



Kartverket

# National report of Norway

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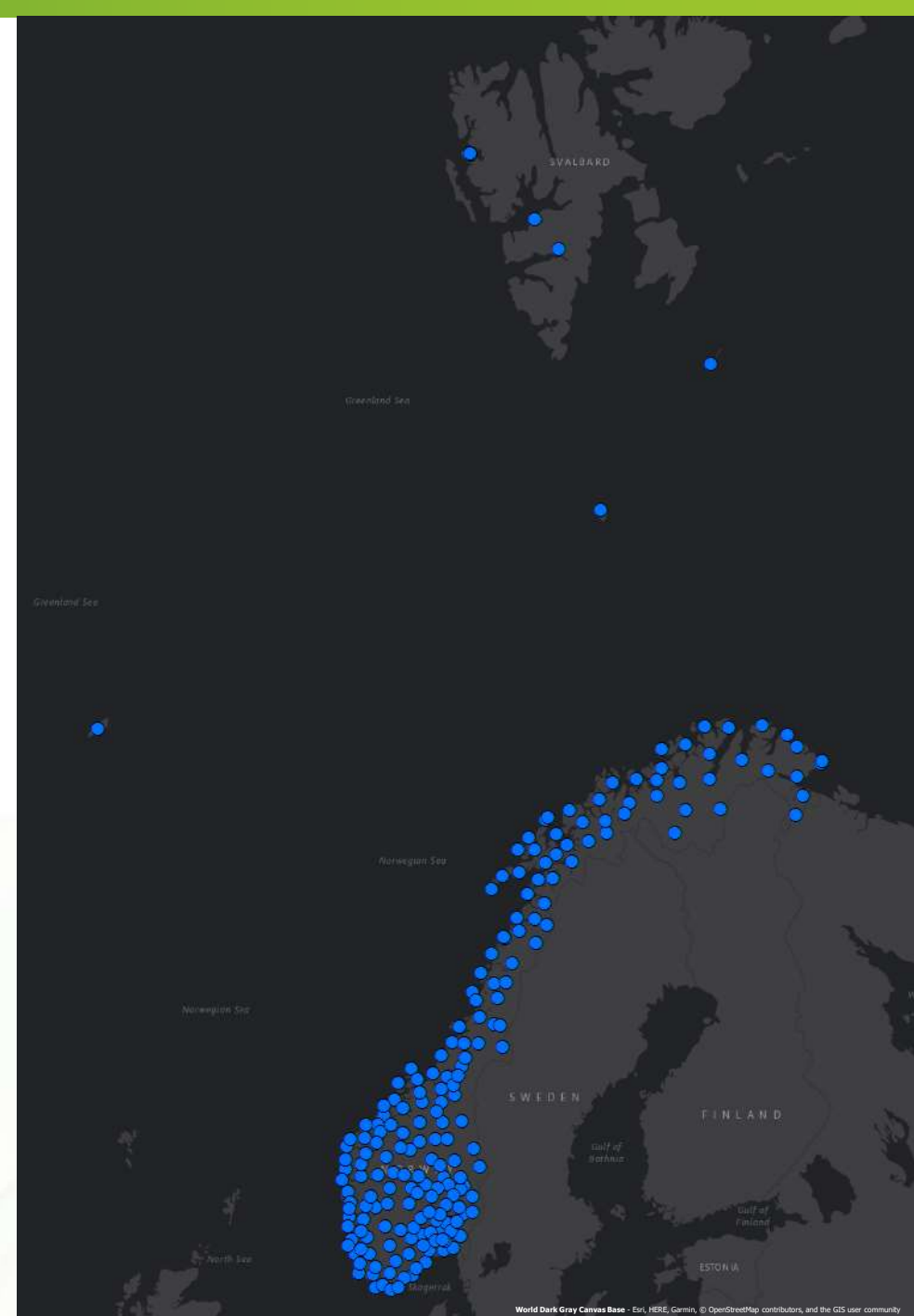
# The Norwegian Mapping Authority

## - The Geodetic Institute

- Responsible for national geodetic information on which all positioning, measuring, mapping and earth observation is based
- Measures and establishes a national reference frame for coordinates, geoid reference, height reference and post-glacial rebound
- Operates a nationwide system of accurate, satellite-based GNSS positioning
- Helps to provide a uniform global reference frame by way of initiatives such as the geodetic observatory at Ny-Ålesund on Svalbard

# Continuous Operating Reference Stations - CORS

- Mainland Norway: 198 Trimble NetR9 receivers
  - Inter-station distance between 35-70 km
  - GPS, GLONASS, Galileo and Beidou
- 6 Trimble NetR8/9 receivers on the Svalbard archipelago and Jan Mayen
- 11 (9) Septentrio PolaRxS scintillation receivers
- 8 Topcon Net-G5 receivers for monitoring



# Correction services

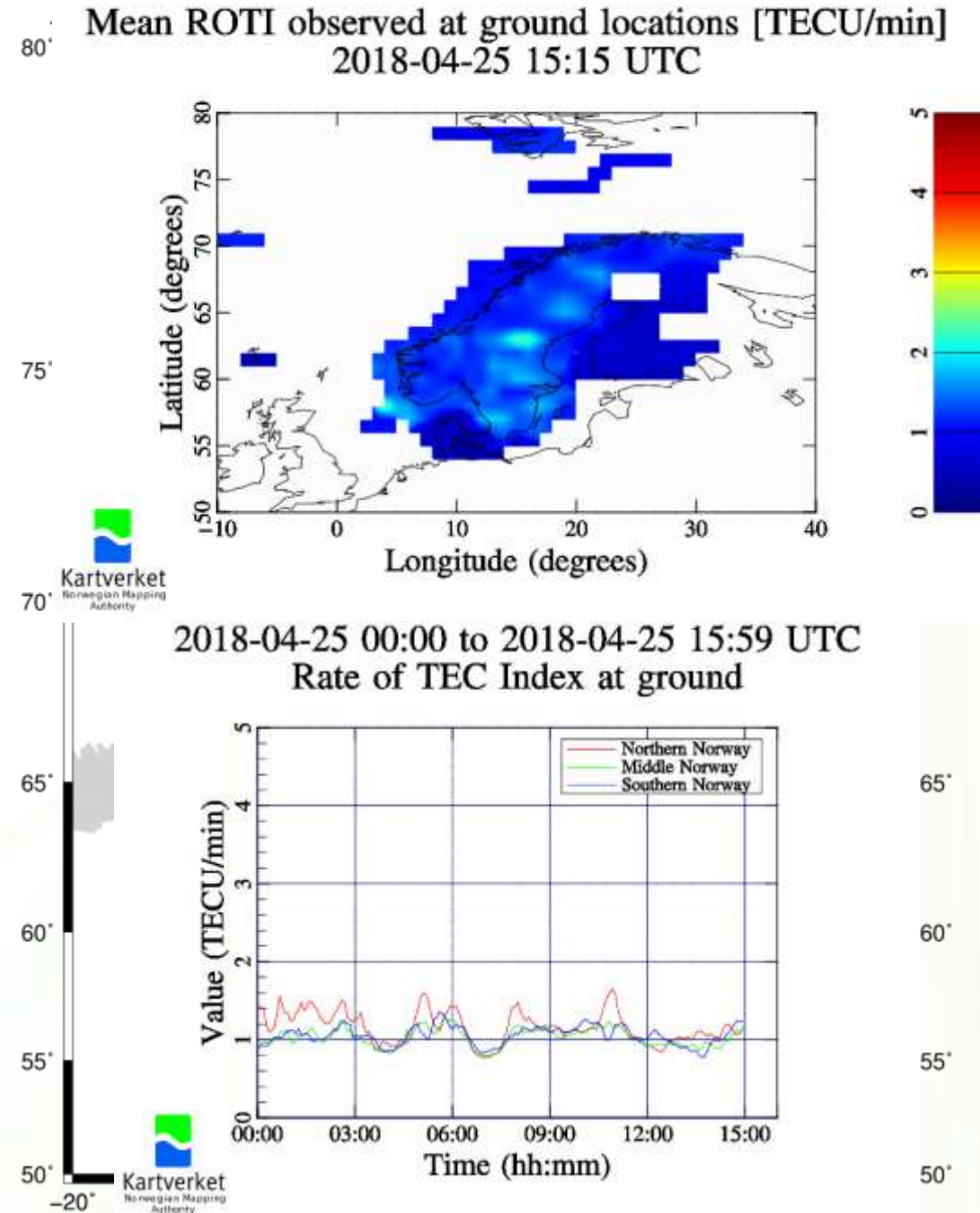
- Network RTK service
  - RTCM 3.1 with GPS and GLONASS
  - Ongoing process of updating the service to RTCM 3.2 MSM with GPS+GLO+GAL+BDS
  - 4000 paying subscribers and up to 850 simultaneous users
  - Continuous growth in the customer base
  - Streaming of data to private service provider with 1200 subscribers
- DGNSS service
- ETPOS service – RINEX 2.11 (and 3.02)





# Ionospheric monitoring

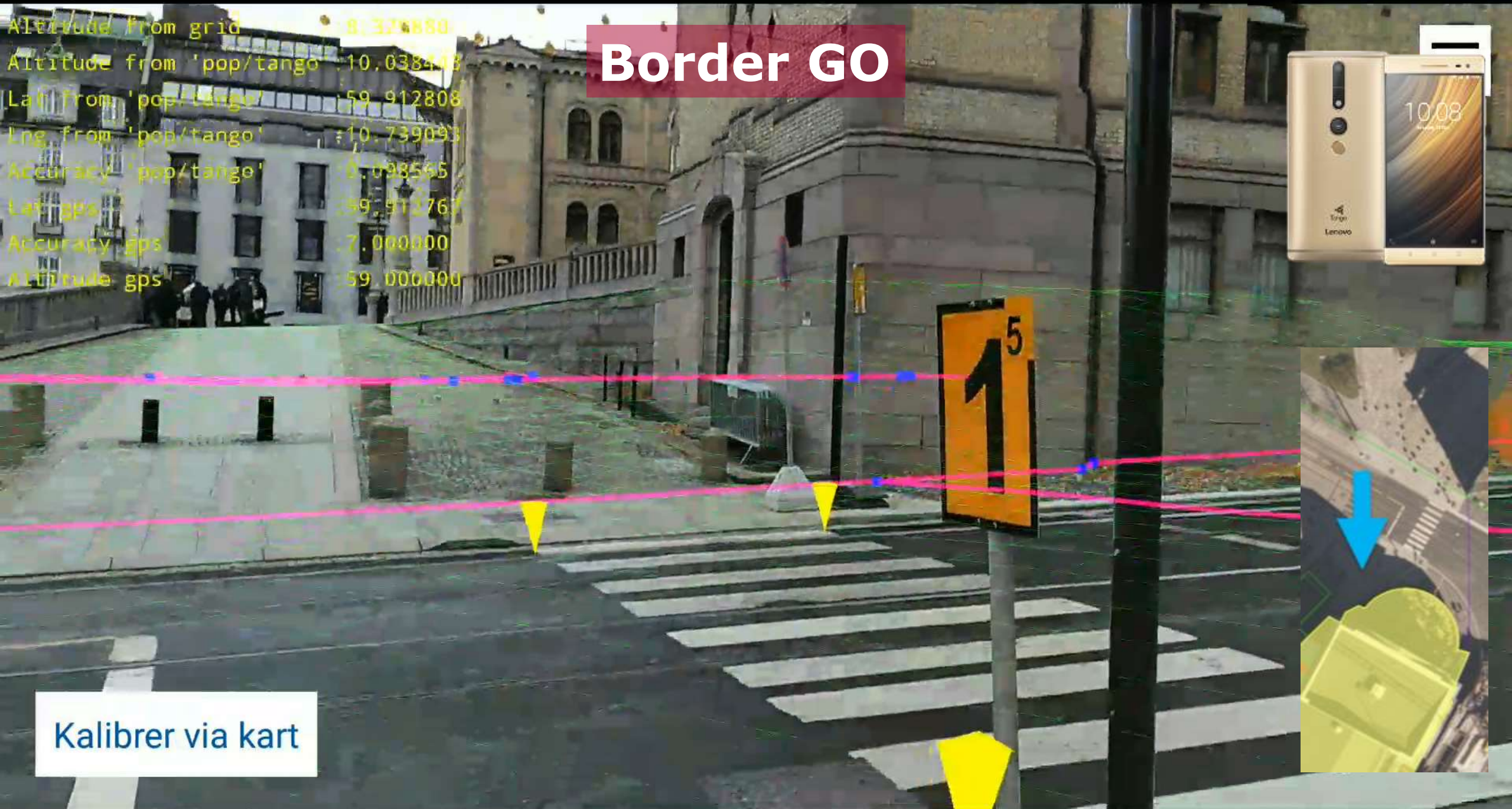
- Around 300 stations equipped with geodetic receivers
- Cooperating agencies: Lantmäteriet, Danish Geodata Agency, Danish Technical University, Finnish Geodetic Institute and Geotrim OY, Umhvørvisstovan
- 11 scintillation receivers
- [sesolstorm.kartverket.no](http://sesolstorm.kartverket.no)



# National achievements 2016-2018

- Nationwide coverage of the new height system NN2000
- Pre-study of the establishment of a common vertical reference frame for sea and land applications – To simplify future sea floor and water column mapping
- Pre-study of densification of CORS along railway segments – currently in negotiation with the Norwegian National Rail Administration regarding a larger densification project
- Pilot project for Dynamic Reference Frame (DRF) on Iceland
- Contracts with The Norwegian Space Centre (NSC) and GSA on the monitoring of EGNOS and Galileo performance
- Strong contributor in the United Nations Global Geospatial Information Management (UN-GGIM) Subcommittee on Geodesy
- Membership in ITS Norway





Kalibrer via kart







# Goals for geodetic activities in Norway towards 2025

- To make and maintain a global geodetic reference frame for Norway that makes it possible to combine the use of geospatial data and positioning services without having geodetic knowledge.
- Contribute to make Norway a leading country innovating safe use of GNSS.

# Future outlook and open questions

- Increasing interest in real-time data from national CORS infrastructure from global, regional and national service providers. How does the future look for NRTK services operated by the NMCA's?
- Legal regulations regarding the use of positioning services (NRTK, PPP/PPP-RTK) for cadastral surveying?
- What role will the NMCA's play in the future of ITS, autonomy and high accuracy positioning in the consumer market?
  - Cooperation across borders?
  - National and global reference frames?
  - NRTK, PPP or PPP-RTK? National, regional, global services?