Nordnes Test Site, Norway

Historic rockslide disaster in NO

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Nordnes landslide site: Context

- **Landslides in Norway:**
  - mountainous country with steep fjords.
  - Over 170 people killed in last century by tsunamis.
  - Rock avalanches typically preceded by years of slow movement.
  - Unstable areas monitored extensively
  - Challenge is to identify these areas!

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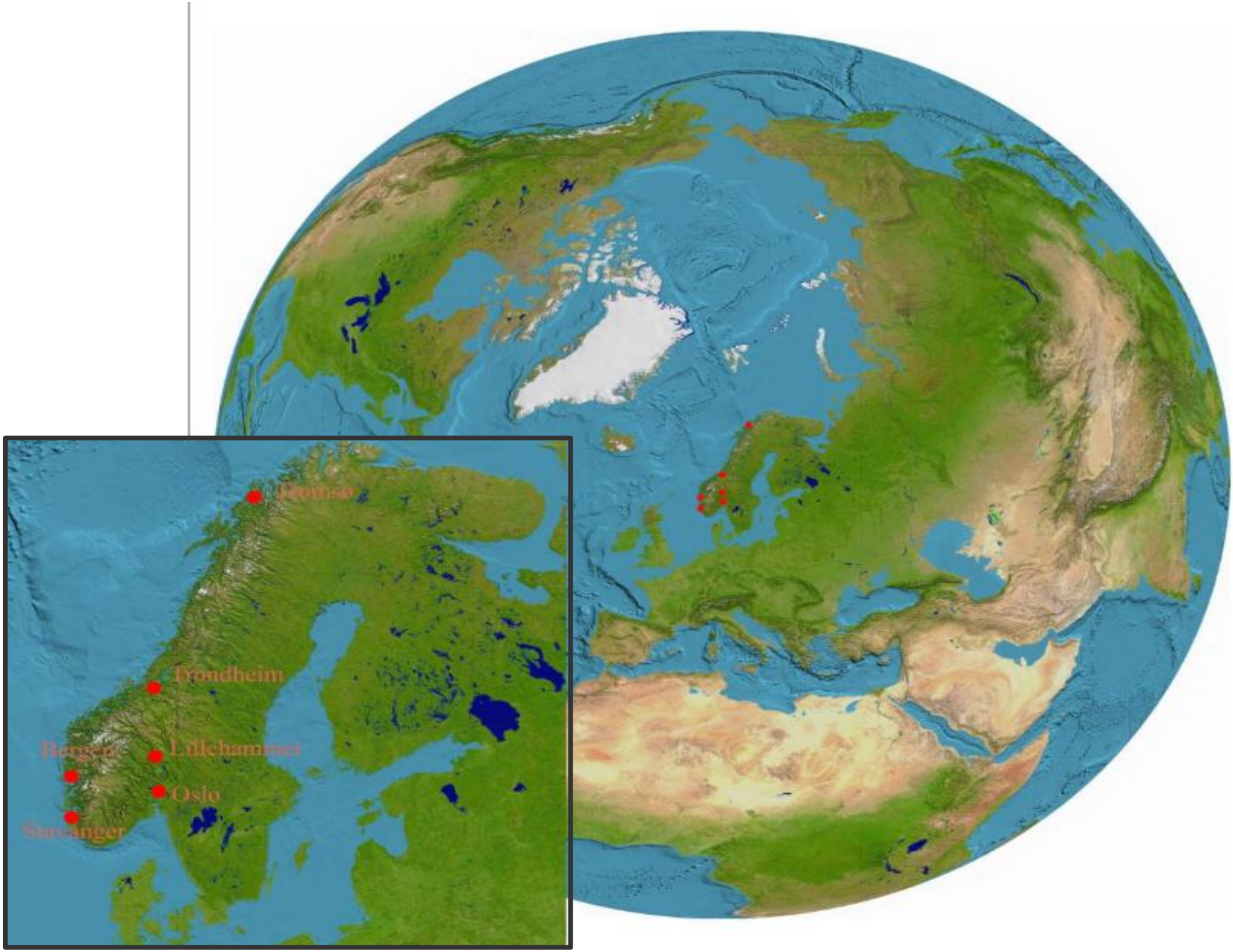
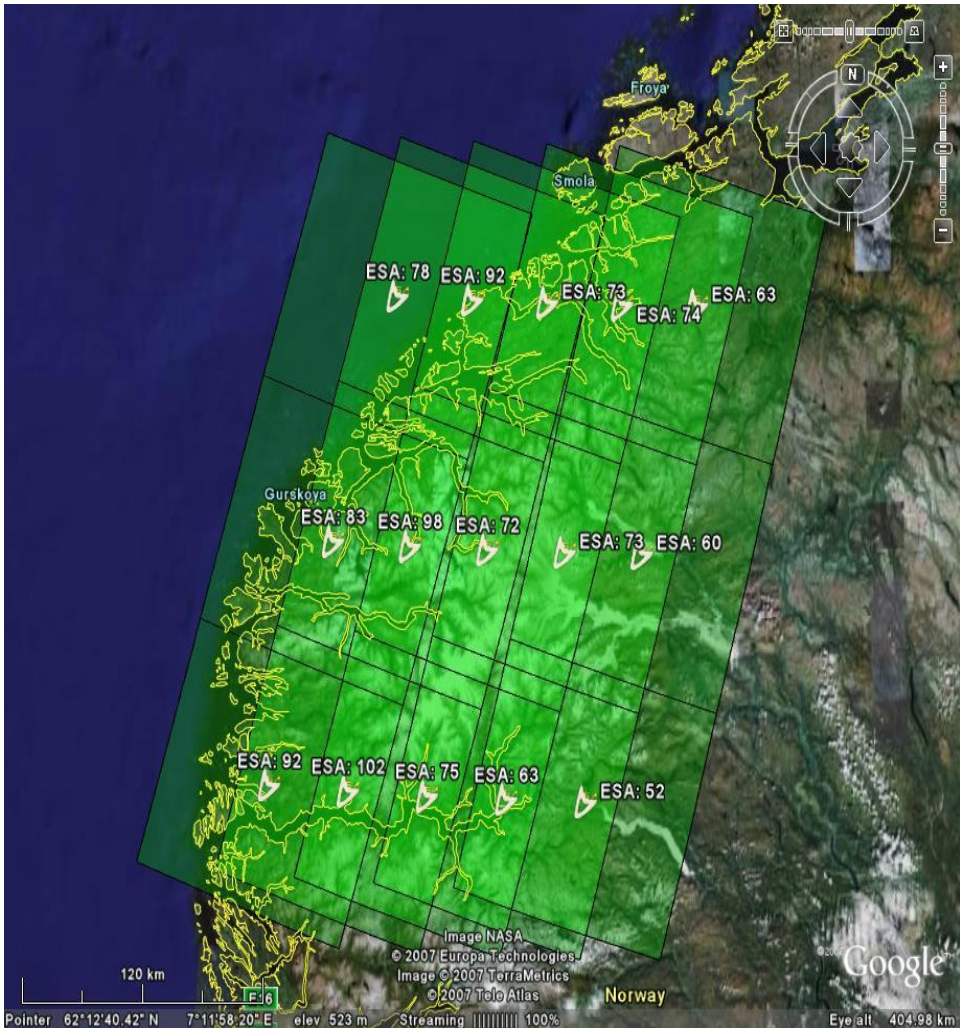
REGIONAL MAPPING

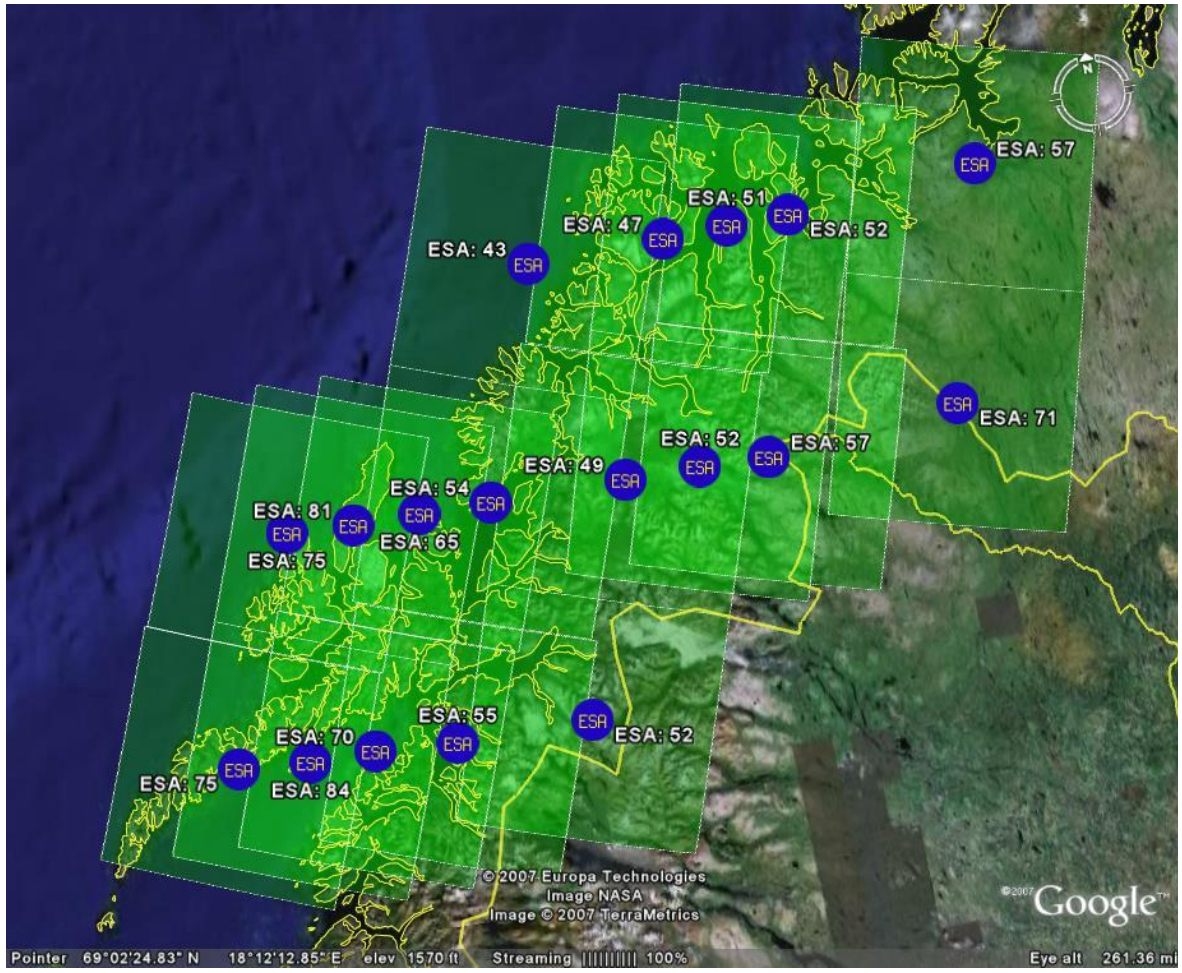
NGU
Norges geologiske undersøkelse
Geological Survey of Norway

NVE


Trondheim
Bergen
Lillehammer
Oslo
Stavanger

What we used to do: ERS & ASAR





In 2007, close to 1200 ERS scenes covering the most rugged parts of Norway were processed as part of our regional landslide mapping. This led to the discovery of several new unstable rock slopes.

What we are going to do: S1

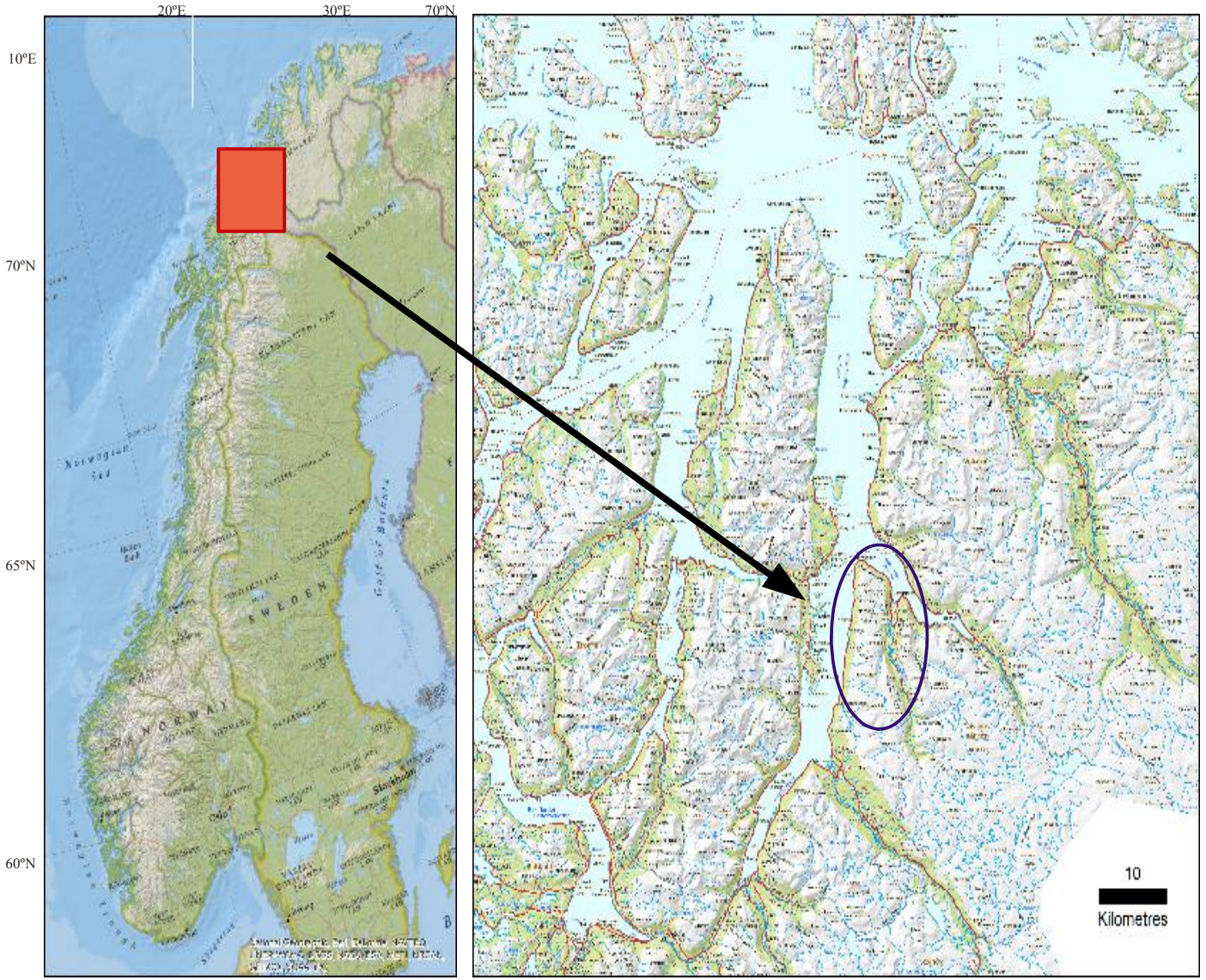
Before application ← validation

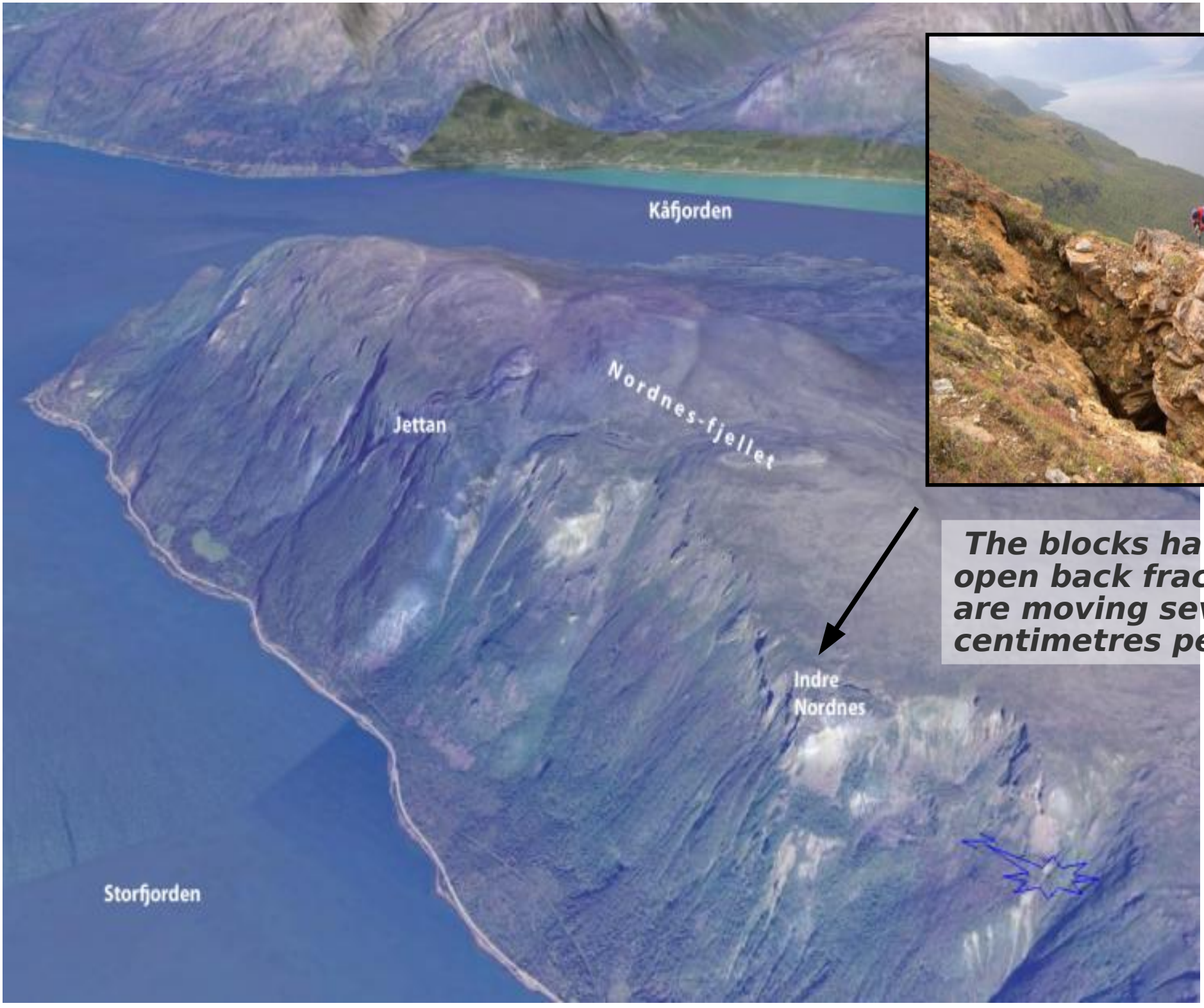
Troms County:

in Northern Norway, is a spectacular area for an integrated study of landslide processes.

The Lyngen region:

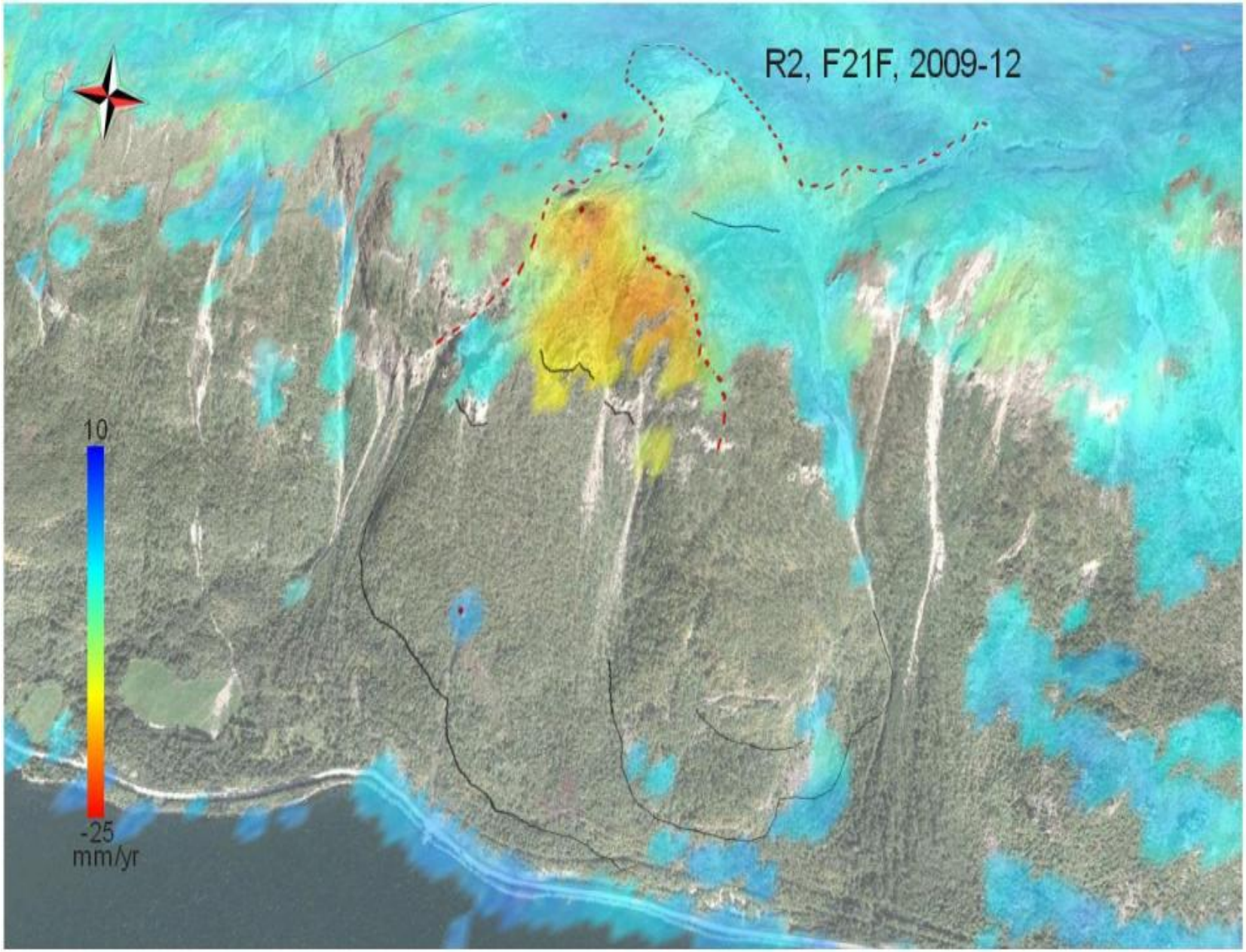
has an unusually high density of large unstable rock slopes.



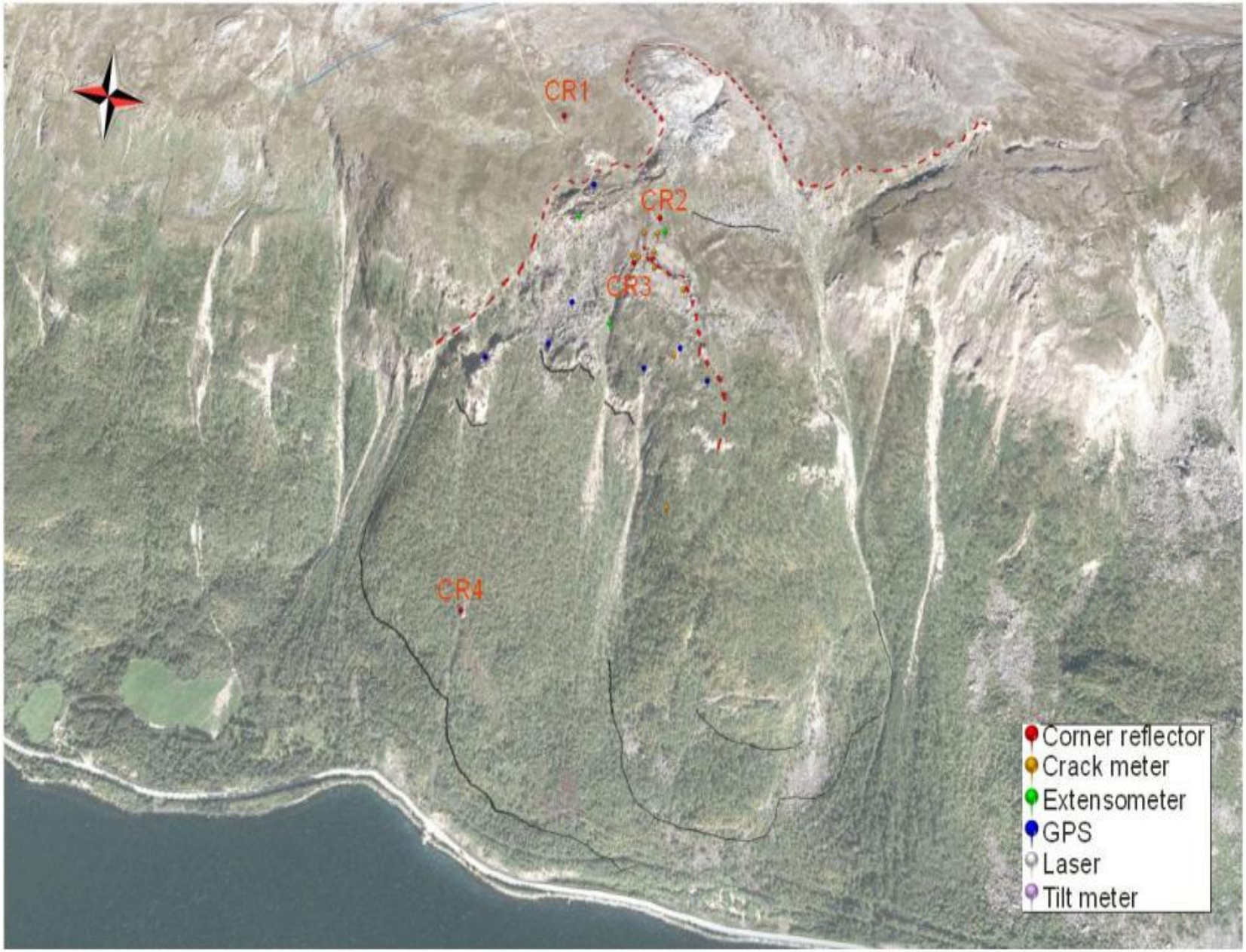


The blocks have large open back fractures and are moving several centimetres per year.

Landslides from mm/yr to dm/yr



Landslides from mm/yr to dm/yr



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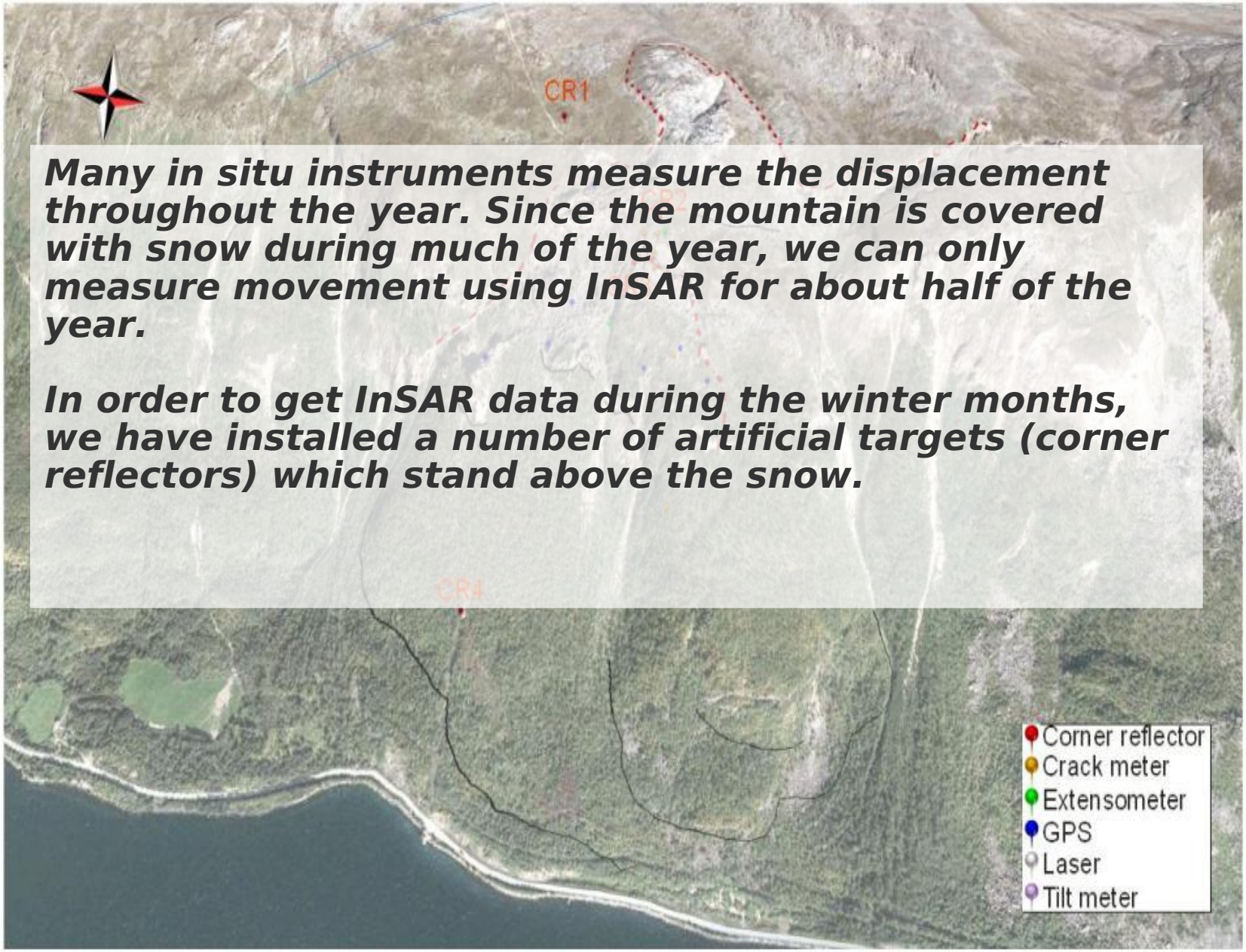
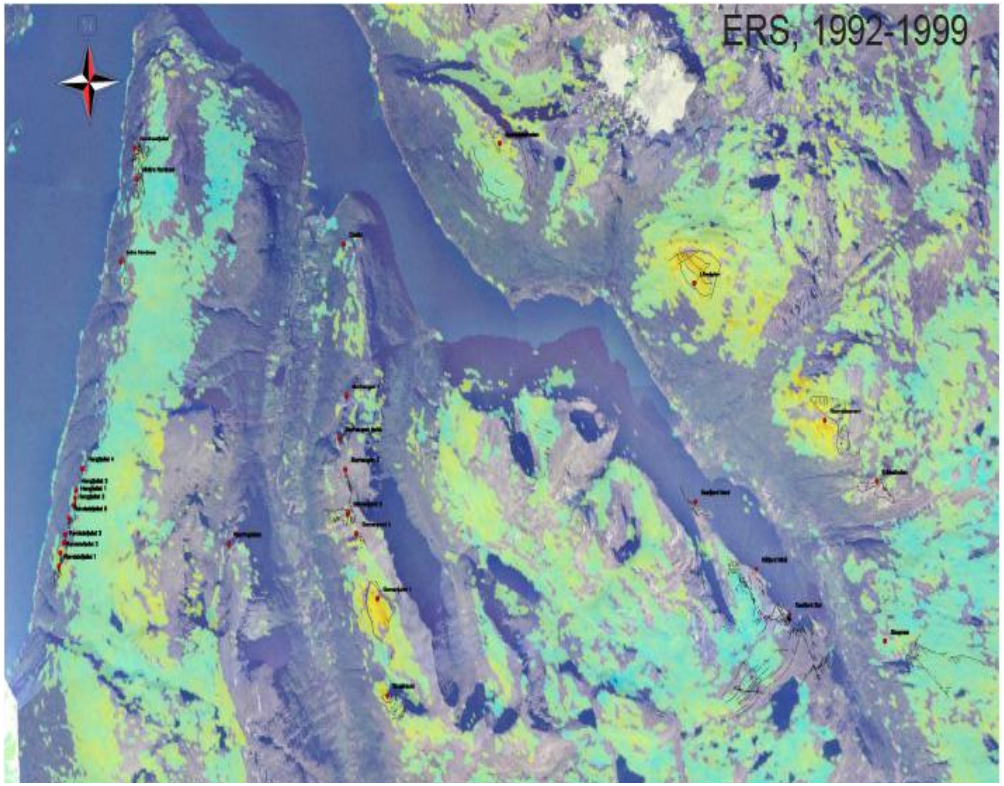
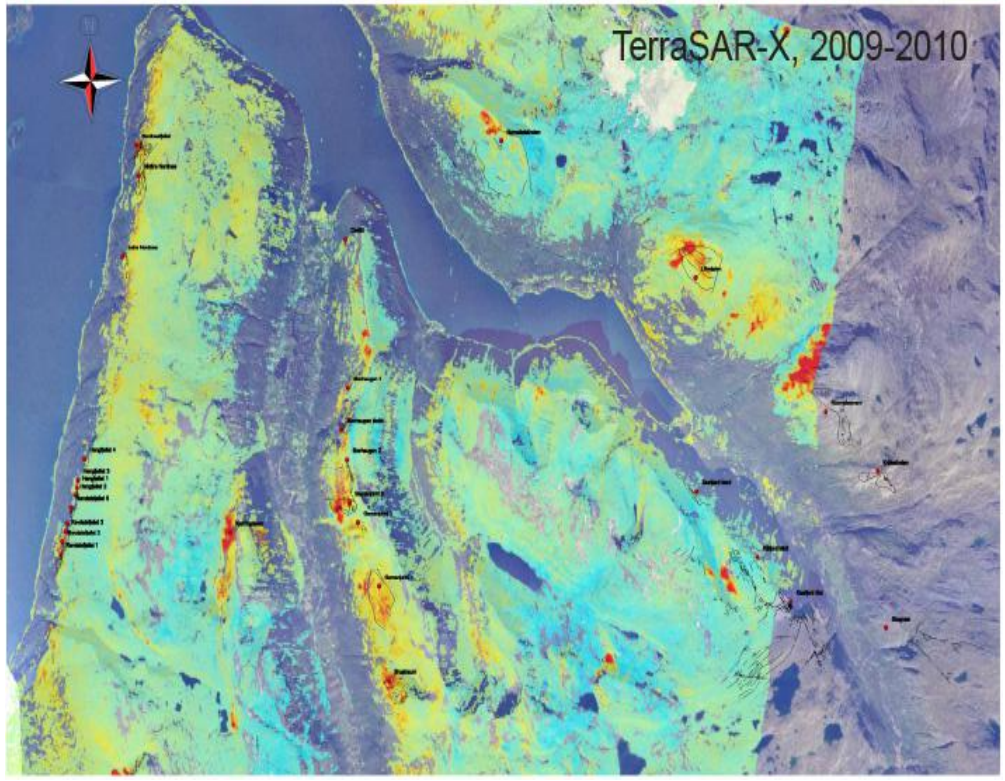


Many in situ instruments measure the displacement throughout the year. Since the mountain is covered with snow during much of the year, we can only measure movement using InSAR for about half of the year.

In order to get InSAR data during the winter months, we have installed a number of artificial targets (corner reflectors) which stand above the snow.

Limitations of previous sensors





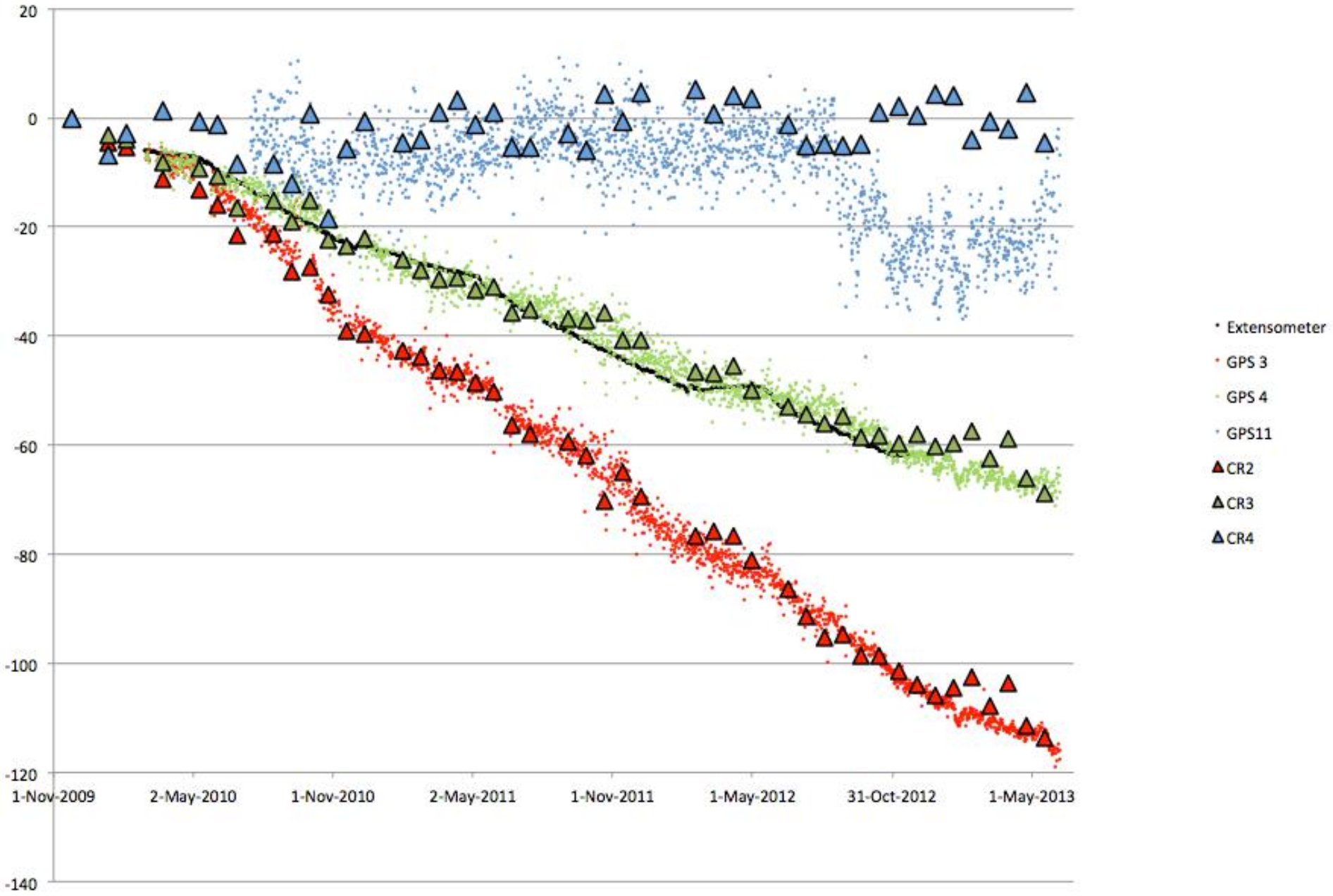
*Although numerous unstable slopes were identified using the archived ERS data, there were **significant limitations**. Some years had no acquisitions, while the best years had perhaps four **snow free** scenes.*

*Using **TerraSAR-X**, which has a **similar repeat interval to Sentinel-1a**, we were able to acquire as many as 15 snow free scenes in a single year. This lead to a **dramatic increase** in the number of unstable slopes we could identify.*

Monitoring

Monitoring

What we expect to see



Summary for Nordnes Test Site

- **Main overall objective regional / national mapping**
- **Secondary objective cal/val of S-1 for landslides monitoring**
- **Initial assessment ← S-1 coverage temp/space: very promising!**
- **Practical considerations:**
  - Onset of winter in Norway before S-1 was operational
  - Only a few available coherent combinations, but none after last burst sync change
  - Snow protected CR's can still be used throughout the winter!