National Report of Finland

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FinnRef: Backbone of Finnish reference systems

Finnish Geodesy strategy: FinnRef permanent GNSS network will be the backbone of Finnish terrestrial, vertical and gravity reference frames

GNSS: long time series

- Maintenance of Finnish ETRS89 realization, EUREF-FIN
- Land uplift modelling and time-dependent transformations

Precise levelled N2000 (EVRS) heights for all (or most of the) stations by ~2026

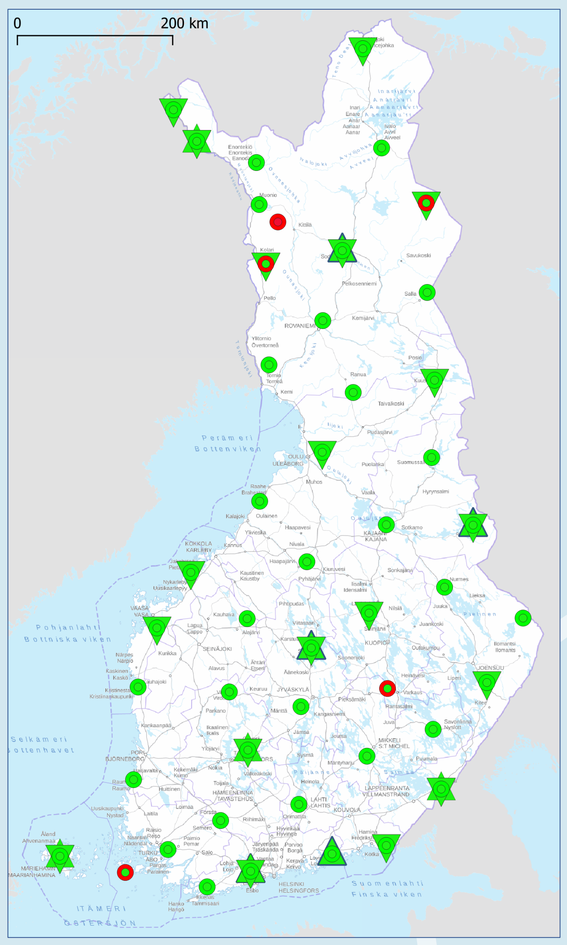
- For example GNSS-levelling points for geoid model fitting

Repeated absolute gravity measurements at 20 stations with AG pillar

- measured every 3 years, gravity changes in time

SAR reflectors

- 7 Zarges type reflectors, 5 MK3D type reflectors (+ 2 at Aboa Antarctica)



Levelling of FinnRef stations

- Status: 42 out of 47 precise levelled
- 2025 Jyväskylä (76 km), Tornio (80 km)
- 2026 Kolari (~80 km), Pieksämäki (~80 km)

Local ties (centering measurements) at FinnRef stations

- Height transfer: N2000 heights from the levelled benchmarks to the GNSS antenna
- Centering measurements: horizontal and vertical ties between GNSS antenna and passive points
- Status: 46/47
- 2025 9 stations in Lapland + 2 SAR reflectors
- 2026 6 stations

Tide gauges re-levelled

- Finnish tide gauges re-levelled every three years
- 2025 All: Hamina, Emäsalo, Hanko, Turku, Föglö, Helsinki, Rauma, Pori, Kaskinen, Vaasa, Pietarsaari, Kemi, Oulu & Raahe

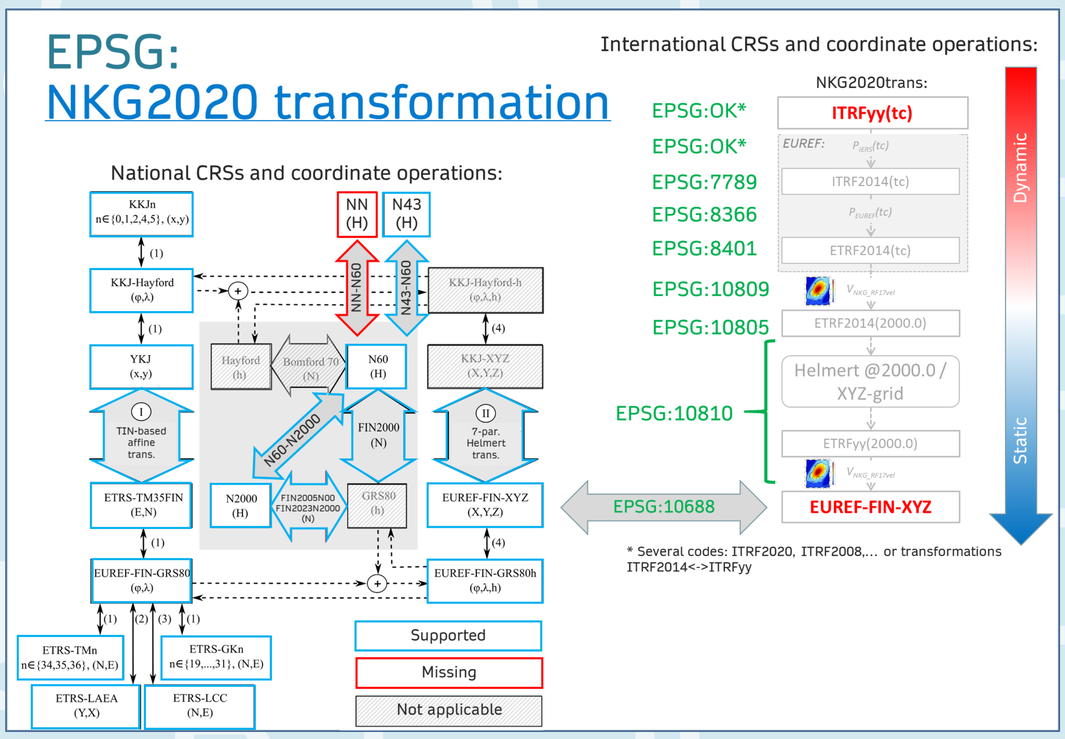







EPSG registry

- The NKG2020 transformation was added to the EPSG dataset in 2025.
- The solution is based on the new coordinate operation that combines Helmert transformation and deformation corrections: Position Vector (geocen) & Geocen translations NEU velocities (gtg).
- It was decided to exclude older NKG2008 transformations and Latvian NKG2020 transformation parameters for old national reference frame LKS-92.
- PROJ adopted the new EPSG codes in the version 9.7.0 (Sep 15, 2025).



Metsähovi

Metsähovi research station is one of the fundamental stations for the GGRF. It is under renewal:

- GNSS, gravimetric, and DORIS measurements have continued without any issues
- Commissioning of the VGOS system is progressing
- Finalizing the commissioning of the Metsähovi SLR telescope and the SLR system
- SLR system update for space debris observation
- Local tie measurements are repeated in Q2/2026
- Planning of replacement of technical facilities that are still in old building

National Standards Laboratory

FGI is the national standards laboratory for length and acceleration of free fall



Length

- Levelling system calibrations for several clients
- Nummela standard baseline for EDM calibrations
- About 30-40 calibration certificates annually
- FGI_KML_Pituus@nls.fi

Acceleration of free fall

- Absolute gravity
  - FinnRef stations (2025: 7 stns)
  - 2026/2027: Measurements at Aboa, Antarctica
  - FG5X-221 laser currently at Micro-g for tube replacement since November
- Relative gravity
  - Otaniemi-Vihti calibration line
  - Kivetty-Maaninka calibration line development
  - Metsähovi-Kevo calibration line
  - 2026: Gradient measurements at all AG stations
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