



NLS
FINNISH GEOSPATIAL
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National Report of Finland

EUREF Symposium 2021

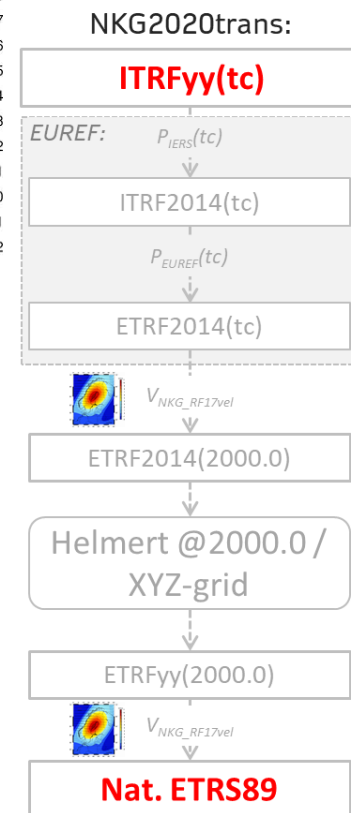
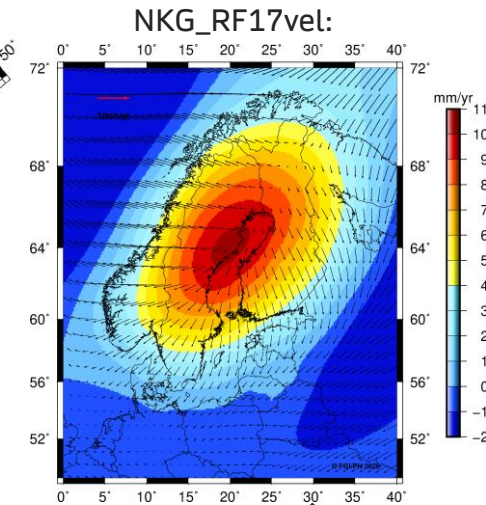
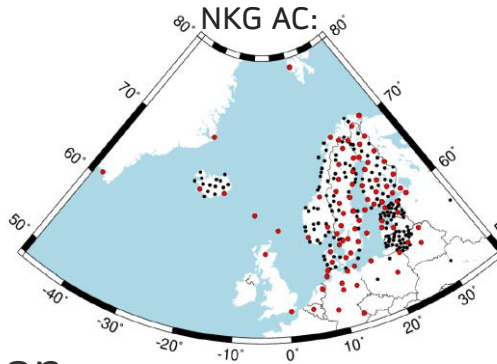
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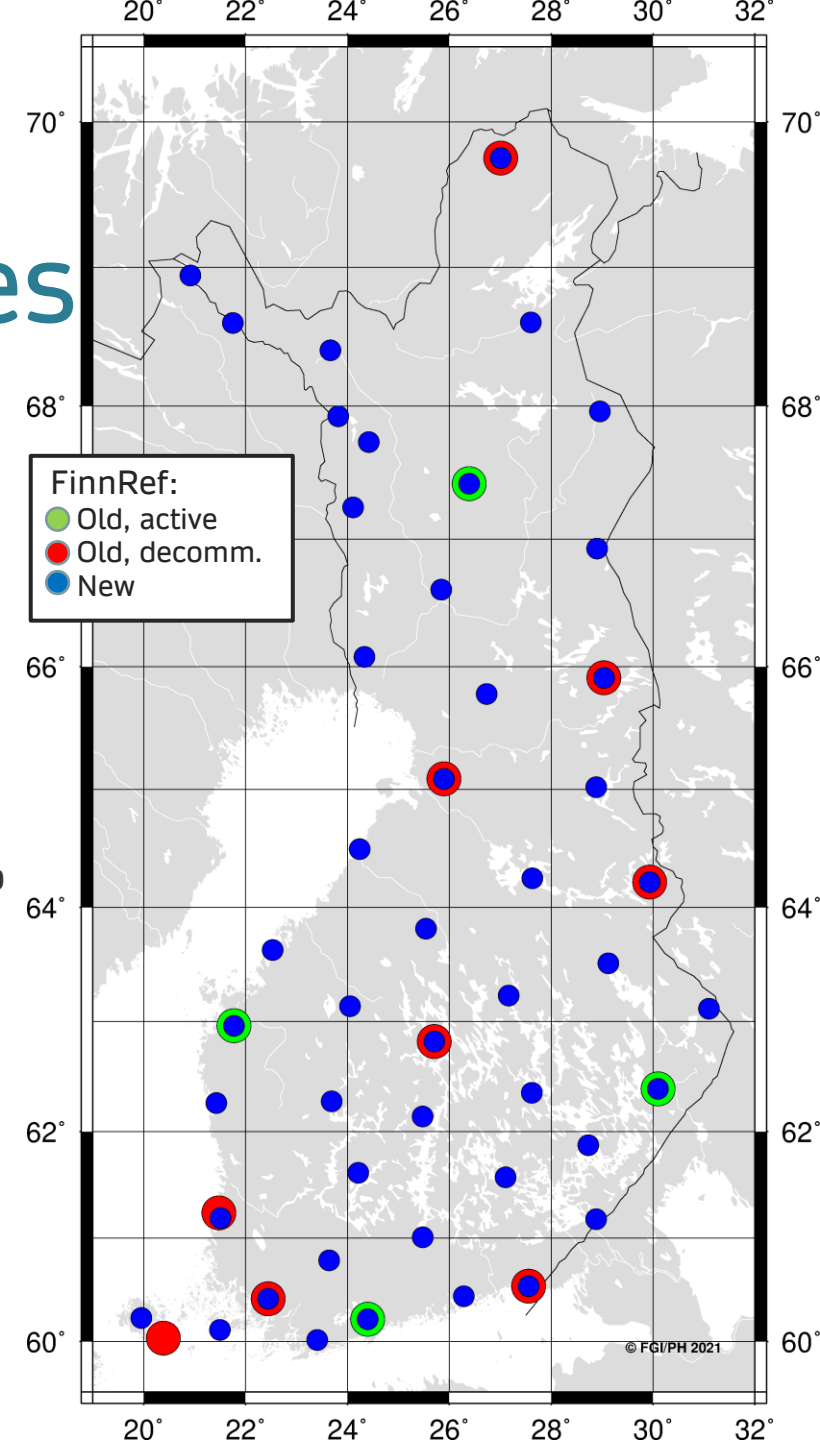
Nordic Geodetic Commission (NKG) related projects

- [NKG GNSS Analysis Centre \(NKG AC\)](#)
 - Operational solutions FGI_LAC subnet
 - Combined solutions NKF
 - Development of NKG cumulative solution
- **NKG_RF17vel model** (postglacial rebound)
 - Model velocities (2D+1D) released in the end of 2019
 - Uncertainty grid in progress
- Update of [NKG transformations](#) (ITRFyy \leftrightarrow national ETRS89 realizations)
 - Updated NKG transformations (NKG2020) were finalized in Dec 2020 – Feb 2021.
 - Utilizes new NKG_RF17vel model to account for intraplate deformations
 - New national parameters (Norway: correction grid), ITRF2014 coordinates from time series, national ETRS89 coordinates revised
 - Implemented in PROJ (starting version 7.2.1, except Norway 8.0.1)



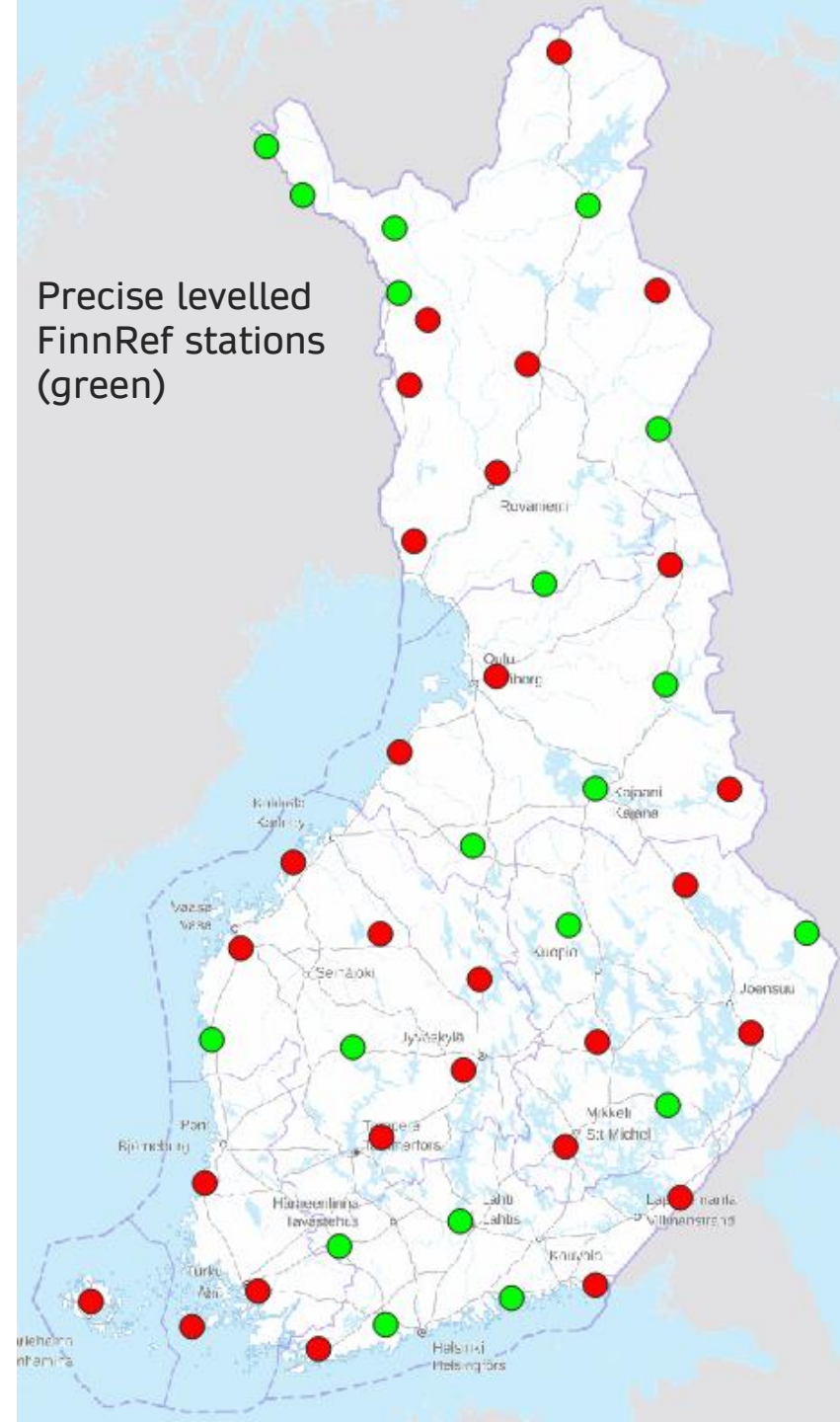
FinnRef (1/2): Updated EUREF-FIN (ETRS89) coordinates

- FinnRef (CORS) network and ~100 passive points with their **official, highest order E1 coordinates** define Finnish ETRS89 realization EUREF-FIN
- However, **most of the original FinnRef stations already decommissioned and 47 new FinnRef stations have been built** 2012-2014 and 2017-2018 (see figure)
 - Previously new stations had second order E2 coordinates, now updated to E1
- New E1 coordinates:
 - Data: 2-4 years (period 2017.1-2020.9)
 - Processing: Stacked from the NKG AC operational solutions
 - Coordinates: IGB14(2019.004) coordinates transformed **with NKG2020 transformation** (including intraplate corrections from the NKG_RF17vel model) to EUREF-FIN → **E1 coordinates**
 - Usage: Came into operation in February 1, 2021
- What changes:
 - **Small changes to the EUREF-FIN** at the reference frame level/domain (rms: NE~2mm, U~6mm)
 - Due to the selected methodology (NKG transformation) for the highest order coordinates, EUREF-FIN can now be considered as a **"semi-dynamic" reference frame** (also one of the goals in the Finnish Geodesy strategy)



FinnRef (2/2): 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 19/47 connected to (precise) levelling network (green dots in the figure)
 - 2021 (plan): ~5-6 new connections
- **Repeated absolute gravity measurements**
 - 20/47 stations with AG pillar
 - 2020: 8 stations
 - 2021 (plan): 8-11 stations



Metsähovi fundamental station

Superconducting gravimeters iOSGS-022 & iGrav-013

- Work on automatization of processes
- 2021: Improve SG-AG synergy

Metsähovi renewal (now NLS funded)

- SLR – finalizing still ongoing
- VLBI – Proceeding as planned
 - 2022 testing phase, operational by end 2022
- Construction of new main building starts this autumn, ready mid-2022

FLEX-EPOS project (4 years, start 2020, Finnish Academy funded)

- Create a national pool of geophysical instruments and multi-disciplinary geophysical superstations & Strengthen role of Finland in European Plate Observing System (EPOS)
- NLS/FGI:
 - Time frequency link to Metsähovi (2020)
 - New relative gravimeter (2021)
 - 10 InSAR targets (2021)



Some other projects

- DynPos – Dynamic Coordinates in [FINPOS](#) Positioning Service
 - Positioning service tested in dynamic, semi-dynamic and static reference frame with real-time VRS measurements
 - Accuracies approximately the same for the three methods, but semi-dynamic EUREF-FIN recommended
- PROJ – Implement national TIN-based transformations to PROJ
 - New method [tinshift](#) developed to PROJ – available starting from PROJ 7.2.0
 - As a result, PROJ is capable to perform all necessary Finnish but also international transformations
- [KaRef](#) - Preparations for the renewal of the Finnish national reference systems
 - WP1: The use of land uplift models and EVRF adjustments in the maintenance of the height system
 - WP2: Active vs. passive coordinate reference system
 - WP3: The relative accuracy of the geoid model & Is it time to calculate a new national geoid model?
- [GeoMetre](#) - Large-scale dimensional measurements for geodesy
 - E.g. improving local ties in Metsähovi

Advancing together

