



# NATIONAL REPORT – SWEDEN

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NKG WORKING GROUP FOR GNSS POSITIONING

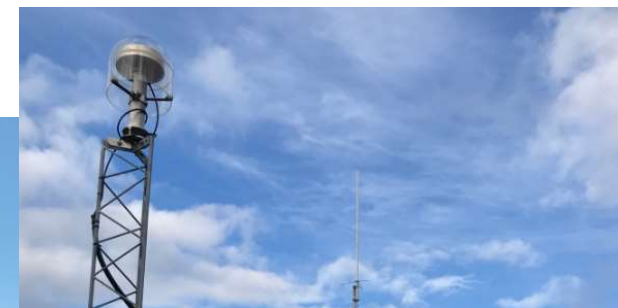
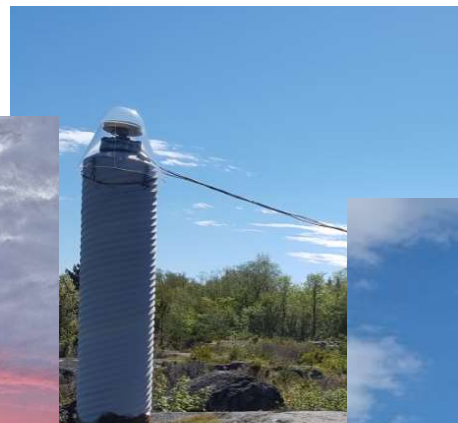
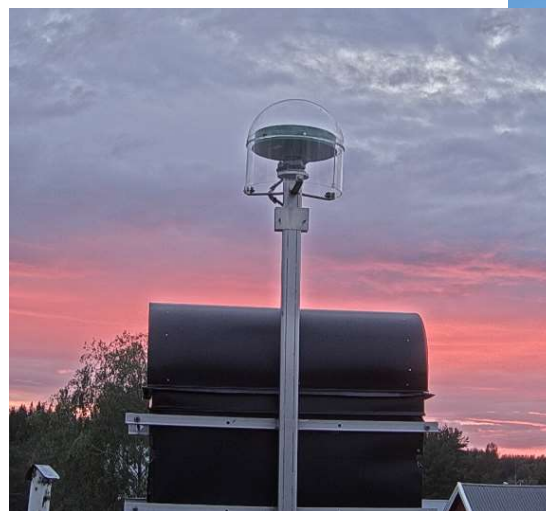
HELSINKI MARCH 4-5, 2025



# CORS - CURRENT STATUS

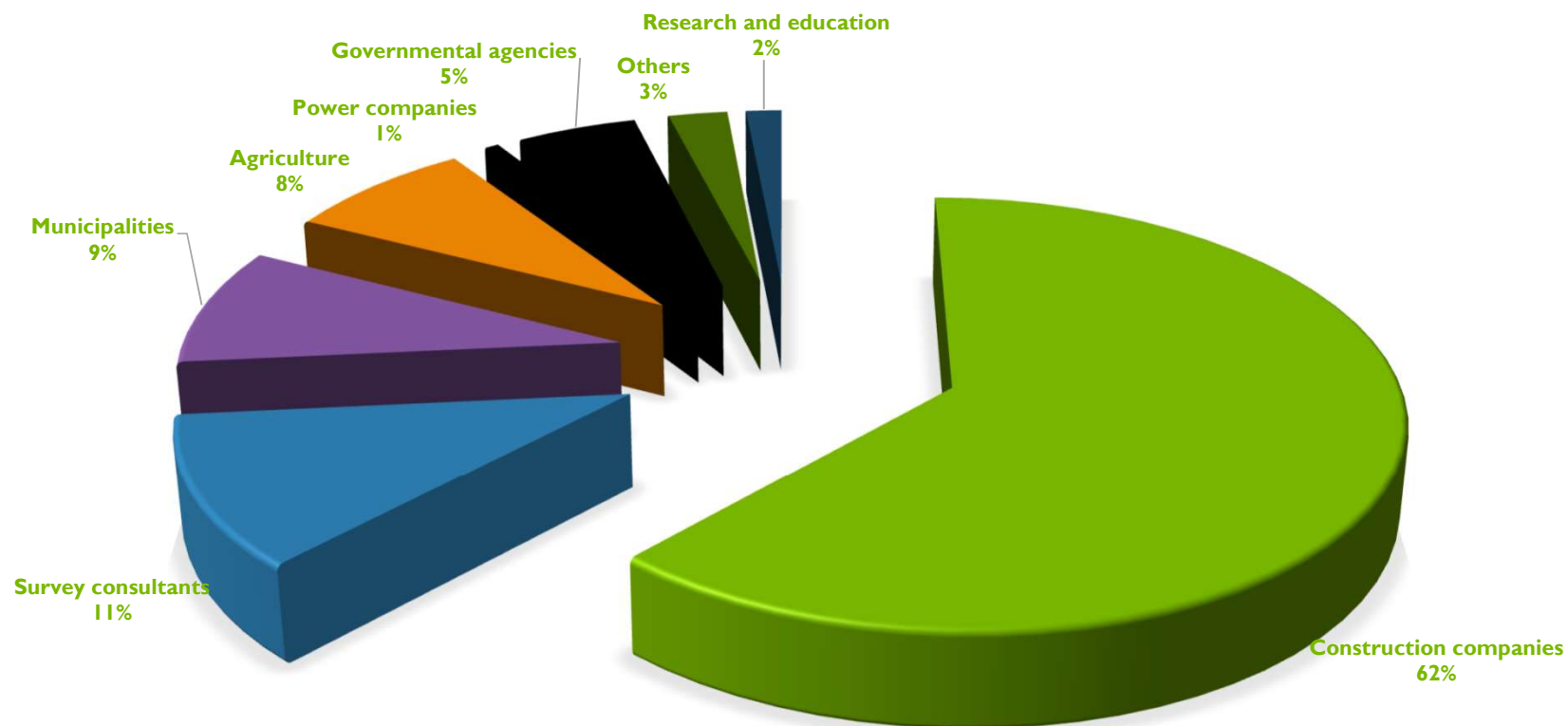
484 stations

- 62 Class A stations (on bedrock)
- 422 Class B stations (houses, chimneys etc.)



# SWEPOS NETWORK-RTK SERVICE, USERS

2024 (>13 000)



# RECENT DEVELOPMENT IN SWEPOS

Continous development to provide corrections for more GNSS, to widen the use and for positioning and navigation in difficult environment.

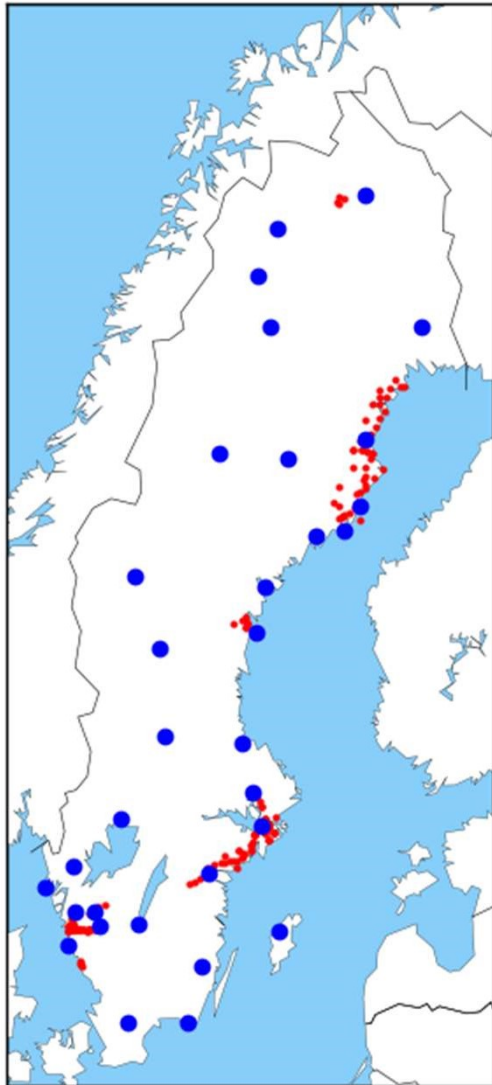
- Support for GNSS in Swepos Network-RTK service.
  - GPS 2004
  - Glonass 2006
  - Galileo 2018
  - Beidou (Beidou3) 2024



# RECENT DEVELOPMENT IN SWEPOS

## New Swepos post processing service

- Improvements compared to existing service
  - Compatible with all RINEX-versions (2.x, 3.x, 4.x)
  - Multi-GNSS (GPS+GLO+GAL+BDS)
  - Based on the latest Bernese GNSS-software (V 5.4)
  - Other improvements
    - Improved problem handling
    - Improved configurability
    - Improved log writing and documentation
    - Modular, future proof concept
- Two types
  - Standard service (blue dots)
  - Project adapted service (red dots)

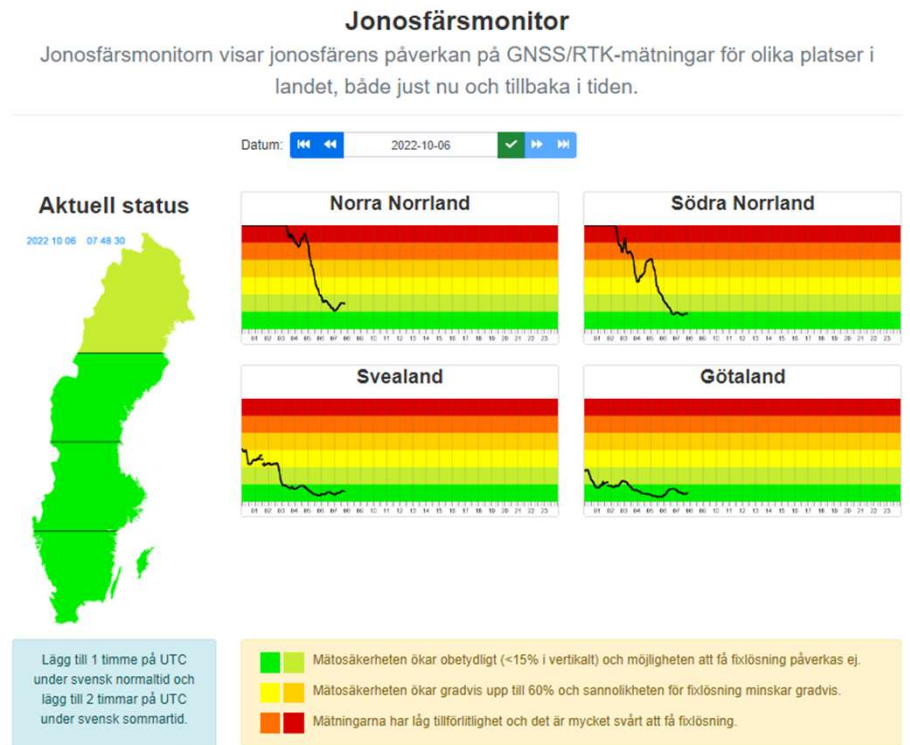


# COORDINATE CALCULATIONS , EPOS AND RINEX

- Calculation of EPN repro 3 and the Swedish part of NKG repro 2 finished.
- New coordinates based on I20.atx calculated and used in Swepos network-RTK service
- Started the contribution of daily RINEX files to EPOS from approximately 60 stations.
- Only supply of RINEX 3 data from january 7th (no longer RINEX 2)

# ONGOING DEVELOPMENT - IMPROVED IONOSPHERIC MONITORING SERVICE

- When users experience problems with GNSS measurements, they can confirm that it is ionospheric activity causing the problem.
- We have identified a need to improve our existing monitor
- See separate presentation on the development of our new ionospheric monitor



# ON GOING DEVELOPMENT – GNSS-SIGNAL DISTURBANCE MONITORING AND DETECTION

## SWEPOS DATA QUALITY MONITORING

### GNSS SIGNAL DISTURBANCE DETECTION SYSTEM

To monitor disturbances at Swepos stations, environmental changes, tree foilage, equipment malfunctioning or interference.

A new version of our disturbance monitor is being developed – see separate presentation.

**Disturbance Status**

- No disturbance
- Disturbance detected (RFI likely)
- Disturbance detected (non-RFI)
- Data gap, station online
- Data gap, power outage
- No status information

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Enter epoch

**RECENT EPOCH**

Select Station

Select Station

Select Receiver

Select Receiver

Affected GNSS

Select GNSS

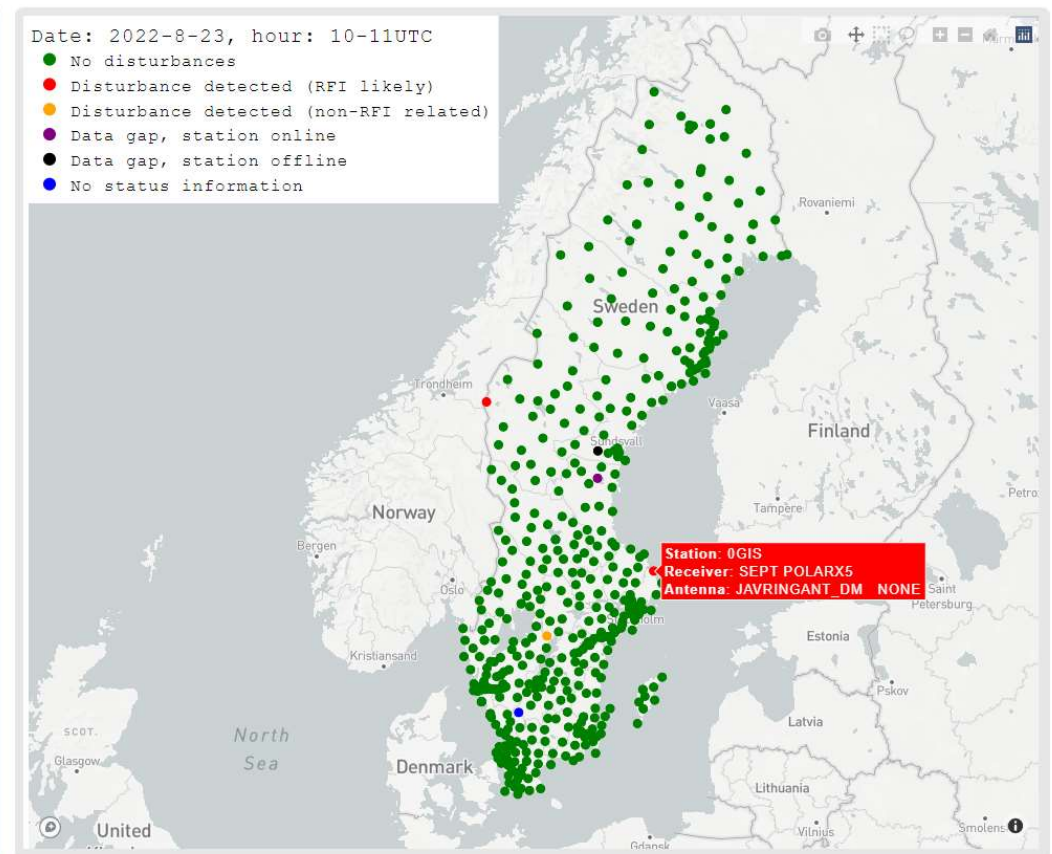
Affected frequency

Select frequency

Number of Satellites

Select frequency

**MIN** **MAX** **MEAN**





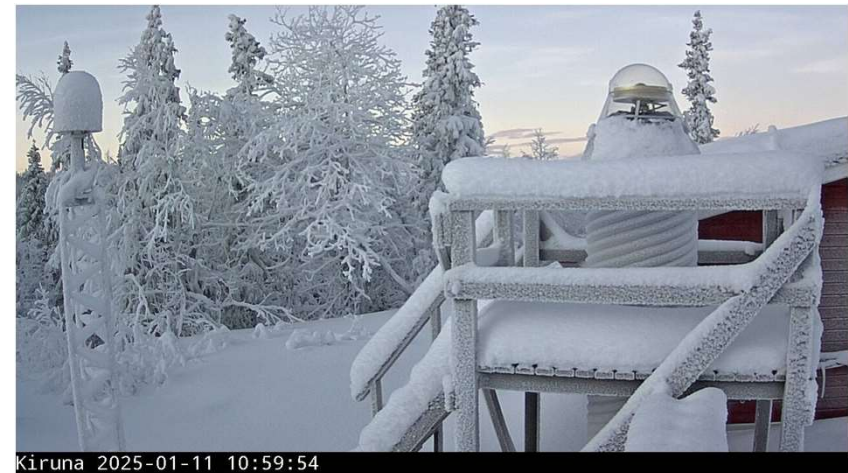
# STATION IMPROVEMENTS – SNOW PROBLEM

## ON-GOING TEST WITH HEATED CHOKE RING

Preliminary results so far, but snow seems to melt on all different types of radomes tested. Earlier results has shown no impact on measurement result from the heating plate. Heating choke-rings also installed at some Swepos stations for evaluation.



Tests on a Swepos concrete pillar, we see that we need some more heat to make the snow melt away also on the lower part of the radome as the radome is bigger. The GNSS antenna to the left in the picture does not have a heated choke-ring.



# FUTURE MASS MARKET

On-going work to understand future needs from GNSS mass-market applications – as an input to the next Geodesy strategy at Lantmäteriet

## Some possible scenarios

- Only provision of basic data
  - Real-time GNSS data from our reference stations
  - Transformation relationship/service between SWEREF99 and ITRF
- Generation and provision of correction data in cooperation with partners
  - No need of support to end customer, handled by partners
  - Enables other distribution channels than just the internet
- Generation and provision of correction data directly to end customer
  - A minimum level of support to the end customer, especially for a free service

# THANKS FOR YOUR ATTENTION!

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