



Natural Hazards, Environmental Change and the Cryosphere

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Polar applications of Copernicus - International cooperation on Arctic issues

COPERNICUS FOR POLAR REGIONS INDUSTRY WORKSHOP

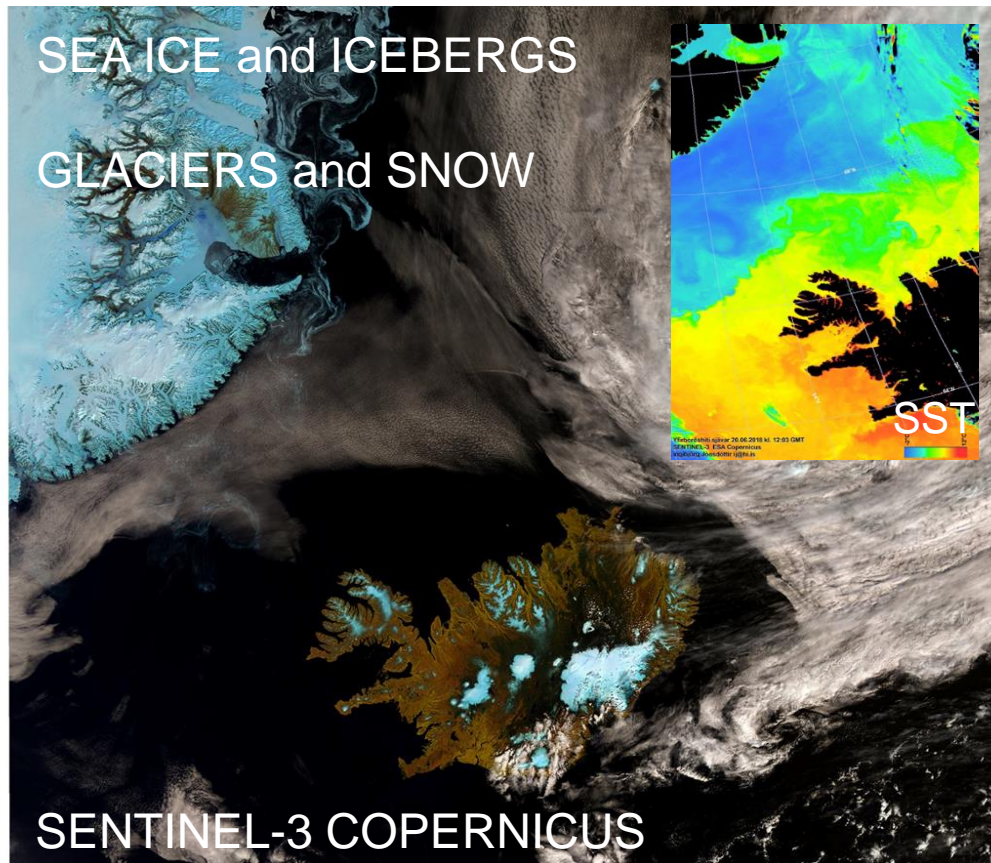
Brussels November 7th 2018



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For navigational safety and climate studies, from growlers to hemispheric coverage



Challenges:

- Dark – Cold – Cloudy
- Remote – Inaccessible - Changing fast
- Complex processes, high influence

Requirements:

- Real time acquisition and delivery
- Medium to high spatial resolution
- Spectral information – Multi spectral, Thermal, Passive mv, Radar
- Dissemination – Bandwidth, Warnings, Information

Importance:

- What is “within normal” vs what is change?
- Time to respond to hazards
- Understanding the system, predictions - actions
- Wellbeing of people and environment
- Research – Monitoring - Training



Sea Ice and Icebergs

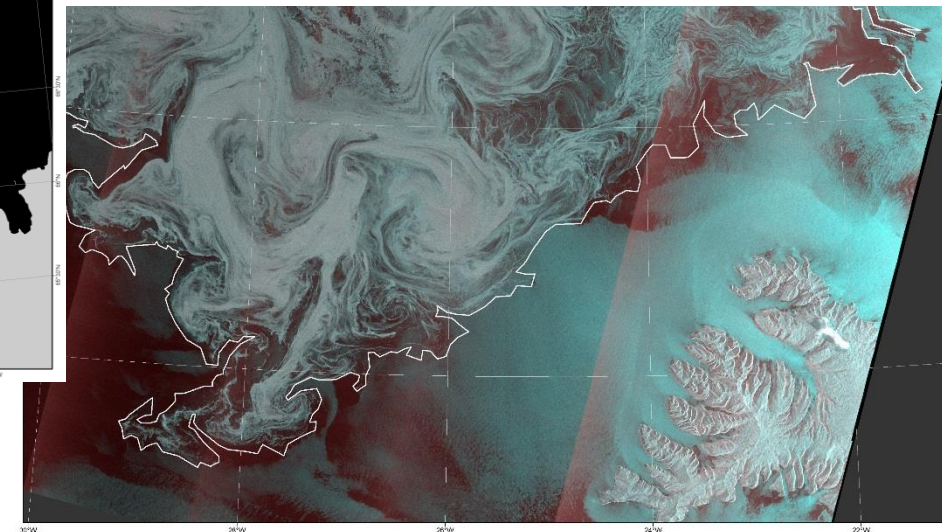
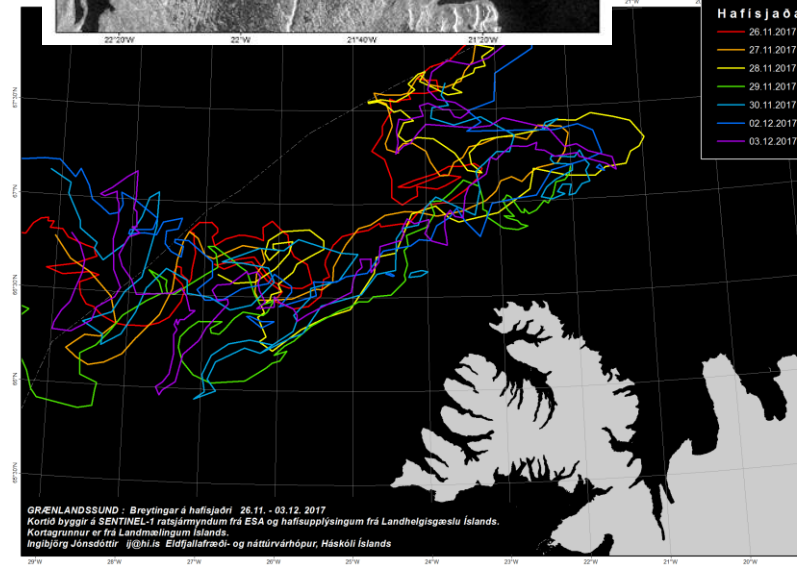
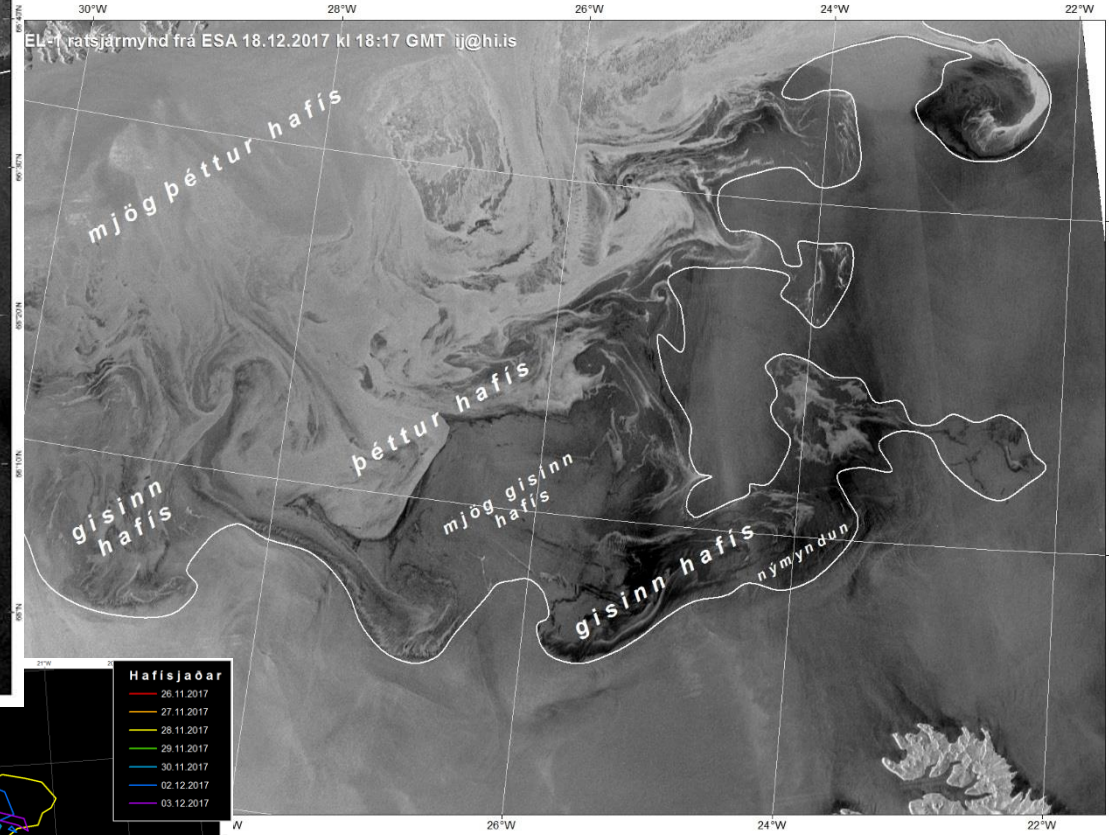
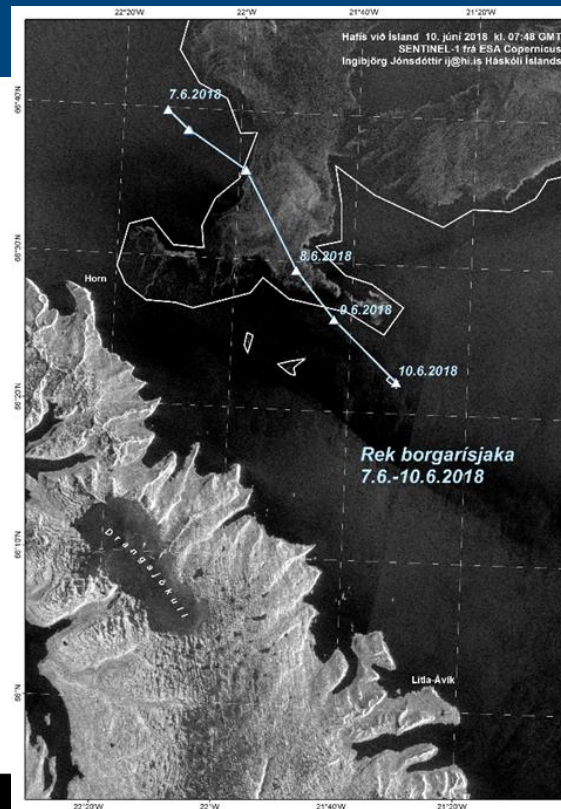
Sea ice information is needed on a daily to hourly basis for navigational safety, when ice is present

Radar imagery has proven to be very effective for this task, providing data reliably, independent of cloud cover or light

Having such good access to high resolution data so frequently has changed the scene completely for sea-ice monitoring and research

High temporal resolution enables iceberg tracking, deepening our understanding of drift and currents

It can be difficult to differentiate between smaller icebergs and ships, especially outside AIS coverage

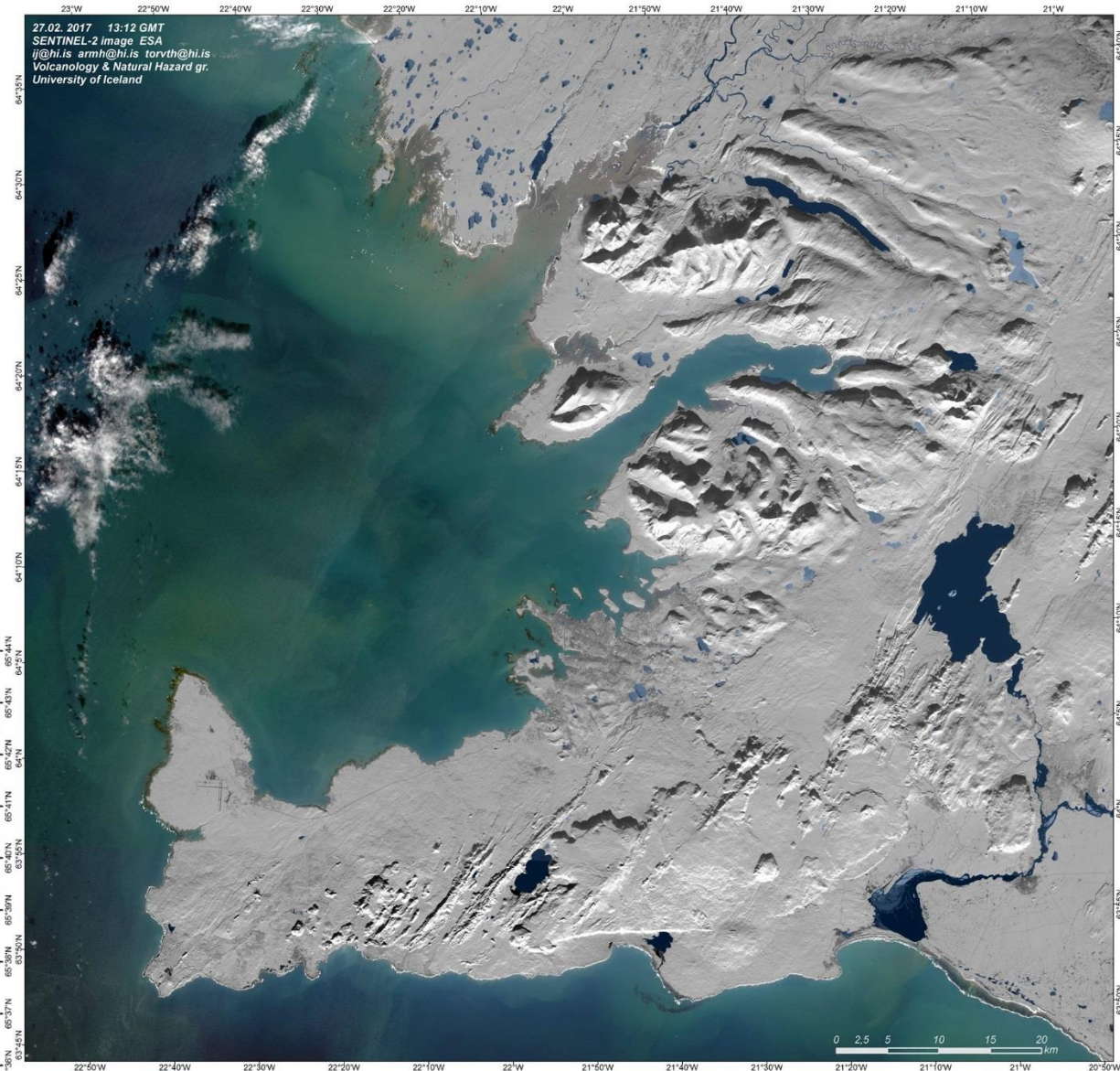
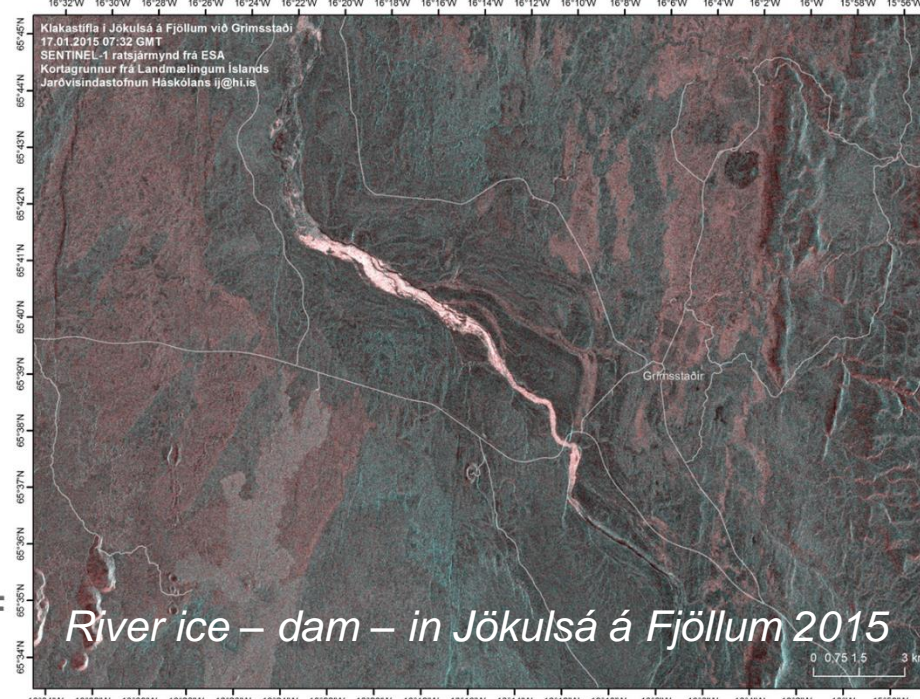
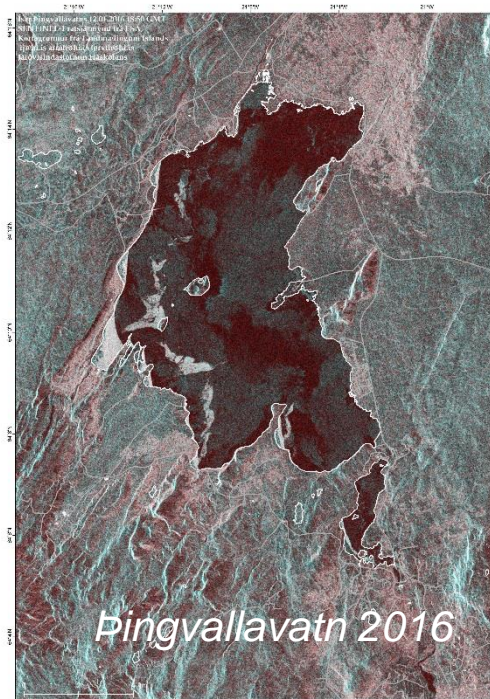




Lake and river ice

Sentinel-1 is used to detect ice dams in rivers. This can be important for identifying regions that are prone for being affected by such dams, and possible floods. It has been possible to see the growth and decay from subsequent images.

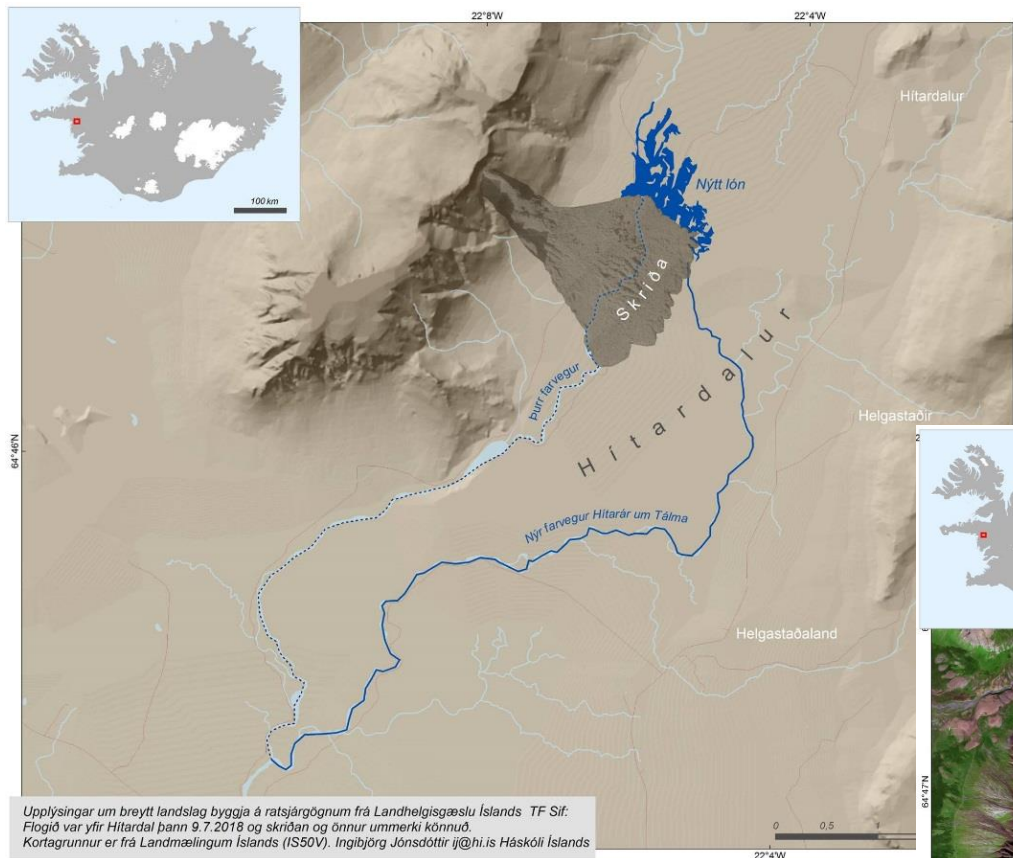
Sentinel 1 and 2 can be used to map lake ice and study structures of the ice: leads and pressure ridges, as well as monitor the formation and melting of the ice



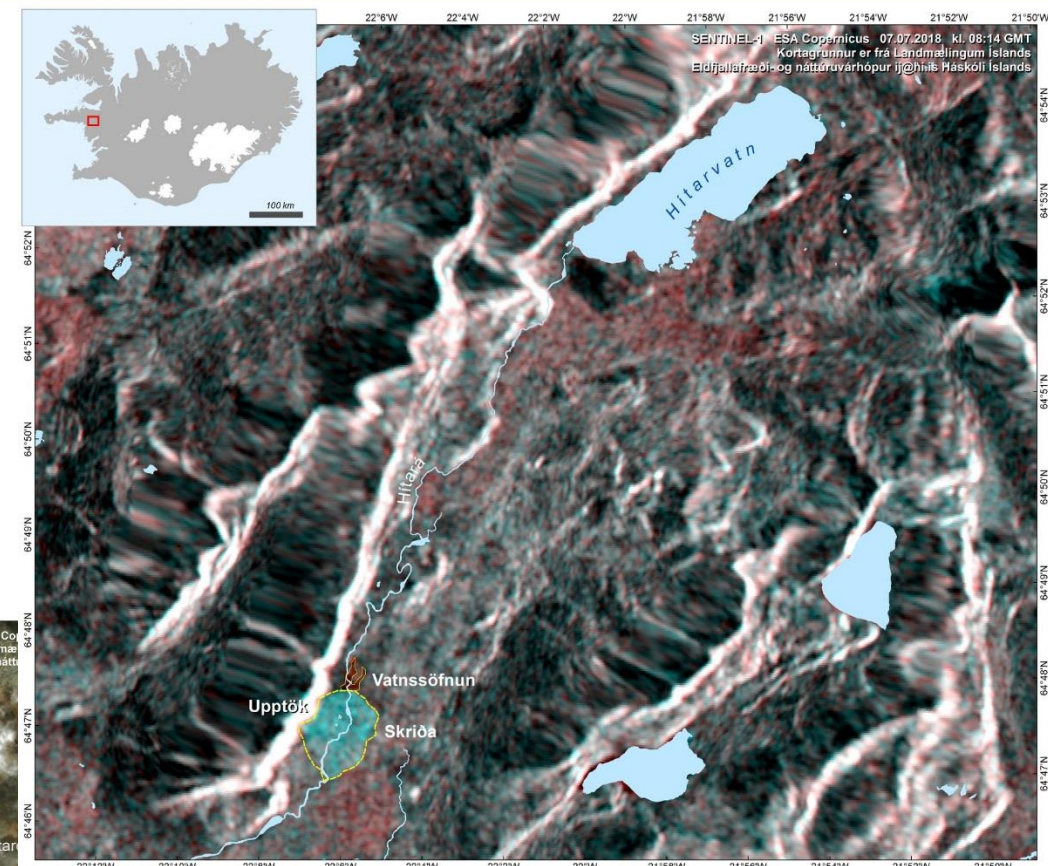
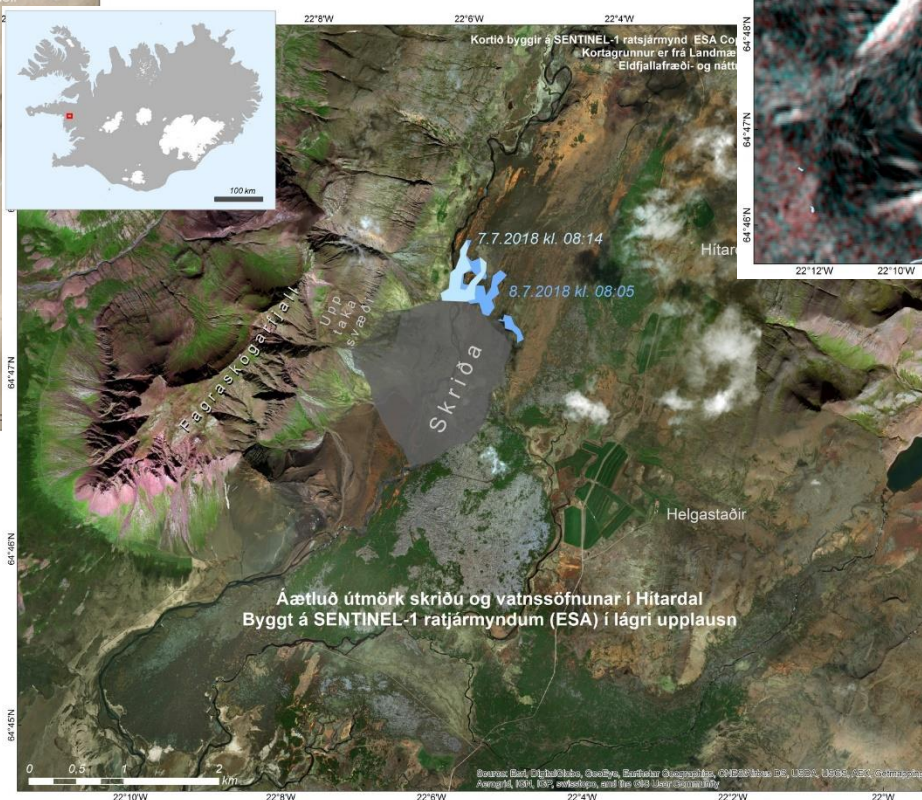
Frozen and unfrozen lakes and rivers February 2017



Landslides



SENTINEL-1
*Change detection of
landslide and water
Aerial photographs
and Icelandic Coast
Guard high resolution
images and radar data*



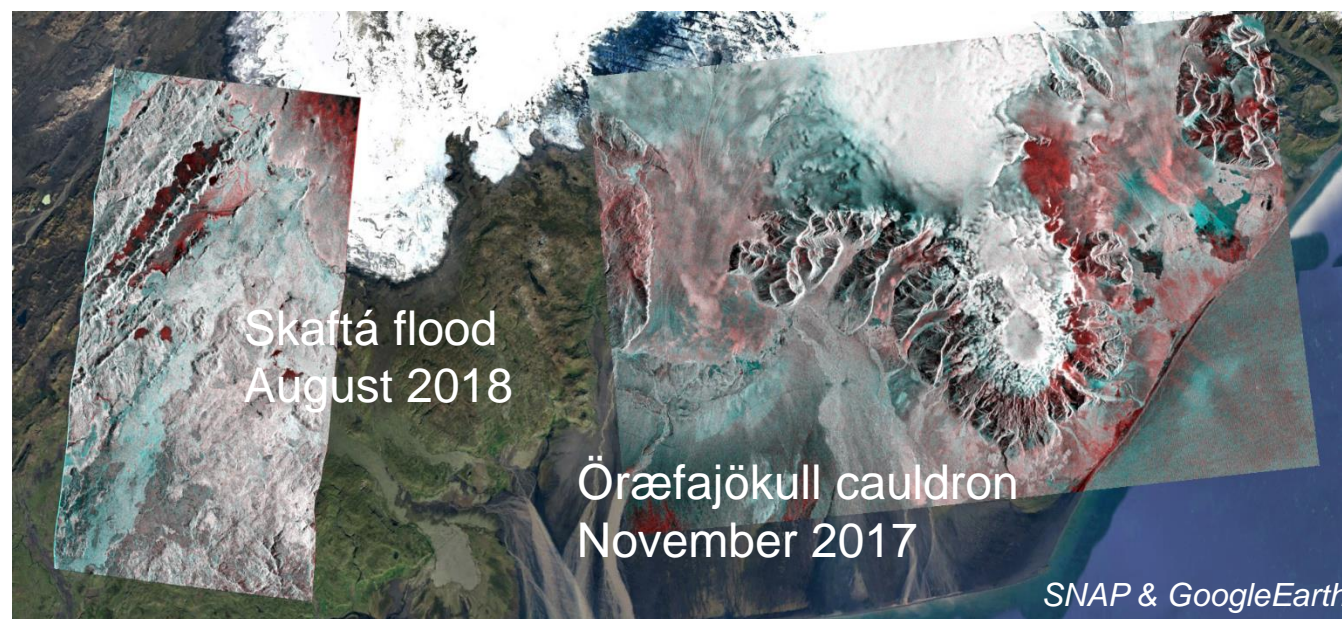
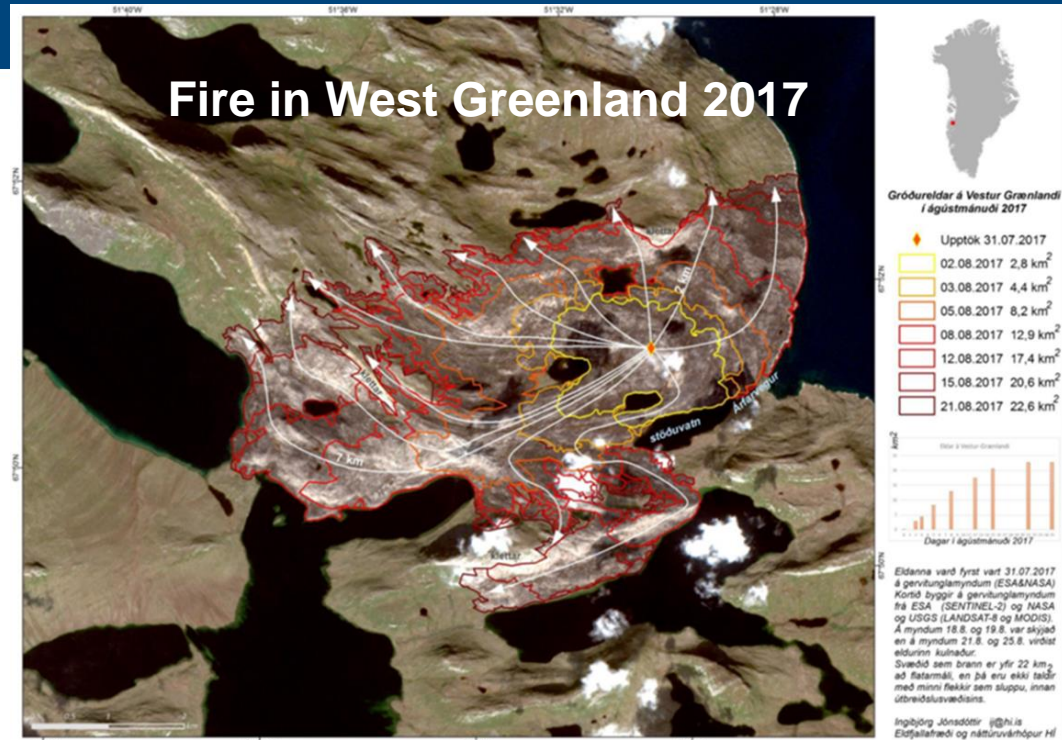
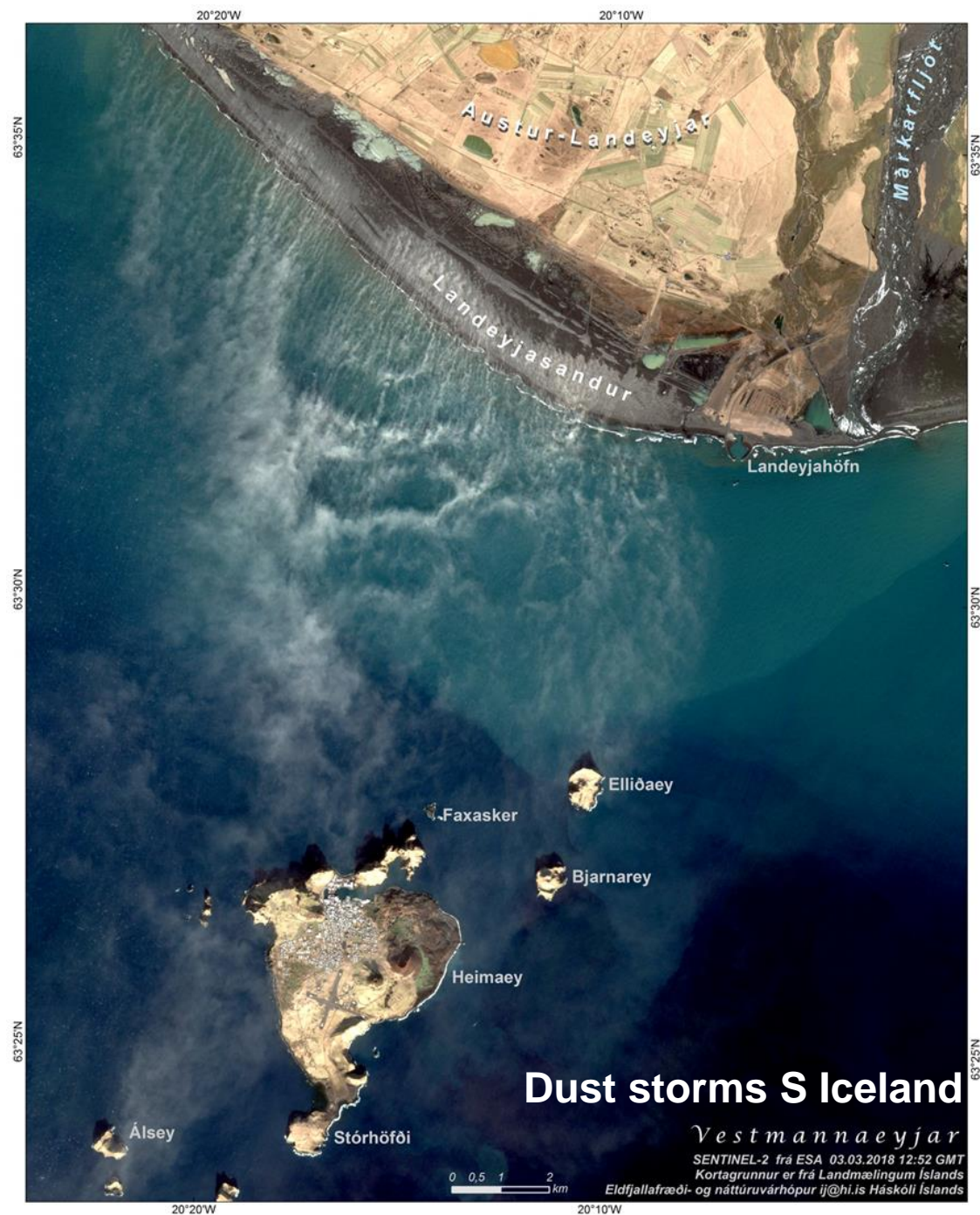
**Landslide detected and mapped
few hours after the event.
Next step, hopefully, to help
prediction of areas prone to
landslides or other hazard**



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**SENTINEL becoming
a standard product in
monitoring most events:
Eruption
Floods
Landslides
Cryosphere**



Flood mapping and cauldron detection SE Iceland



Significance of access to EU COPERNICUS data, software & training to monitoring, research and education in the Arctic & Sub-Arctic

- The combination of high temporal and spatial resolution is extremely important for monitoring natural hazard and environmental change.
- RADAR imagery is of particular importance in high latitudes, Arctic and the Antarctic
- Fast delivery of data in standardized format is essential – supports warnings, necessary reaction
- The data is used systematically to map the extent of hazard, affected regions and environmental change, to quantify many aspects of the change
- The next steps will be to learn more from these examples in order to be able to predict likely scenarios and understand processes better
- Copernicus data can be connected to other longer time series – from ESA, NASA and others.
- It is important to be able to study changes by comparison with earlier imagery. Now this is possible with data from all seasons. Otherwise it can be hard to detect relevant information from typical change detection.
- ***It would be useful to have the option of acquiring low solar and night time data for SENTINEL-2***

Without the access to the Copernicus datasets, many of the tasks would simply not be possible.

The support to the research community is very strong, through data, software and training

