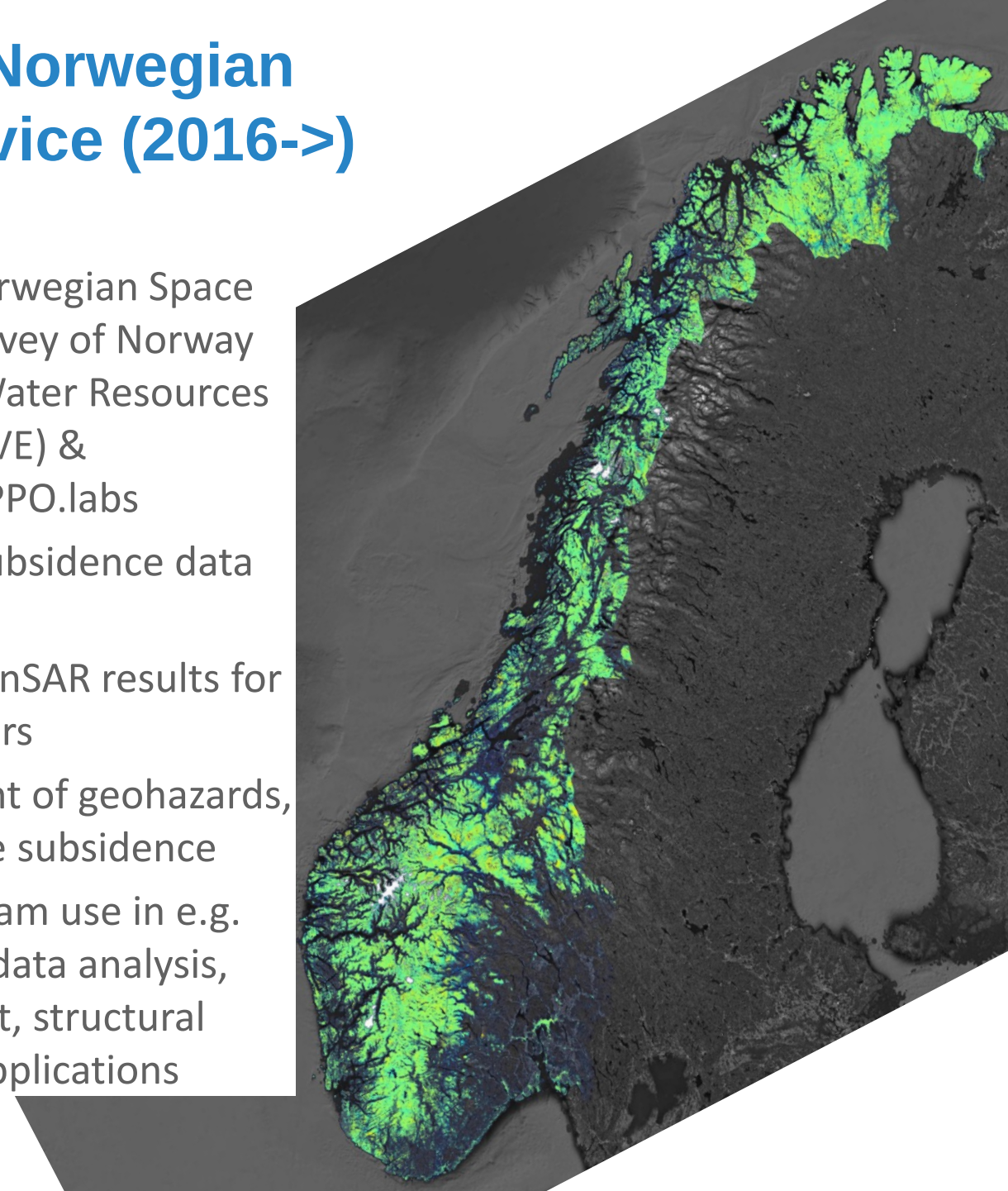
Status
InSAR Norway

Norsk Romsenter
Norwegian Space Agency

Dag Anders Moldestad
Norwegian Space Agency
Dag.Anders.Moldestad@spaceagency.no
+47 91 32 82 73

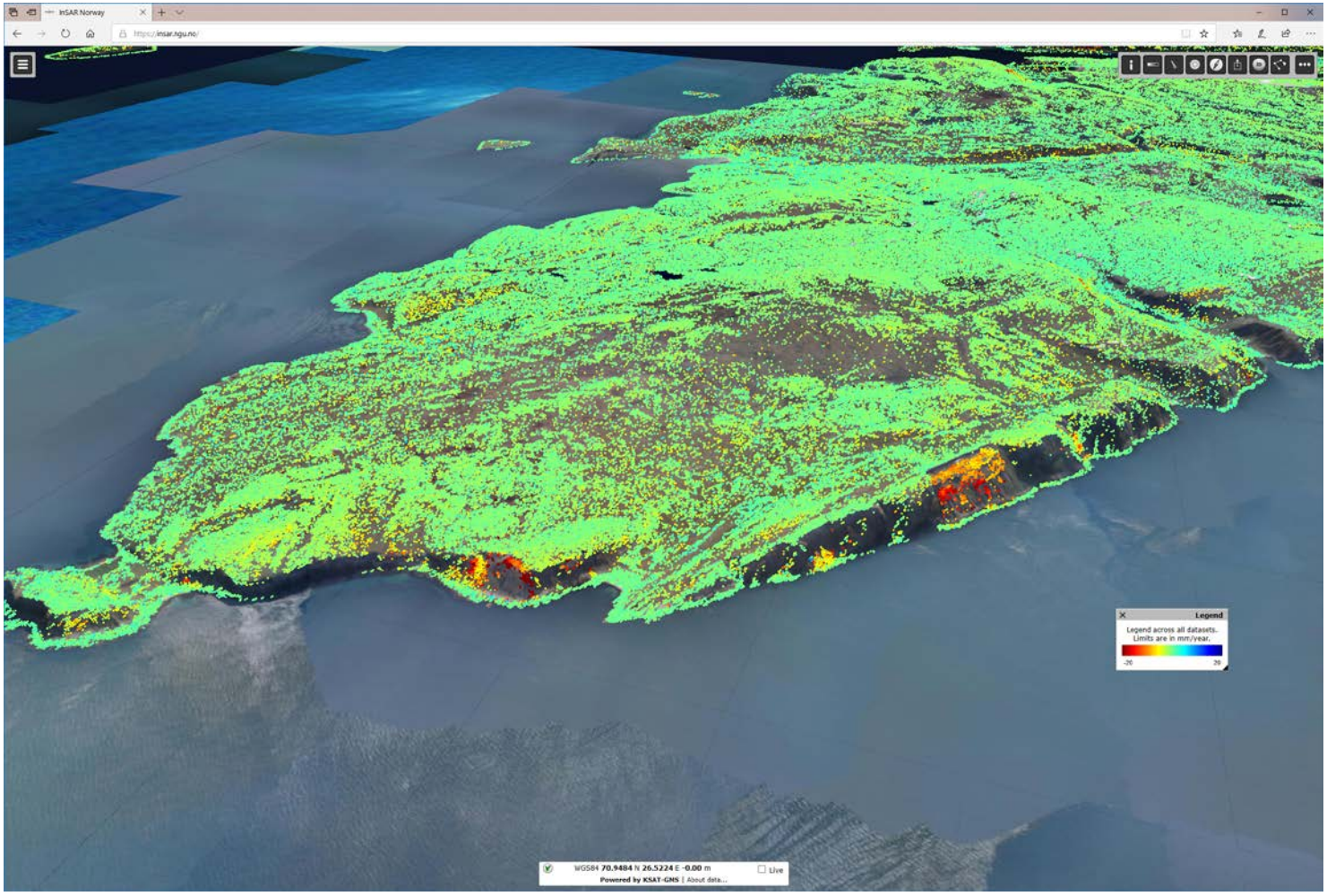
InSAR Norway – Norwegian Ground Motion Service (2016->)

- Insar.ngu.no
- Collaboration between Norwegian Space Centre, The Geological Survey of Norway (NGU) & The Norwegian Water Resources and Energy Directorate (NVE) & subcontractors NORUT & PPO.labs
- Goal: Operational InSAR subsidence data production over Norway
- Improved accessability of InSAR results for public and commercial users
- Mapping/Risk management of geohazards, rock slides & infrastructure subsidence
- Tool for creating downstream use in e.g. geotechnical, climate, big data analysis, insurance, property market, structural engineering & transport applications

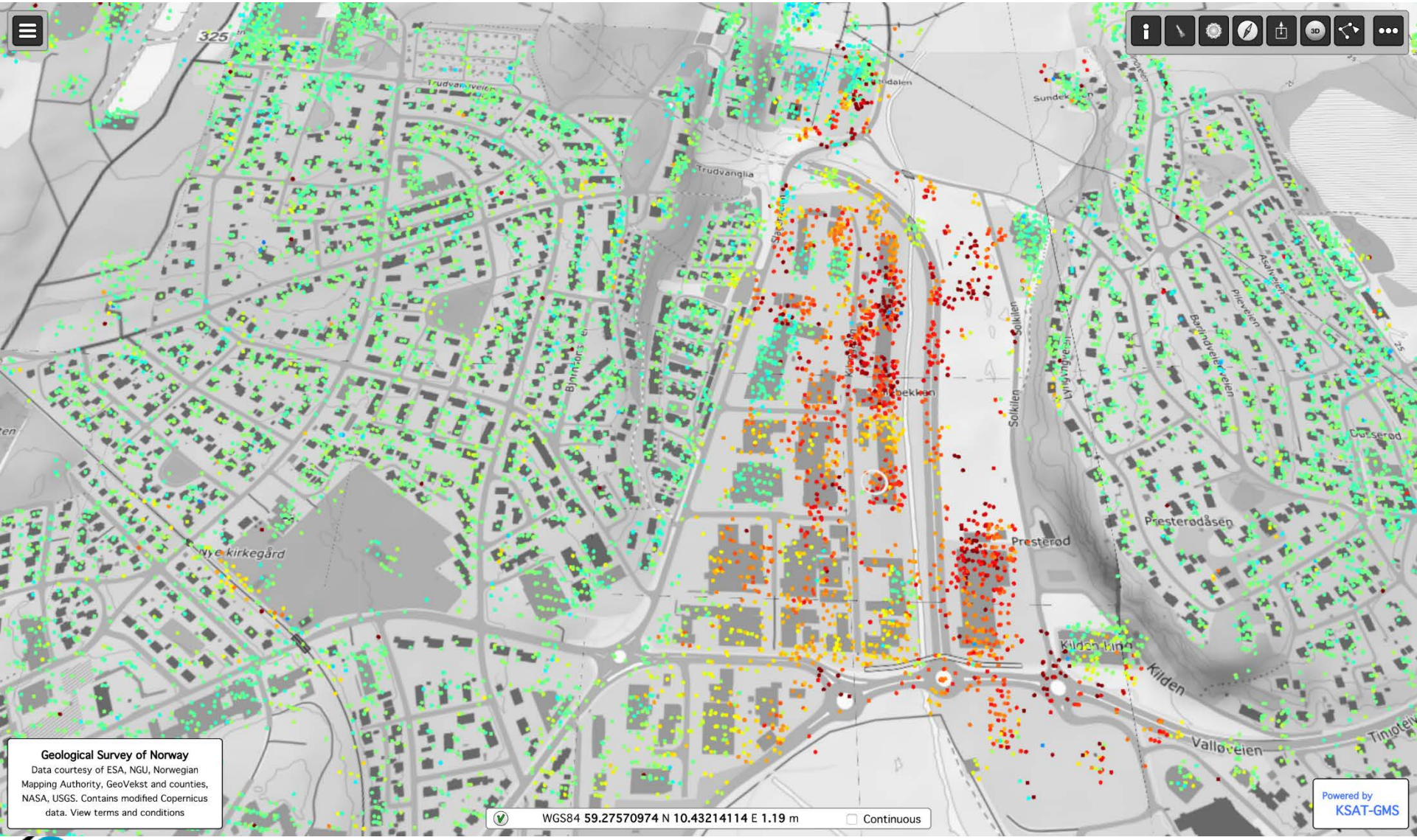


Norsk Romsenter
Norwegian Space Agency

Mountain on the move close to Honningsvåg (InSAR Norway – Norwegian Ground Motion Service)

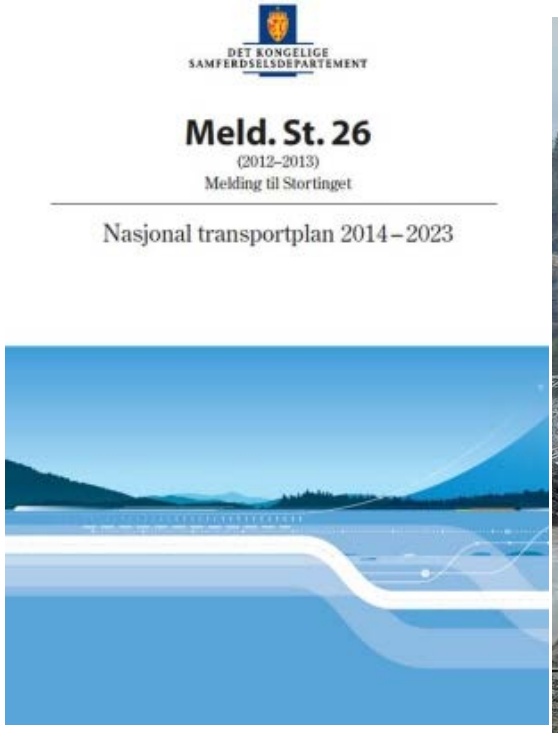


Subsidence in Tønsberg - variation in foundation (InSAR Norway – Norwegian Ground Motion Service)



Norsk Romsenter
Norwegian Space Agency

Life phase monitoring with InSAR of new large building projects of transport infrastructure



- Before building
- During building
- After building

Norsk Romsenter
Norwegian Space Agency

Kommunen mener skadene er entreprenørens skyld: – Dette burde kommunen ha forutsett, svarer selskapet

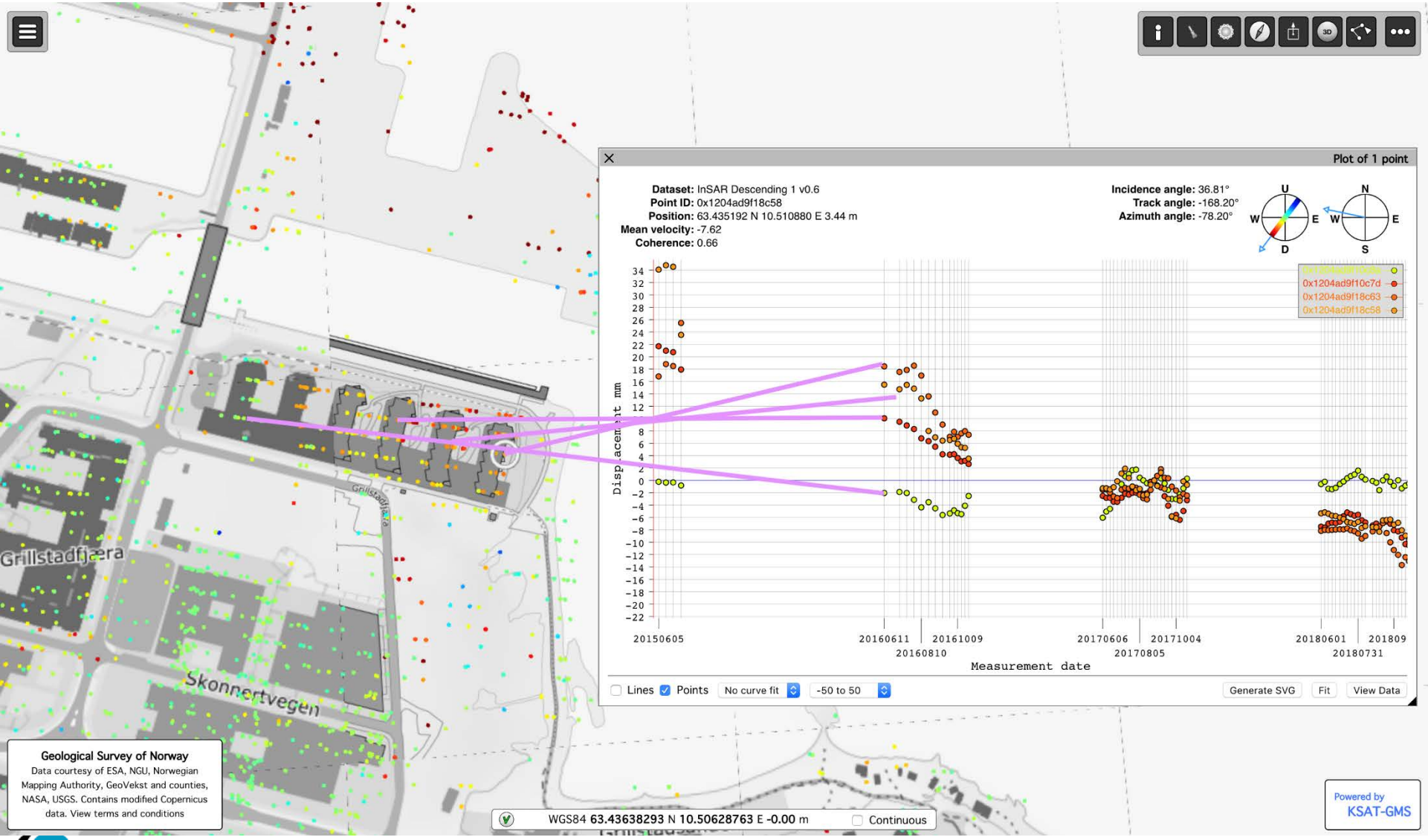
SYNKER: Grunnen rundt Bjønnessåsen bo- og aktivitetssenter synker. Dette har medført setningsskader ved inngangspartiet og i sansehagen. Foto: Therese Eskelund

– I møtet 20.12.2018 henviste vi til NGUs satellittbaserte målinger, som indikerer at det er setninger i hele området omkring Bjønnes bo- og behandlingssenter, og ikke bare inntil bygget. Store deler av området var ikke gjenstand for våre byggearbeider. Det er dermed ingen åpenbar sammenheng mellom hvordan vi har utført fundamenteringsarbeid, masseutskifting m.m. og de generelle setningene som observeres.

– Rapporten peker på faren for setninger ved grunnvannssenkning. Samtidig er det i kommunens kravspesifikasjon krevet at det dreneres rundt bygget. Kommunen var ved dette tidspunktet i stand til å forutse at dette kravet om drenering ville kunne medføre grunnvannssenkninger med tilhørende setninger, akkurat slik som det observeres i dag. Vi anser grunnvannssenking for å være en mulig årsak til setningene, og avviser derfor at det foreligger en mangel som Veidekke Entreprenør AS er ansvarlig for.

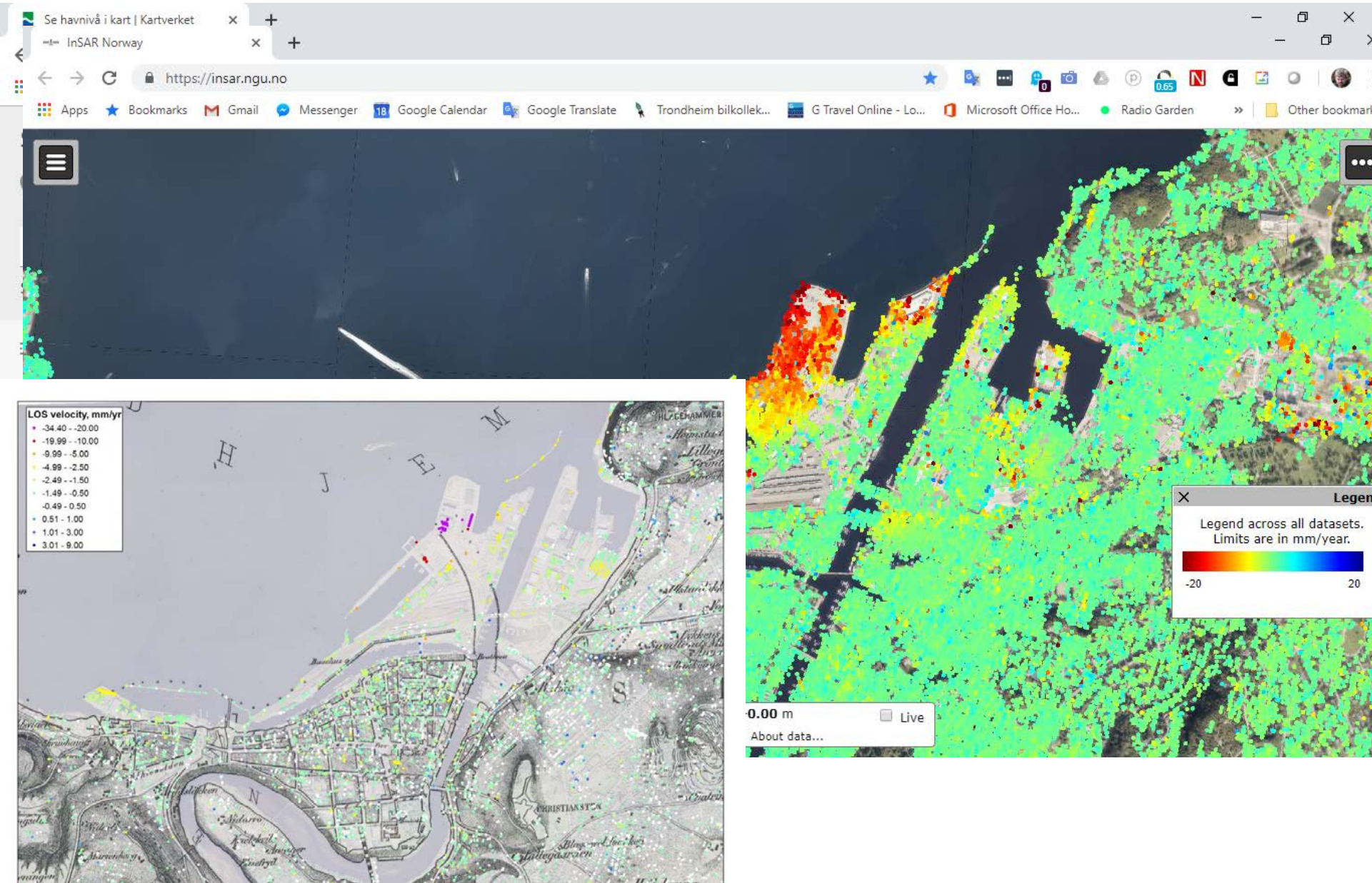
– Tvert imot mener vi at kommunen selv både kunne forutsett og må ta på seg ansvaret for den utvikling som er observert. Det er heller ikke tvilsomt at kommunen har ansvaret for byggetomtas beskaffenhet.

Subsidence at the Grilstad marina (InSAR Norway – Norwegian Ground Motion Service)

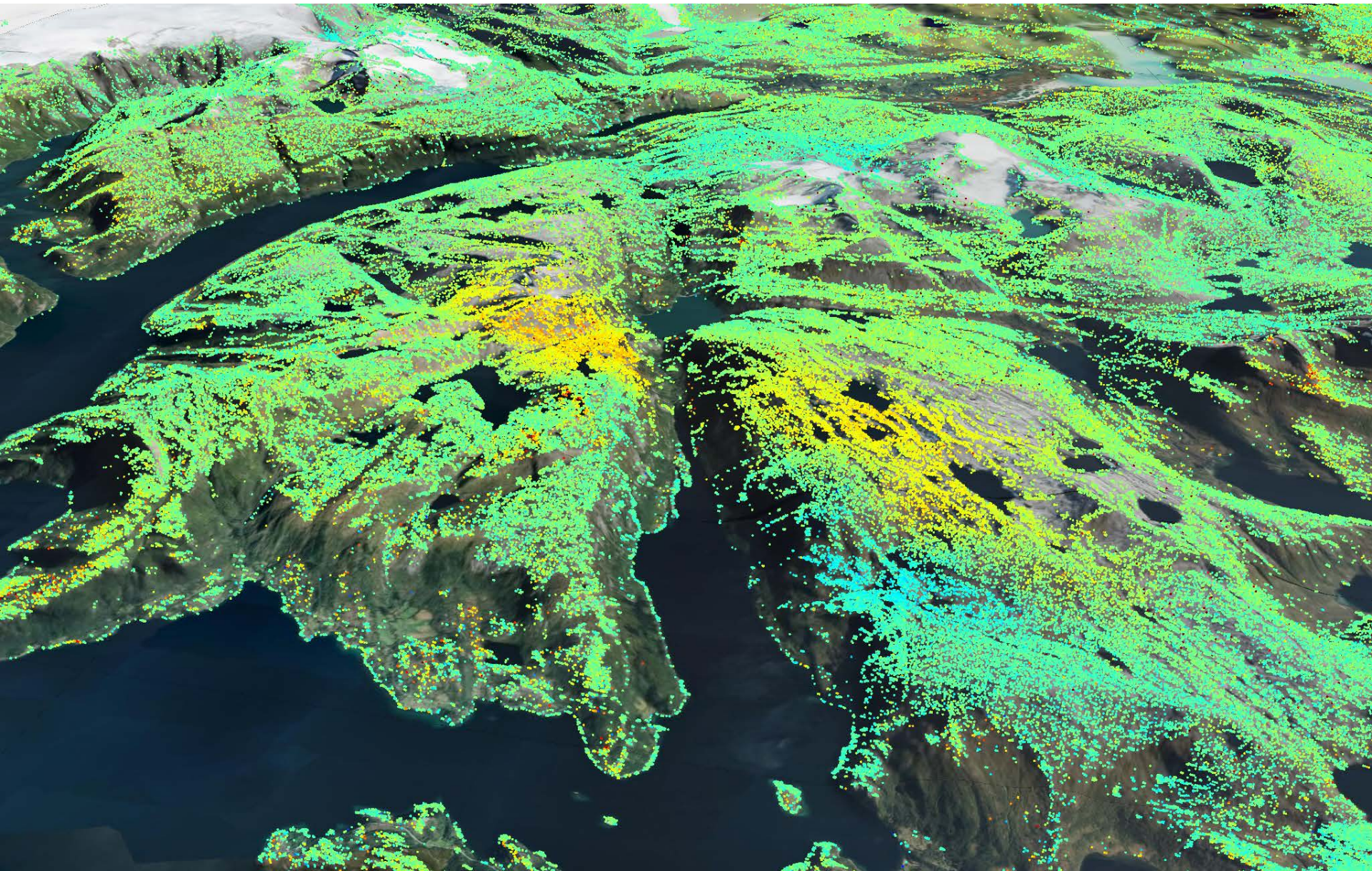


Norsk Romsenter
Norwegian Space Agency

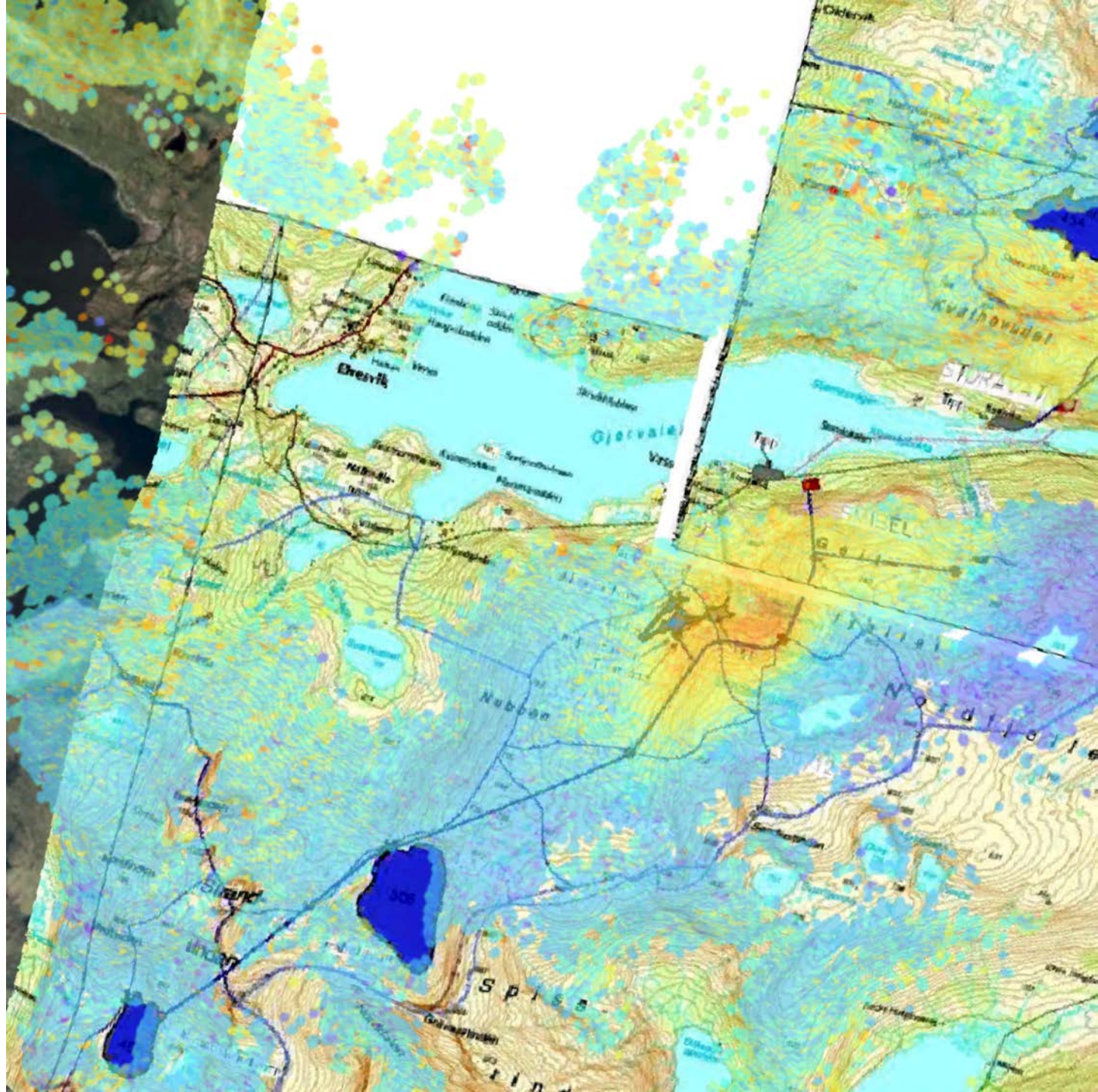
Sea level change / flooding



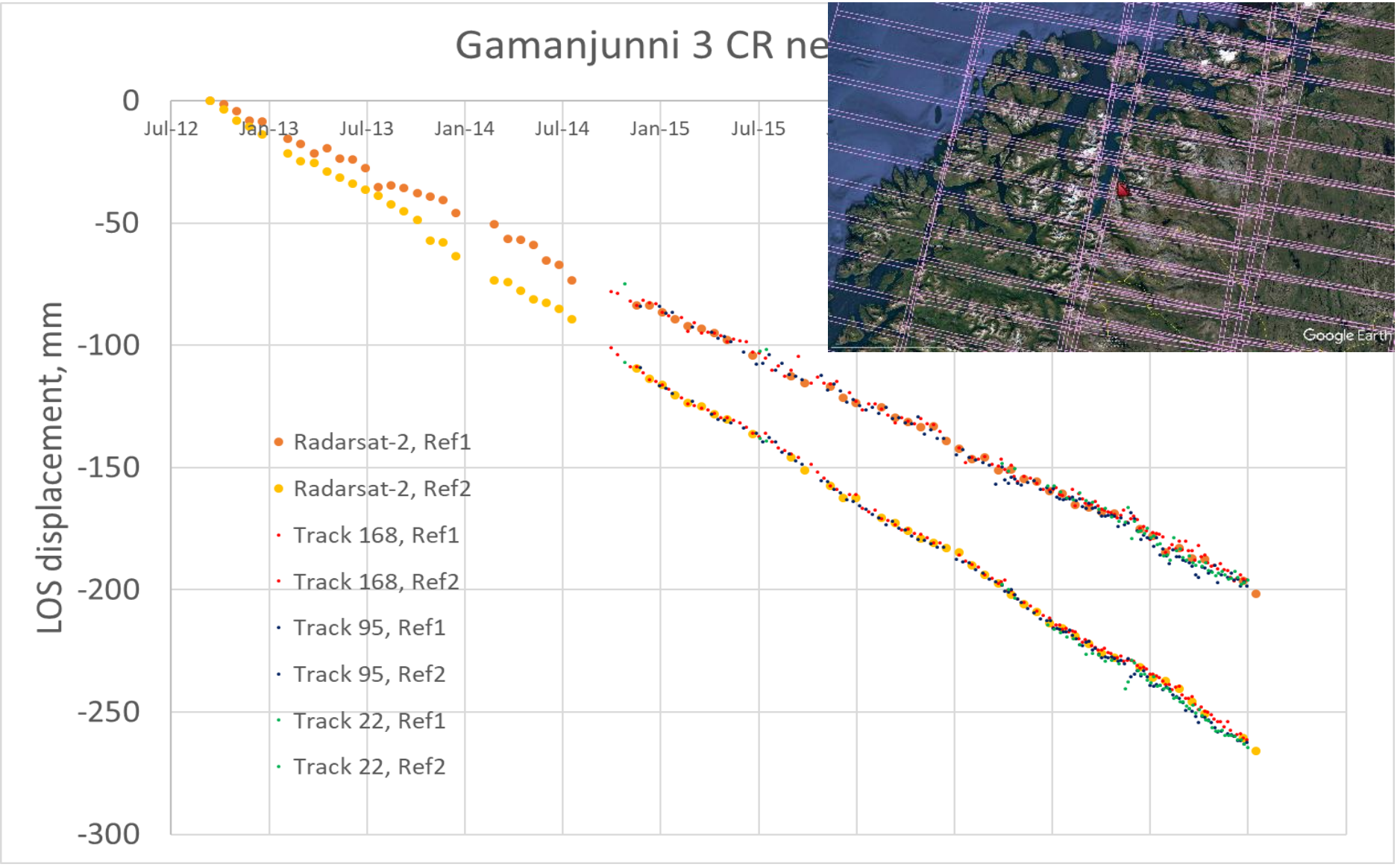
What is this?



What is this?



The quality of the InSAR subsidence measurements from Sentinel-1 is outstanding! (NGU & NORUT)



Feedback

Fri 10/12/2018 2:12 PM

BE

Bernd Etzelmüller <bernd.etzelmuller@geo.uio.no>

RE: RE: question

To Dehls John

You replied to this message on 10/12/2018 3:57 PM.
We removed extra line breaks from this message.

John,

These data are amazing. Totally. My features are visible, and velocities are what we measure. Amazing ...
Thnaks
Bernd

>-----Original Message-----
>From: Dehls John <John.Dehls@NGU.NO>
>Sent: Friday, October 12, 2018 9:36 AM
>To: Bernd Etzelmüller <bernd.etzelmuller@geo.uio.no>
>Subject: RE: RE: question
>
>Hi Bernd,
>
>You can go to ftp2.ngu.no and sign in as user InSAR and password Radar$2018.
>There is a zipped ESRI file geodatabase there.
>Let me know if you need any explanations. There are two main fields you

Dashboard

OVERALL ANALYZED REQUESTS

Total Requests	Valid Requests	Failed Requests
1 999 342	1 911 356	87 986
Excl. IP Hits	**Referrers**	**Unique 404**
0	0	197

UNIQUE VISITORS PER DAY - INCLUDING SPIDERS

HITS HAVING THE SAME IP, DATE AND AGENT ARE A UNIQUE VISIT.

Panel Options

#	Hits	Visitors	Bandwidth	Data
	1 911 356 Max: 15 718 Min: 6 502	18 685 Max: 202 Min: 44	24.15 GiB Max: 259.8 MiB Min: 91.39 MiB	181 Total
1	7 904 (0.41%)	63 (0.34%)	91.39 MiB (0.37%)	27/Aug/2019
2	10 434 (0.55%)	105 (0.56%)	132.85 MiB (0.54%)	26/Aug/2019
3	8 815 (0.46%)	56 (0.30%)	119.11 MiB (0.48%)	25/Aug/2019
4	8 219 (0.43%)	75 (0.40%)	114.83 MiB (0.46%)	24/Aug/2019
5	10 928 (0.57%)	123 (0.66%)	141.99 MiB (0.57%)	23/Aug/2019
6	10 911 (0.57%)	128 (0.69%)	138.06 MiB (0.56%)	22/Aug/2019
7	10 444 (0.55%)	81 (0.43%)	201.57 MiB (0.81%)	21/Aug/2019

Lessons learnt from the users

- Application of the InSAR Norway web service is good enough for most users
  - Most users:
    - Very happy with performance of InSAR Norway
    - Use Visualisation tool as check tool for area of interest
    - Put priority on building more functionality into the InSAR Norway web service – this is what we will use
    - No/Little need for download of data
  - Super users:
    - Need for API, and downloading capability to own systems at least for areas of interest
    - Amount of data is not easy to handle for current GIS systems

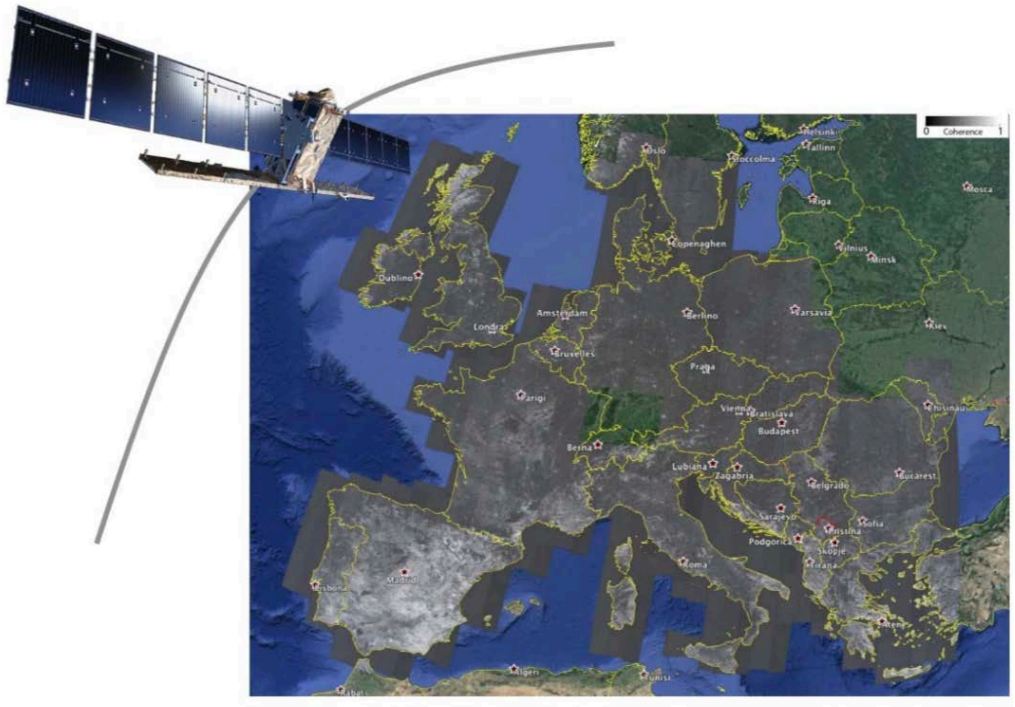
Next InSAR Norway launch, January 2020

- Inclusion of Sentinel-1 2019 in InSAR time series
- Release Radarsat 2010-2018 time series
- Release of API
- InSAR Norway User Forum

Copernicus European Ground Motion Service

European Ground Motion Service (EU-GMS)

A proposed Copernicus service element



- Specification contract 2019
  - Lead by NGU
    - NGU, NORCE, KSAT, NGI, PPO.Labs, IREA, TRE, E-GEOS & DLR
- EU-GMS Advisory Board 2019-2021
  - Lead by Spain
  - Spain, Italy, Germany, Norway, Denmark & Netherlands
  - Alternates: Poland & UK
  - Norwegian member: NoSA
  - Norwegian alternate: Norwegian Cadastrian Agency

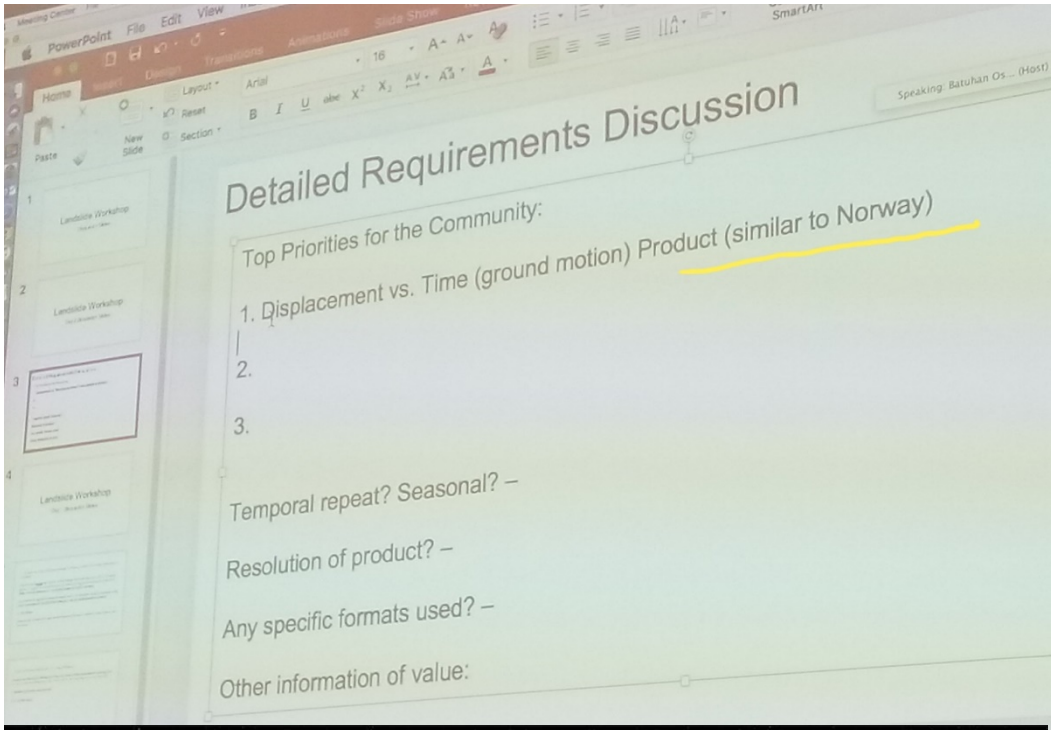
Norsk Romsenter
Norwegian Space Agency

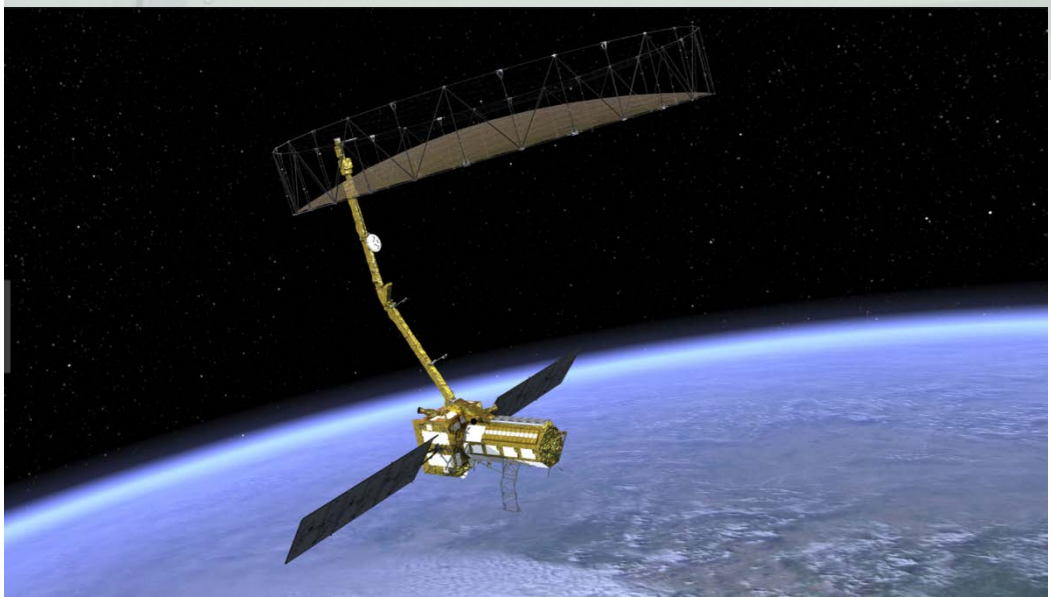
InSAR Norway scales vs InSAR Europe scales

Norway	Europe
• 2 billion measurement locations with time series	• 100 billion measurement locations with time series
• 40-200 users per day • 3766 unique users in March 2019 • 25 000 users first week Dec 2018 • Over 1200 users in parallell at release	• 2000-10000 users per day? • 200 000 users per month? • 1,25 million users first week? • Over 60 000 users in parallell at release?
• 2 PB storage • HPC: 500+ cores, 9 TB RAM • 4 x faster SAR processor • Challenge: Scalable visualisation & dissimination: Solved	• 20 PB storage? • HPC strategy? • Challenge: Scalable visualisation & dissimination

NASA

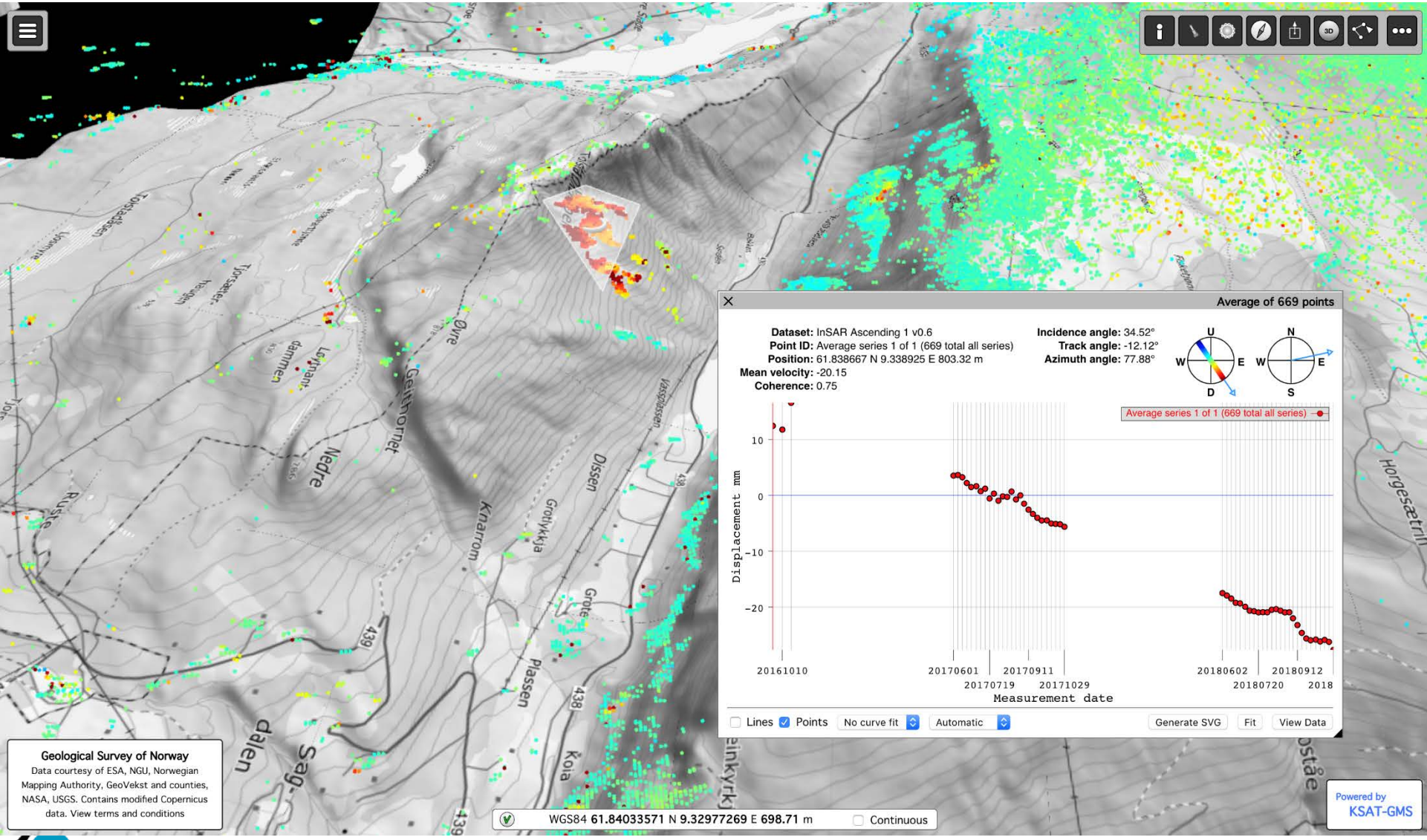
- NISAR:
  - US NASA/India ISRO collaboration
  - L- & S-band SAR
  - Dedicated InSAR mission
  - Optimised for studying hazards & global environmental change
  - Launch 2021/2022
- Invited lecture NASA NISAR Landslide workshop April 2019: John Dehls
- Top priority NASA NISAR Landslide requirements after workshop:
  - Ground Motion product similar to Norway





You can not solve 21st century´s challenges with 20th century´s technology

(InSAR Norway – Norwegian Ground Motion Service – insar.ngu.no)



Norsk Romsenter
Norwegian Space Agency