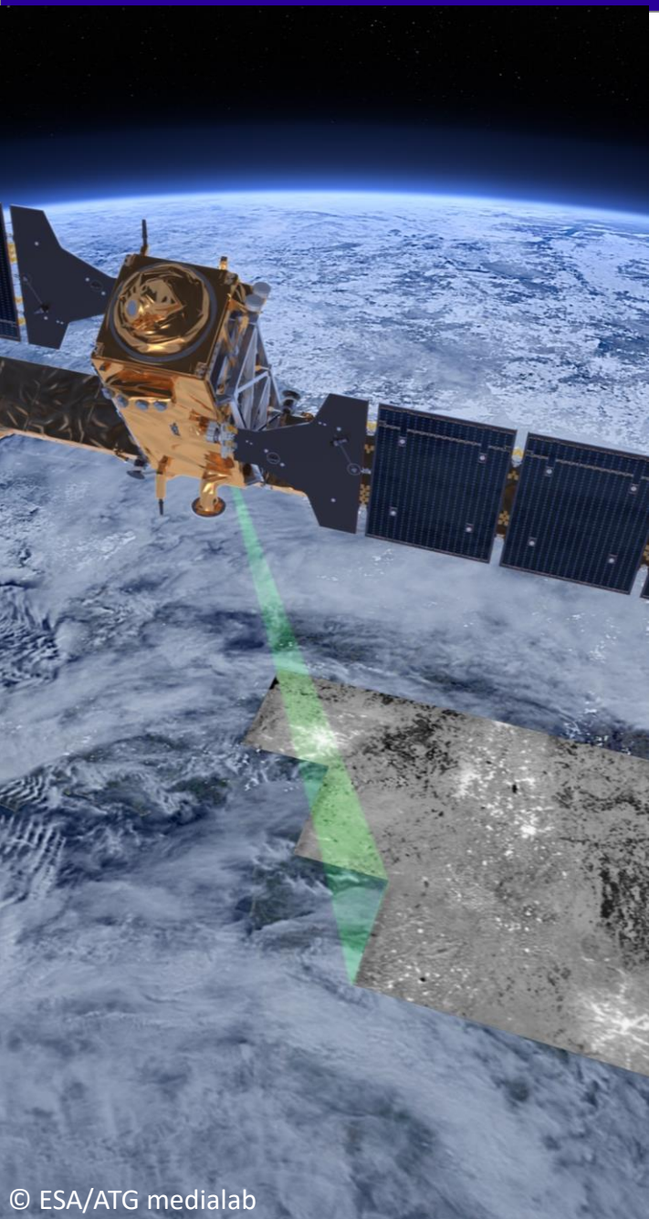


Use cases of Sentinel-1 interferometry in Iceland

Vincent Drouin[1][2]

(1) National Land Survey of Iceland, Akranes, Iceland
(2) Nordic Volcanological Center, Institute of Earth Sciences, Reykjavík, Iceland

Image 1 (2015-07-21)

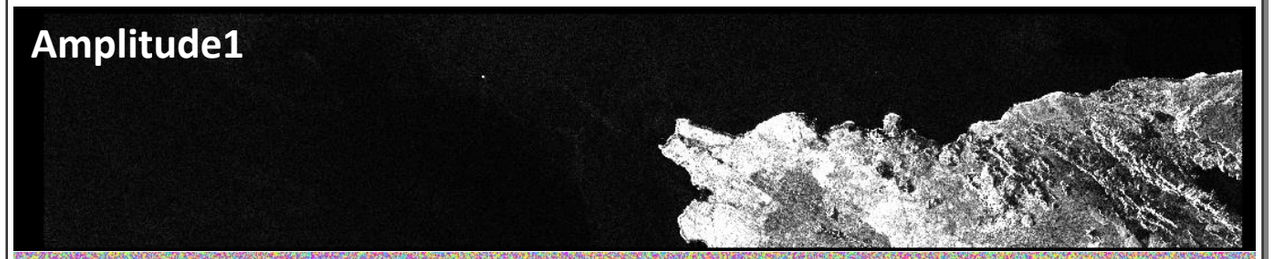
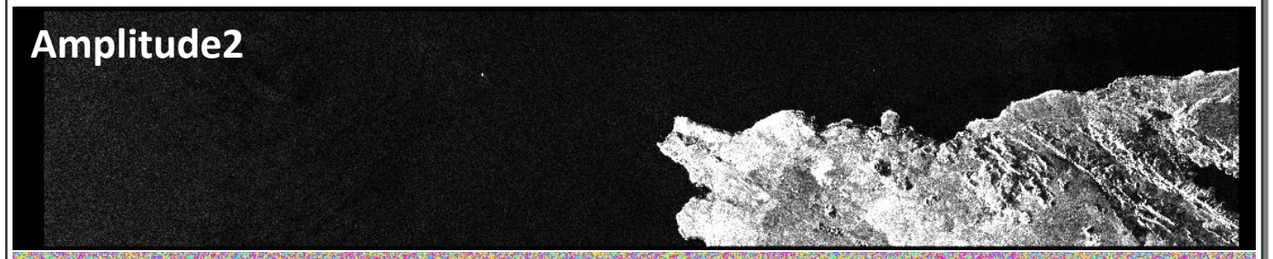
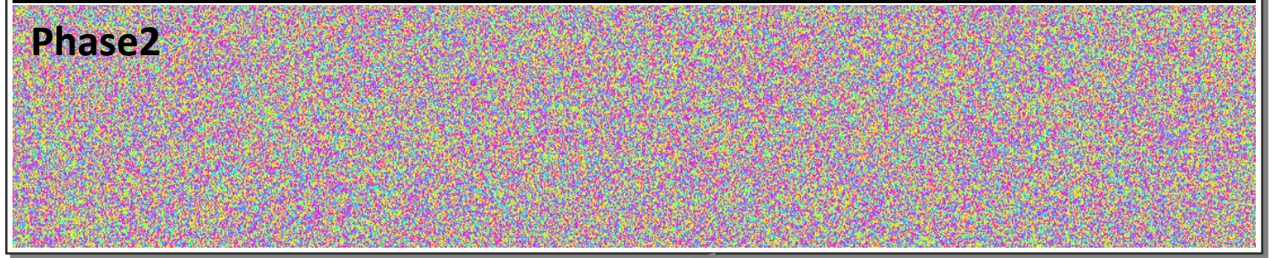


Image 2 (2017-08-21)



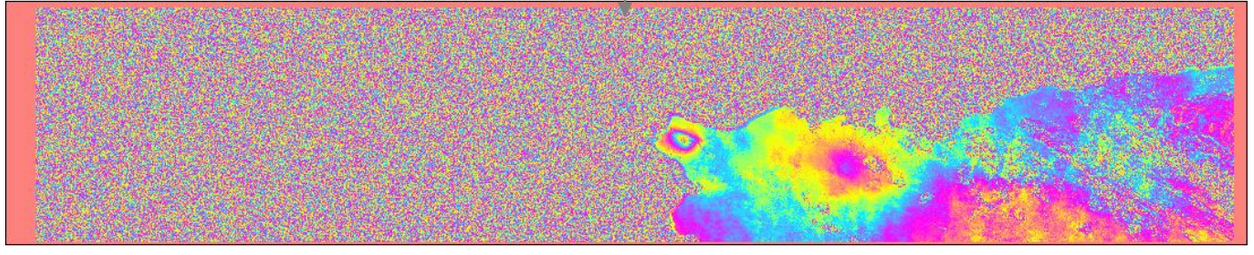


Amplitude images coregistration

Phase difference

Orbital correction

Topography correction



InSAR provides high precision measurements of the ground deformation.

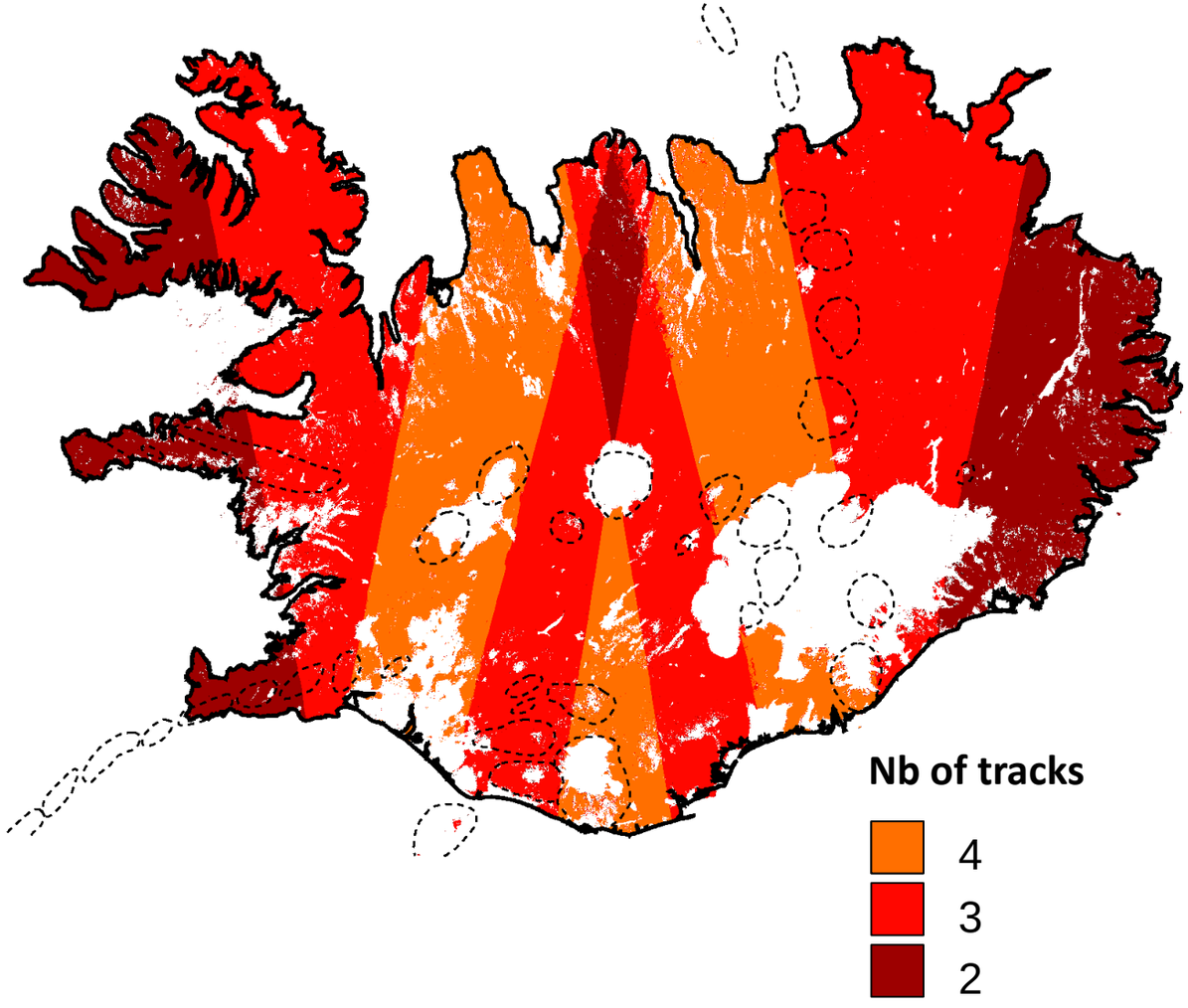
It is sensitive to a mm level but all signal are lost if the surface change to much between the two images.

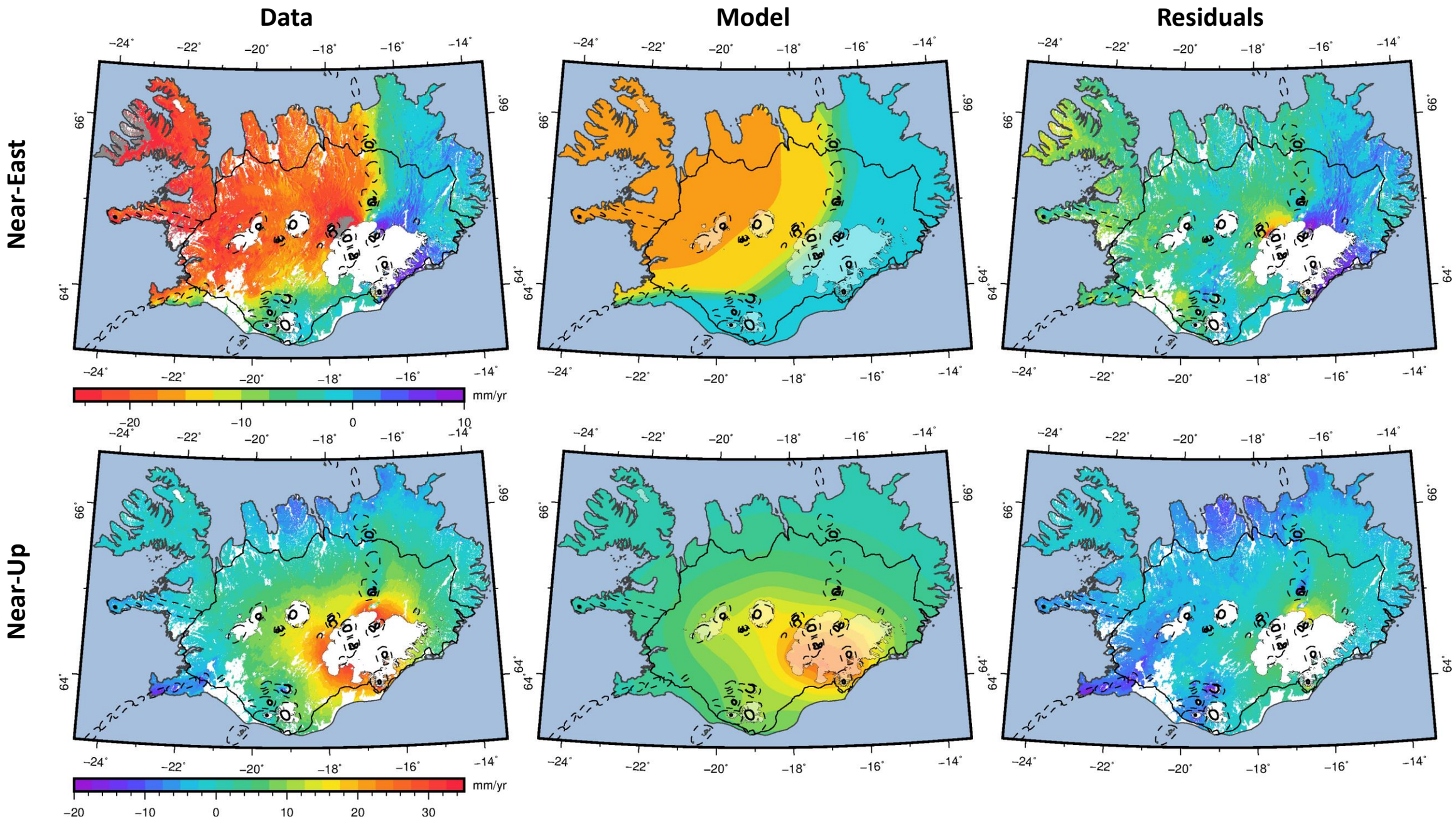
The phase of the images is sensitive to the ground deformation, the atmosphere, the satellite orbit, and the topography.

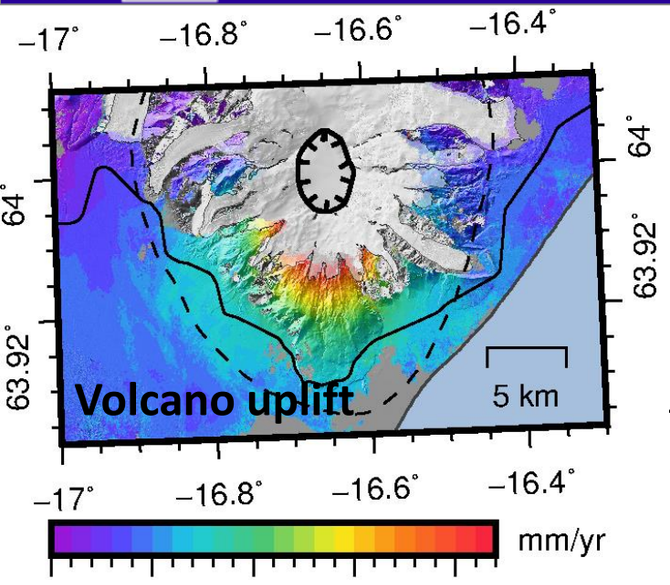
Topography and satellite orbit can easily be corrected for. Atmosphere is the main source of noise in the final interferogram.

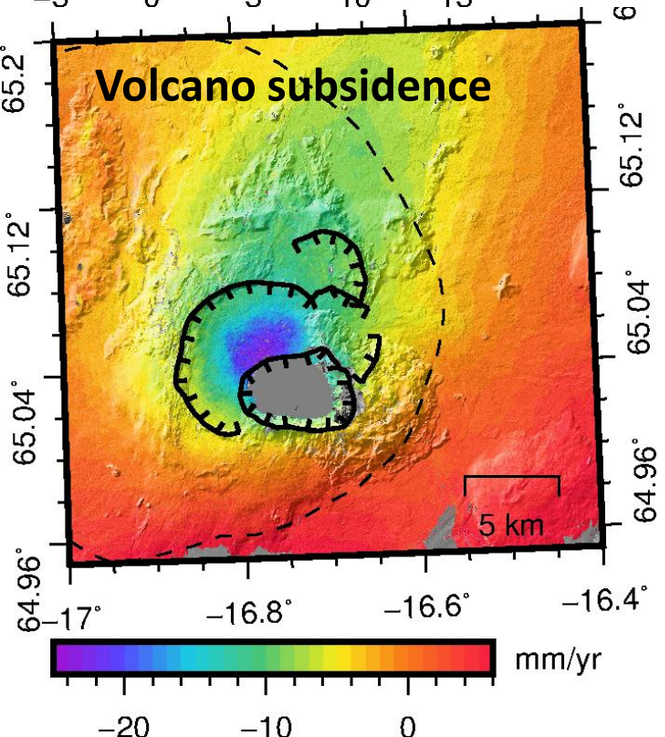
Data: Six Sentinel-1 IW tracks

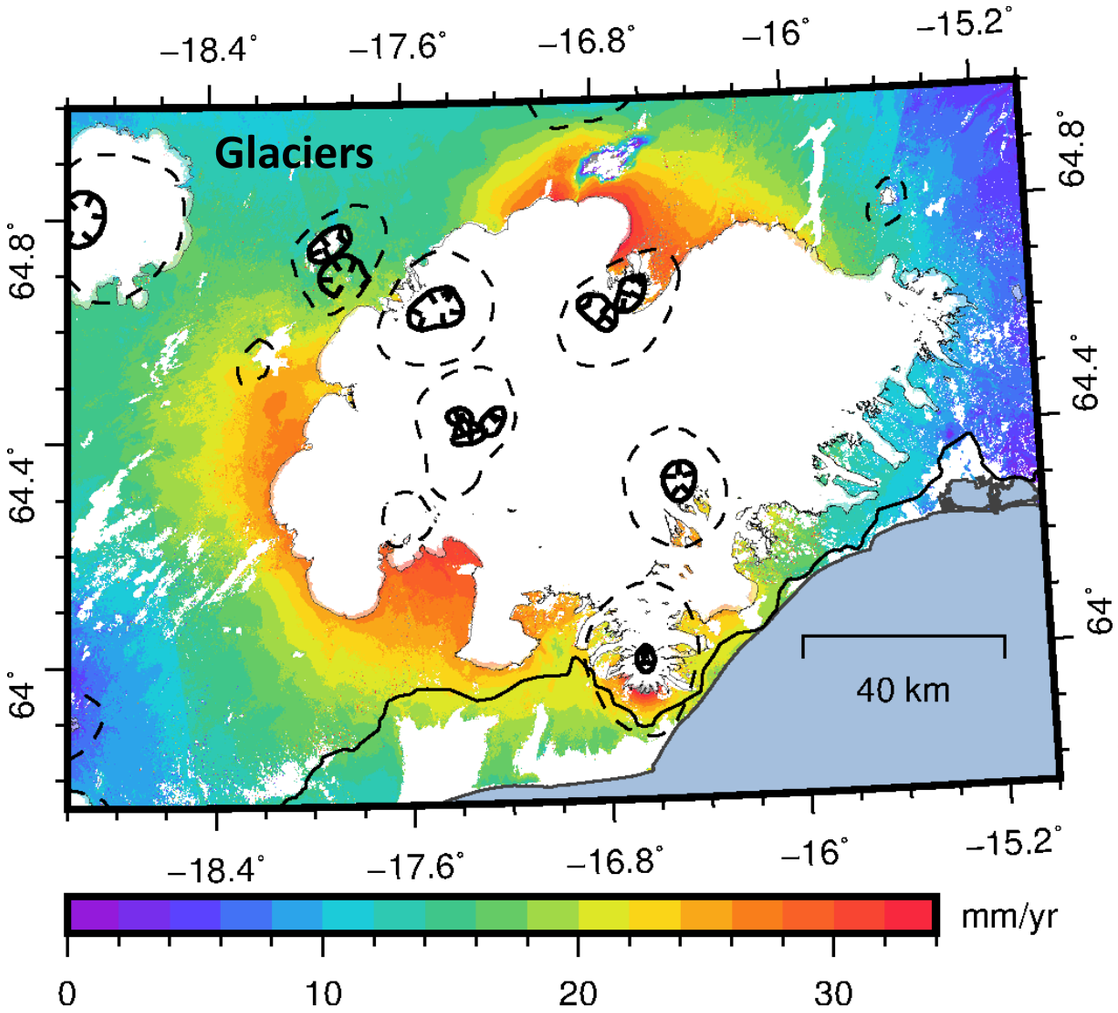
Coverage after one year

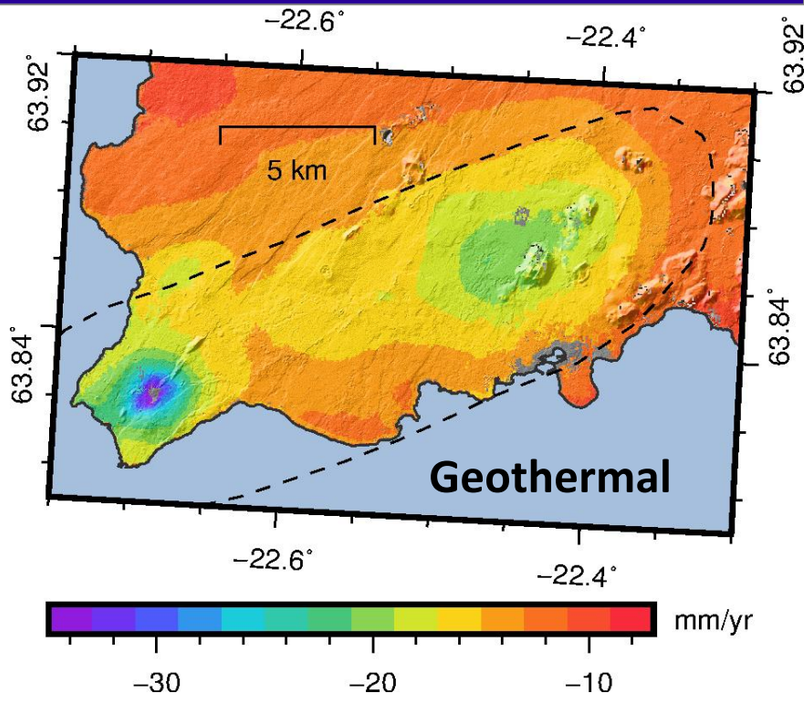


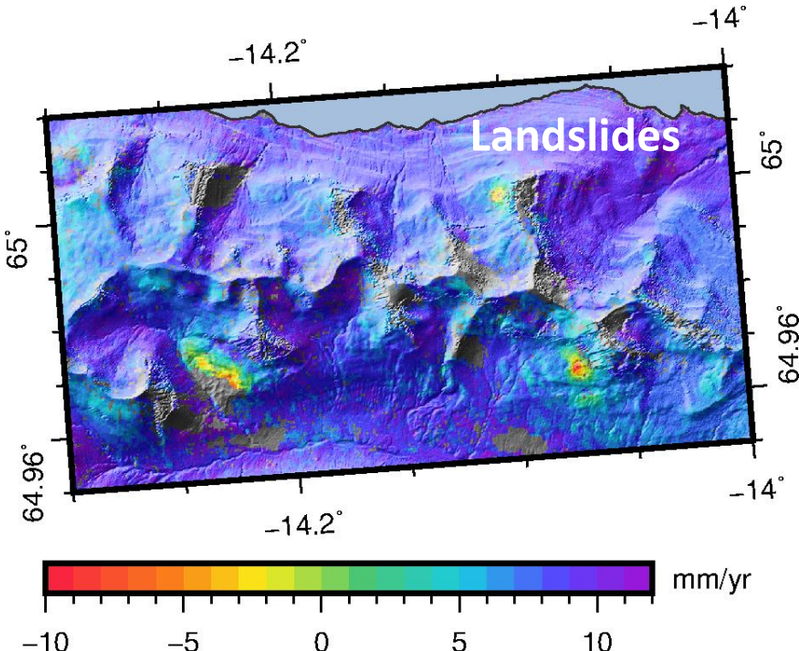

Data
Model
Residuals
Near-East
Near-Up
mm/yr
mm/yr


Volcano uplift
5 km
mm/yr


Volcano subsidence
5 km
mm/yr

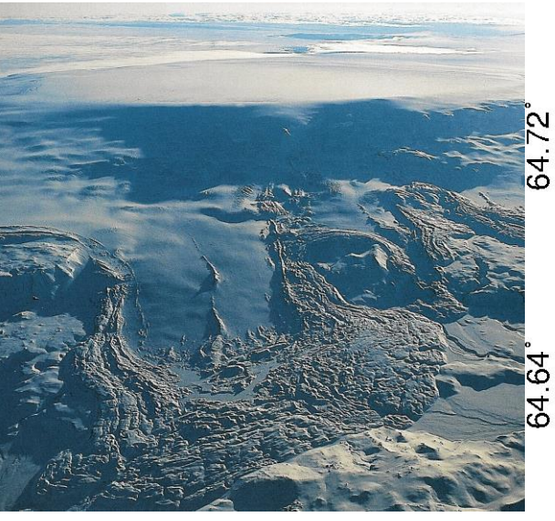

Glaciers
40 km
mm/yr

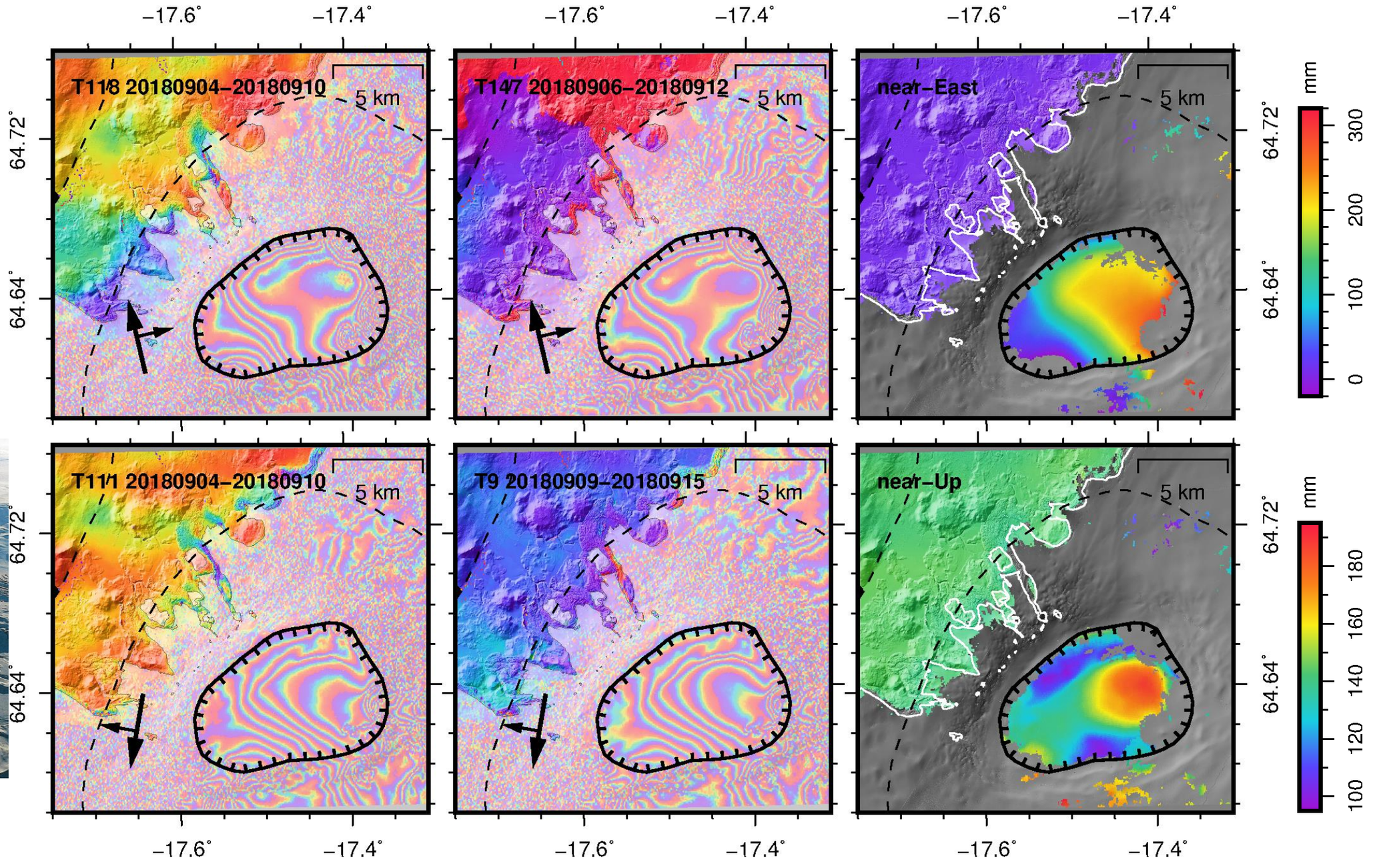

Geothermal
5 km
mm/yr


Landslides
mm/yr

It is possible to observe the ice flow on a glacier with InSAR if its flow rate is slow.

6-day interferograms using Sentinel-1 images can occasionally provide information about the ice flow on icelandic glaciers.





No information = information?

Some part of the interferograms are pure noise, they contains no valuable phase information.

This noise is usually caused by the ground surface changing to much between the two images.

6-days is a short enough period that no growing vegetation or ground deformation should cause such noise.

In winter in Iceland, the most likely cause behind the lost of phase information are snow falls changing the ground surface.