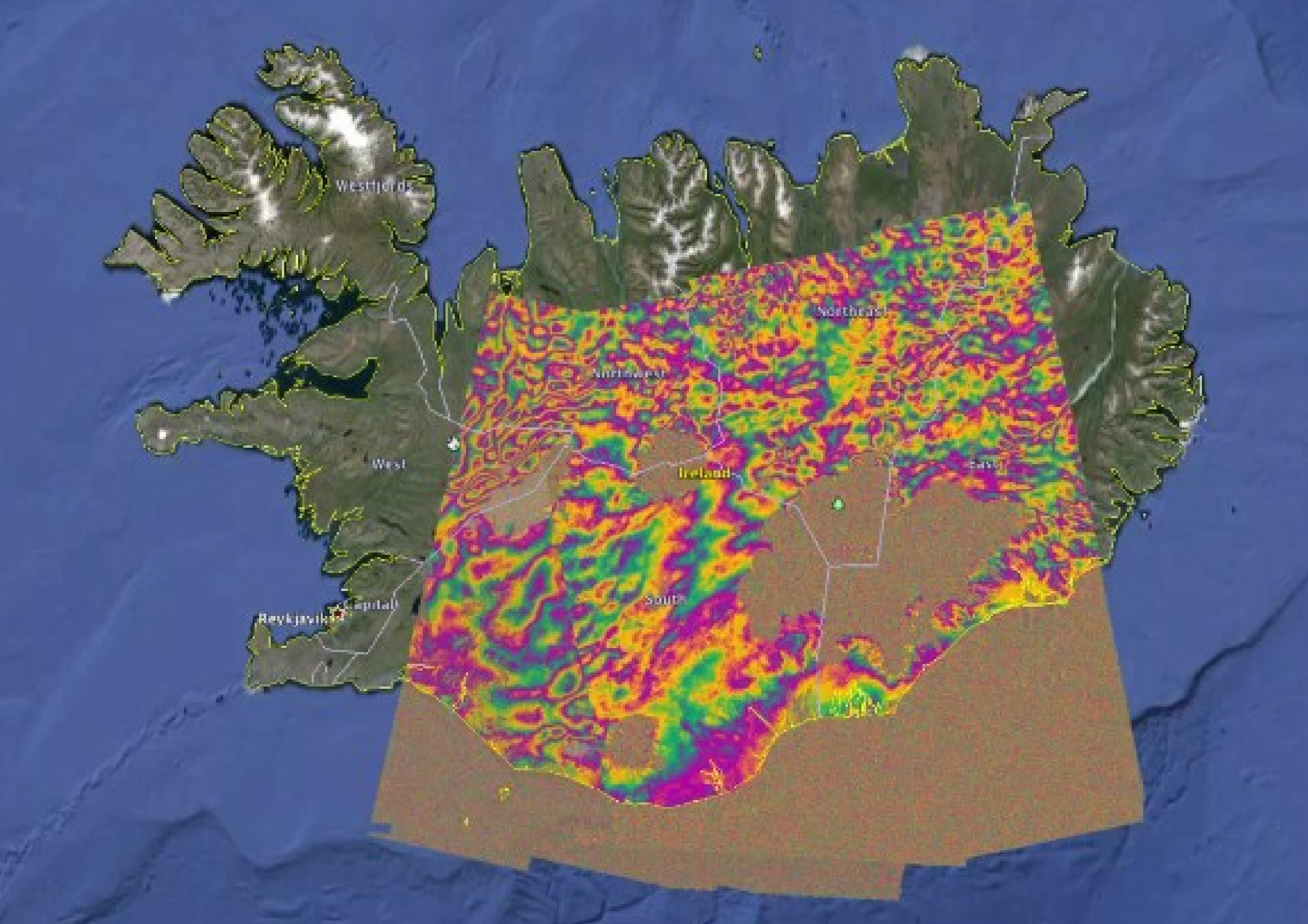
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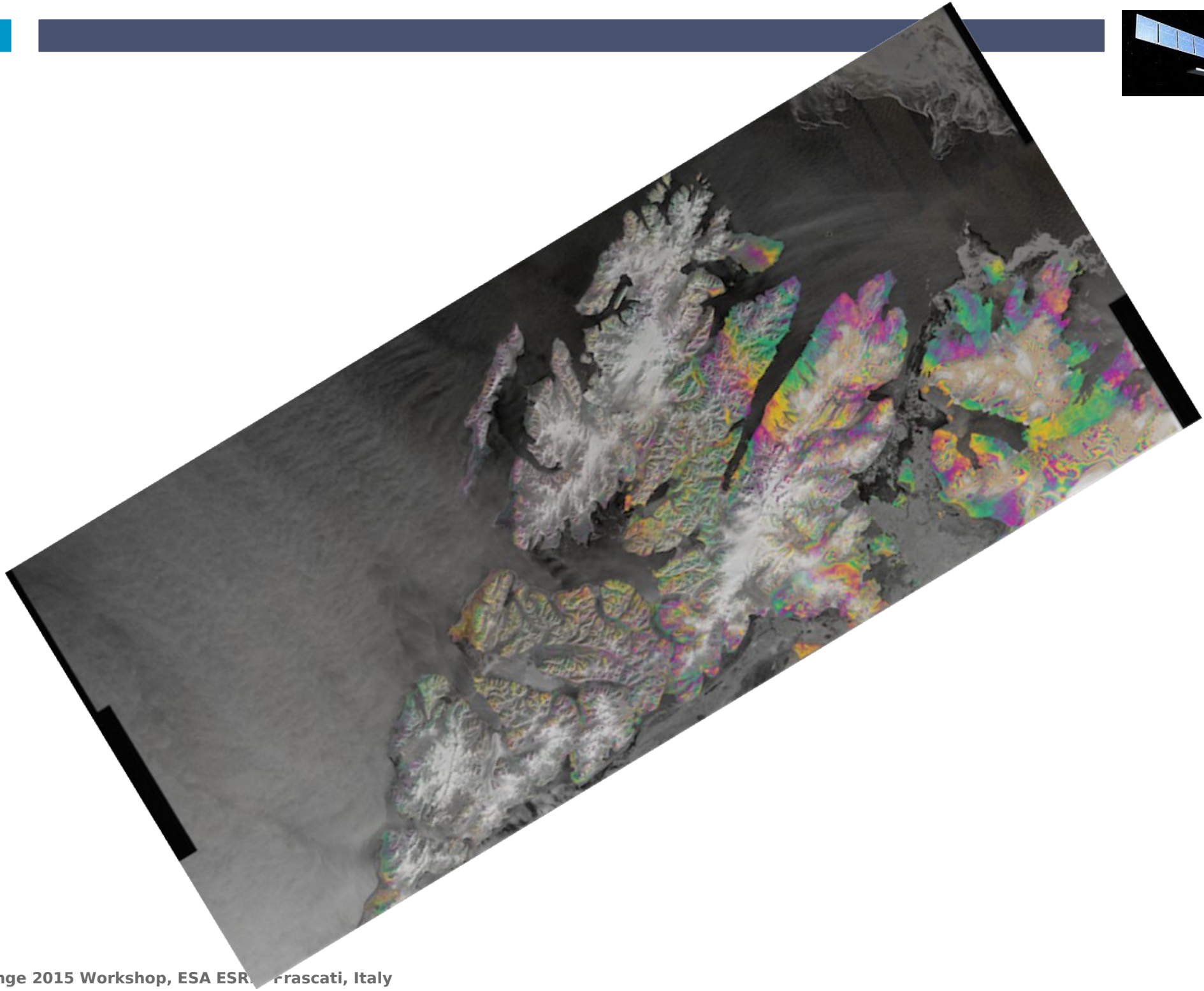
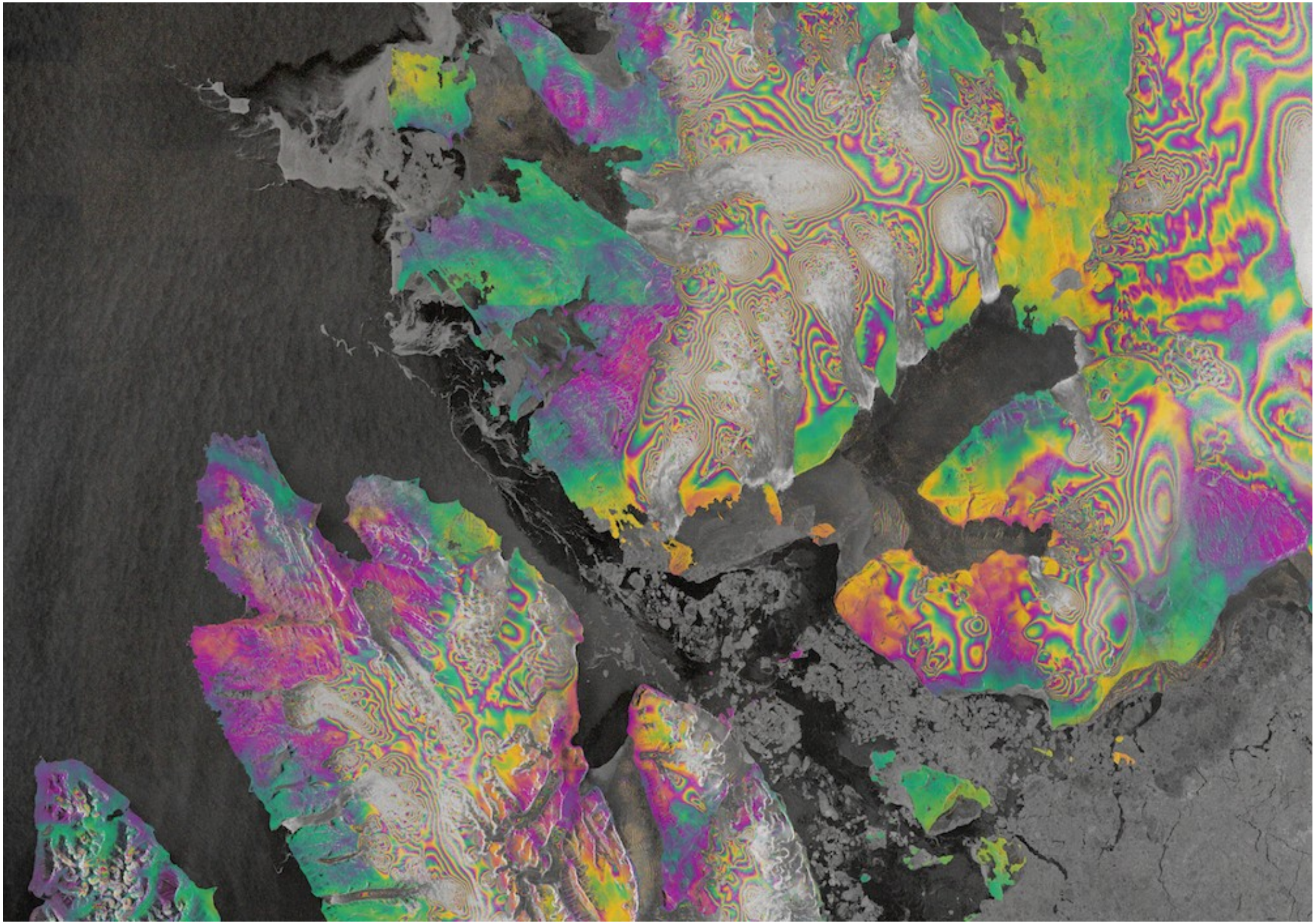
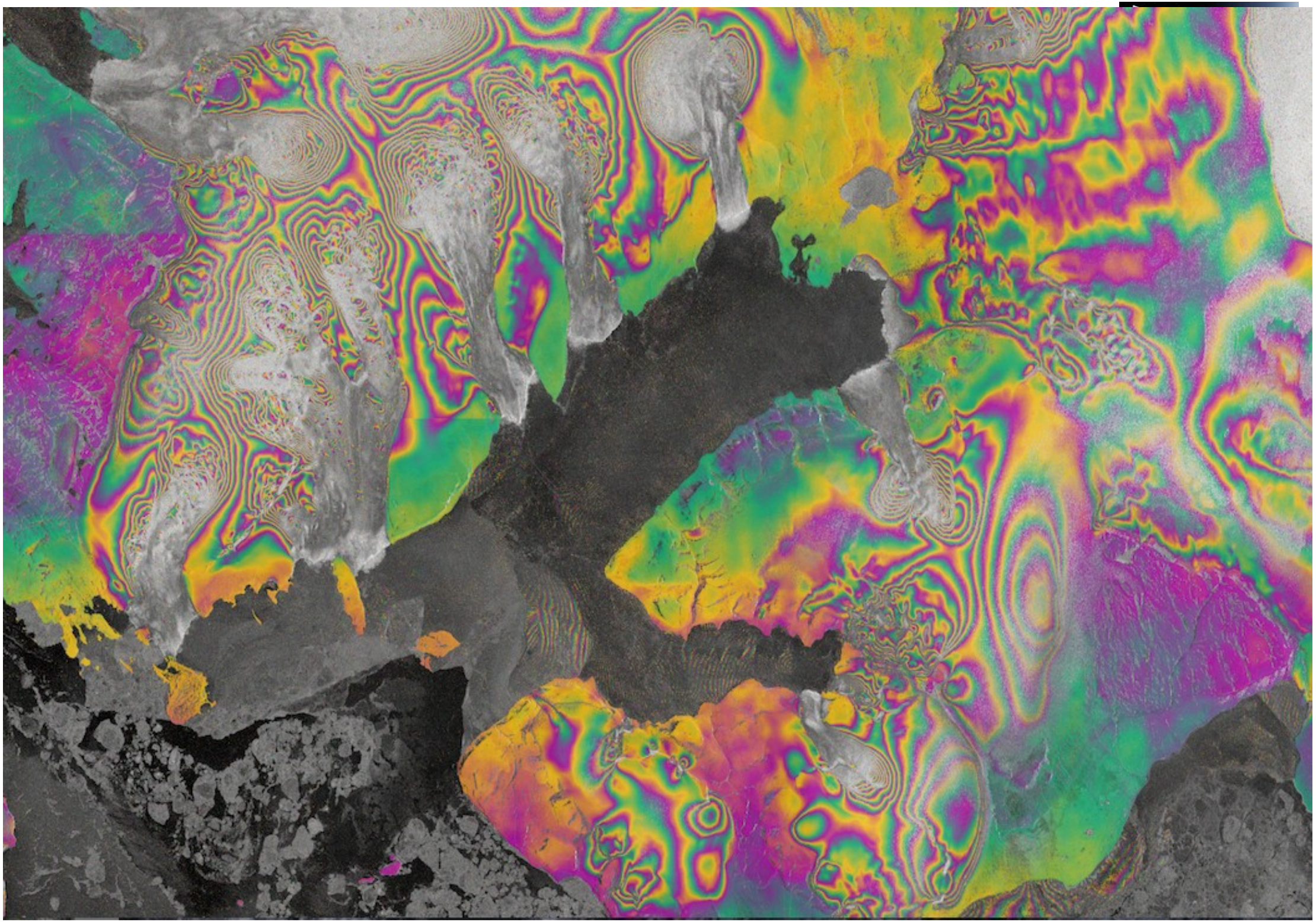
West
Northeast
Northwest
Iceland
East
South
Capital
Reykjavik








Lewino Test Site
Babiak Test Site
US Dept of State Geographer
©2014 Google
Image Landsat
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Google earth
Imagery Date: 4/10/2013 54°14'34.55" N 18°59'51.75" E elev -1 m eye alt 371.81 km

Remarks and Future Plans

- **Complete the development and validation cycle**
- **Focus on time-series analysis issues**
- **Addressing issue of non-stationary scenes in a systematic manner**

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