



## **EUREF's pan-European Geodetic Infrastructures in Support of Geosciences**

Ambrus Kenyeres (1), Carine Bruyninx (2), Martina Sacher (3), Heiner Denker (4), and Rui Fernandes (5)

(1) BFKH FTFF Satellite Geodetic Observatory, Satellite Geodetic Observatory, Budapest, Hungary (kenyeres.ambrus@gnssnet.hu), (2) Royal Observatory of Belgium (ROB), Av. Circulaire 3, B-1180 Brussels, Belgium (carine.bruyninx@oma.be), (3) Federal Agency for Cartography and Geodesy, Karl-Rothe-Straße 10, 04105 Leipzig, Germany (martina.sacher@bkg.bund.de), (4) Leibniz Universität Hannover, Institut für Erdmessung, Schneiderberg 50, 30167 Hannover, Germany (denker@ife.uni-hannover.de), (5) University of Beira Interior SEGAL, Rua Marquês d'Ávila e Bolama, Covilhã Portugal – 201-001 (rui@segal.ubi.pt)

The primary role of EUREF as an IAG (International Association of Geodesy) affiliated organization is to provide geodetic reference frames such as ETRS89 for GNSS and EVRF2007 for height referencing. To fulfill this task, EUREF established and maintains long-term continental scale infrastructure such as EPN (EUREF Permanent Network) and UELN (United European Leveling Network), and publishes the related standards and databases. EPN and UELN also serves as interface for various geoscience applications including atmospheric and solid Earth studies. In this connection, two standardizing activities shall be highlighted here: (1) EPN Densification and (2) EUVN\_DA (European Vertical Network Densification Action).

(1) EPN is used to interconnect the national GNSS networks and serves as a backbone for the EUREF flagship EPN Densification. The project delivers a homogenized regional position and velocity product based on the long-term combination of the national scientific processing results. The recently published solution (D1933) includes 31 networks with some 3200 stations, made available at the EPNCB website. The positions and the velocities can be used as reference for national solutions and for the large-scale tectonic interpretations in geosciences. EPN Densification is also being part of EPOS (European Plate Observing System), which provides access to a wide range of geodetic and geophysical information and may also contribute to the new EU “European Ground Motion Service” initiative.

(2) EUVN\_DA integrates the ETRS89 positions and EVRF2007 height information available at more than 1300 selected UELN benchmarks, where high precision GPS/GNSS measurements were performed. Since the publication of the database in 2009 huge amount of new and updated leveling information is available, and therefore an update of the EUVN\_DA solution is planned.

The new EUVN\_DA database together with the latest European geoid solution can serve as an example for modern, GNSS-based height determination.