



NLS
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National Report of Finland

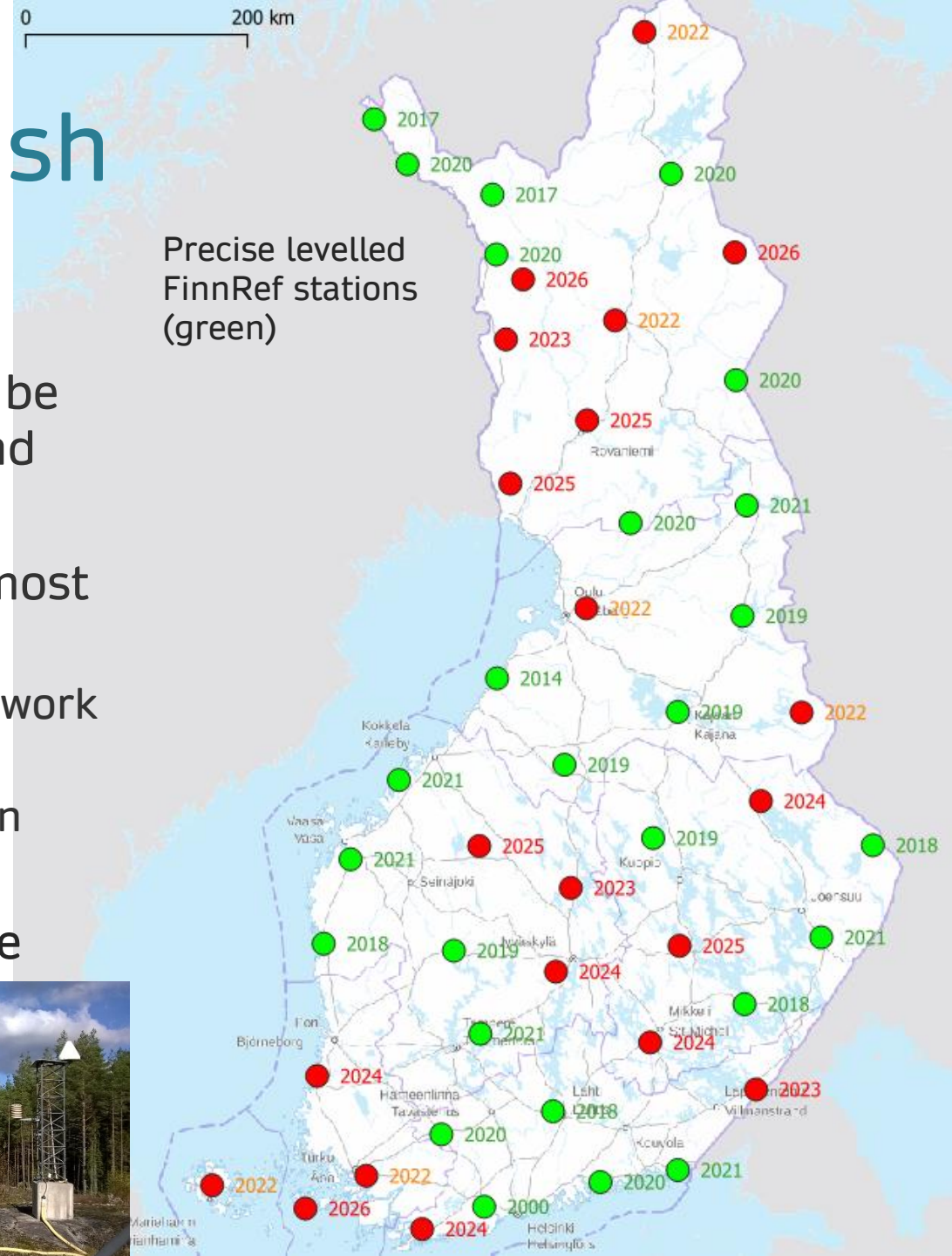
National Land Survey

Pasi Häkli

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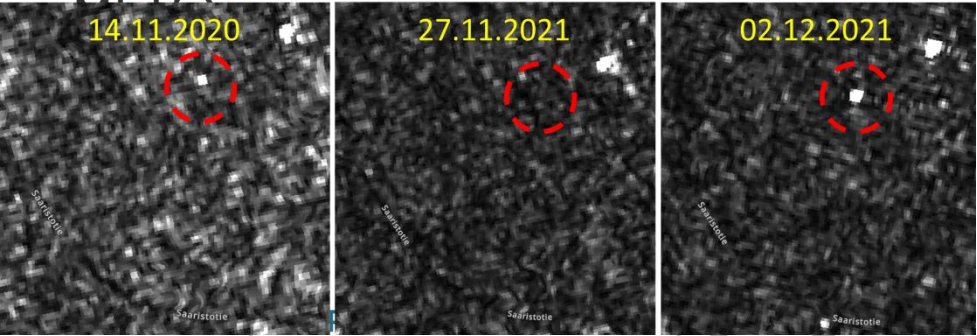
FinnRef: Backbone of Finnish reference systems

- Finnish [Geodesy strategy 2017-2026](#): FinnRef will be the backbone of the national coordinate, height and gravity reference systems
- **Precise levelled N2000 (EVRS) heights** for all (or most of the) stations by ~2025
 - Currently 26/47 connected to (precise) levelling network (green dots in the figure)
 - 2022 (plan): 6 new connections (~100km double run precise levelling)
- **Centering measurements** (heights from the reserve markers to the GNSS antenna)
 - Currently 24/47 done
 - 2022 (plan): 8 stations



FinnRef: Backbone of Finnish reference systems

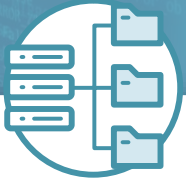
- **Repeated absolute gravity measurements**
 - 20/47 stations with AG pillar
 - 2021: 11 stations
 - 2022 (plan): 7 stations
- FLEX-EPOS: **SAR reflectors** to be installed at FinnRef stations
 - 6 Zarges type + 5 MK3D type
 - 2 reflectors now installed: Metsähovi & Loviisa
 - 2022: snow covers & 7 installations (2 more to MET3)



Loviisa:

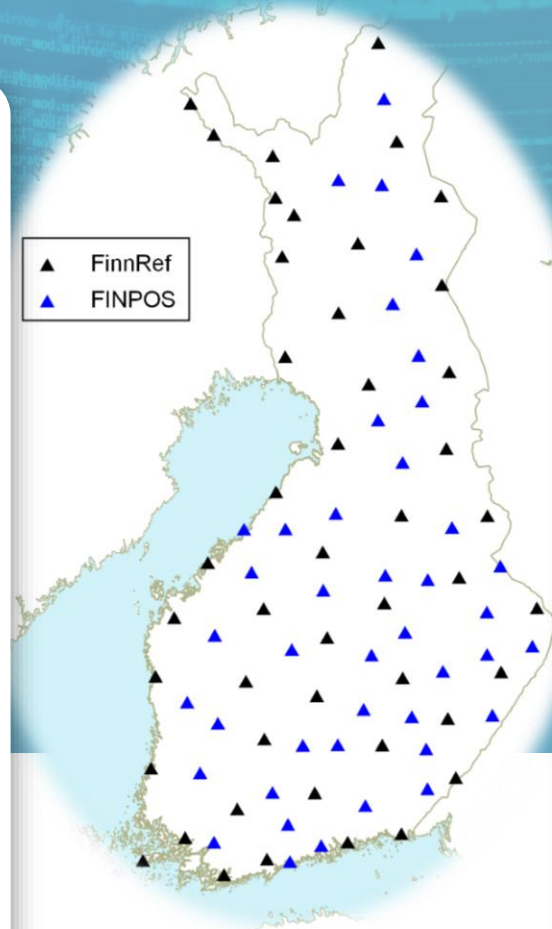
FINNISH transponder no target 1.5 m Zarges

National Land Survey's GNSS-network



RINEX (files)

- FINPOS-service ([link](#))
 - 1 s observation interval
 - Browser-based download service
- Via EPN-network ([link](#))
 - Open: data from 20 of the stations
 - 30 s observation interval
 - FTP service



RTCM (real time)

- NLS DGNSS-service ([link](#))
 - Free service
- NLS raw data service ([link](#)) **NEW !**
 - Paid service
- Via EPN network ([link](#))
 - Open: data from 20 of the stations
 - Free service
 - Data available for demo- and development purposes

Nationwide network-RTK services in Finland



Own network (Trimble)

HxGN SmartNet

Own Network (Leica)

NEW !



Uses FinnRef/FINPOS data

NKG GNSS AC: cumulative solution

- Cumulative GNSS solution
 - Update with 3.5 year of data: 1997-2020.5
 - IGB14
- Results published in Nov
 - Focus on automatization of the time series analysis
 - <https://link.springer.com/article/10.1007/s10291-021-01194-z>

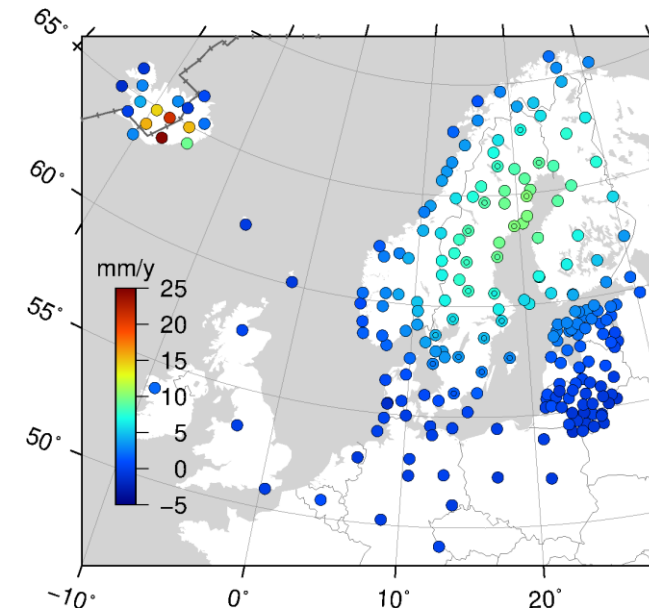
Original Article | [Open Access](#) | [Published: 01 November 2021](#)

Updated GNSS velocity solution in the Nordic and Baltic countries with a semi-automatic offset detection method

[Sonja Lahtinen](#) ✉, [Lotti Jivall](#), [Pasi Häkli](#) & [Maaria Nordman](#)

GPS Solutions **26**, Article number: 9 (2022) | [Cite this article](#)

471 Accesses | 4 Altmetric | [Metrics](#)



KaRef – Preparations for the renewal of the Finnish national reference systems

Project funded by the Ministry of the forestry and agriculture, 2020-2021

- WP1: Height system
- WP2: Active reference frame
 - Agreement with the active and passive networks <1cm in horizontal and ~2cm in vertical coordinates
 - Semi-dynamic (active) coordinates produced by the NKG2020 transformation – with long (~20yrs) GNSS time series time dependency almost zero → produces practically static EUREF-FIN coordinates over a few decades
- WP3: geoid model

Metsähovi

Development of VLBI and SLR continues

VLBI (first signal received in the end of 2020)

2022: Improvement of the thermal insulation of the pedestal

Laser scanning the dish, shape and its variations (by RISE, Geometre-project)

SLR

Still challenges with delay of the telescope subsystem supplier

2022: Closed-loop distance measurements, brings us again a step closer to observations

Telescope manufacturer will continue to work on the telescope this spring



New Metsähovi Main building Ready May 2022



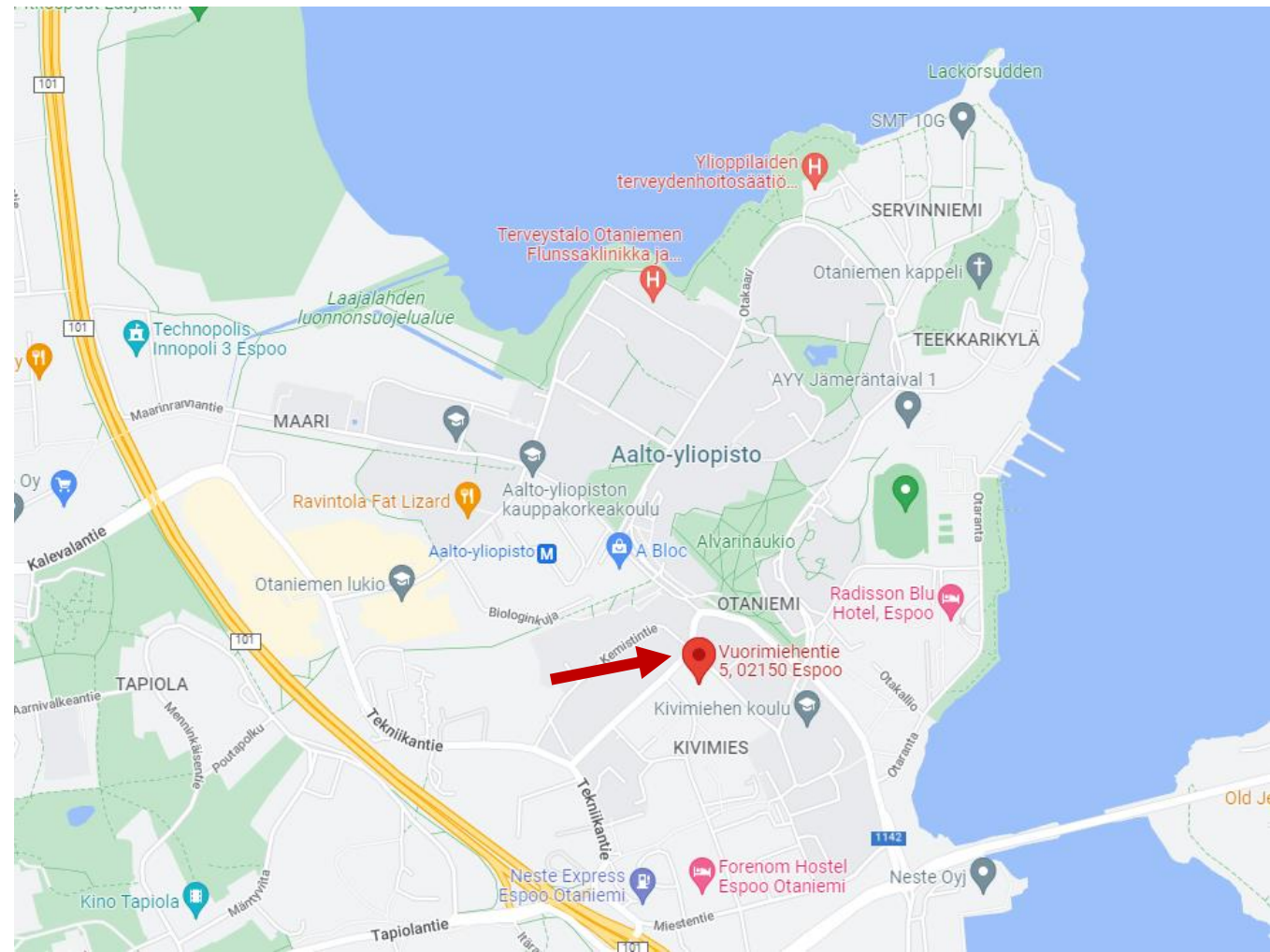
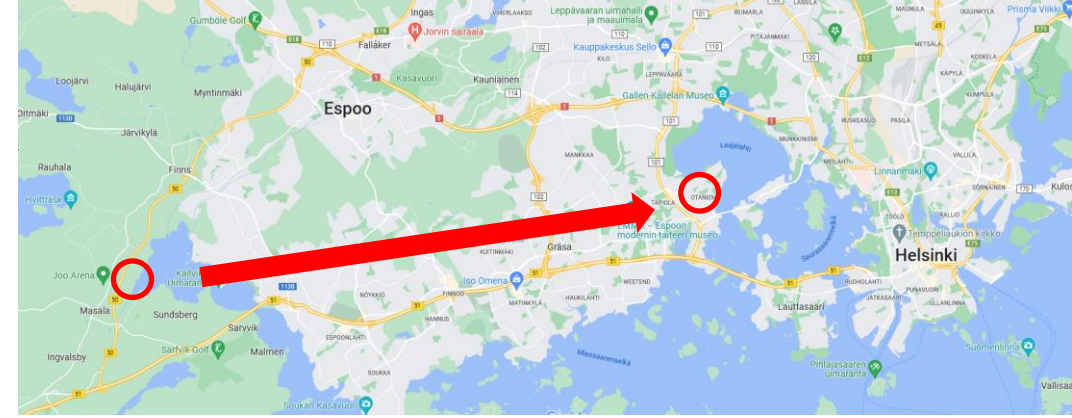
Other news

- PhD Defences:
 - 2021: Phd Defence Mirjam Bilker-Koivula
 - 2022: PhD Defence Sonja Lahtinen in May 27
- NLS organizational change 3/2021:
 - FGI continues mainly as before as the research unit of the NLS.
 - Finnish reference frames: Responsibility shared by the Geodesy and Geodynamics department (GEOGEO) of FGI and the Production Unit - GEOGEO department: scientific basis
- Discussion on high level to secure Metsähovi operation in the future

FGI moved to Otaniemi Campus 20.4.

New address: Vuorimiehentie 5, 02150 Espoo, Finland

- Rod comparator calibrations on pause about ~1/2 year (from 3/2022)
- Masala-Vihti calibration line for RG: Establishment of new end point in



Advancing together



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