
EUREF NEWSLETTER

SEASON'S GREETINGS

BY THE EUREF CHAIR MARTIN LIDBERG

Dear colleagues,

We have now lived almost two years with the Covid-19 pandemic. In the beginning, in spring 2020, I thought that we could wait some weeks or a few months for the pandemic situation to calm down and then go back to a more “normal” situation. But slowly it turned out that this pandemic will be much more long lasting. We found out that geodetic fieldwork and maintenance of GNSS stations could not be postponed indefinitely, and therefore developed working procedures to get the most urgent tasks done in a relatively safe manner despite the pandemic.

For EUREF the situation has been similar. Last year we postponed our symposium and we were able to have our 2021 EUREF Symposium 26-28 May digital thanks to excellent arrangements from our colleagues in Slovenia. And thanks to all participants and presenters! With some 35 scientific presentations, 2 splinter meetings, and 25 national reports, I think it was a successful symposium given the circumstances.

The EUREF Symposium 2022 is scheduled for 1-4 June in Zagreb. I really hope that we can have that on-site and meet physically and be able to have interesting discussion during breaks and evenings (and at the breakfast table?). However, what we have learned from this pandemic is that an alternative back up plan is good to have.

I wish you, your relatives and friends a merry Christmas and all the best for 2022.

EUREF GOVERNING BOARD 2021

BY THE EUREF GB CHAIR WOLFGANG SÖHNE

In 2021 the EUREF Governing Board (GB) only met virtually. We had six meetings of 2,5 hours length each. These shorter meetings allowed concentrated work on the topics of the agenda but let less time for discussion – usually an important point during the face-to-face meetings.

One important topic throughout all our GB meetings was the discussion and preparation of the annual symposia with the local organizers, i.e. the 2021 symposium, which was held fully digital, and the 2022 symposium (see below). The general information on EUREF GNSS campaigns was added to the EUREF web page (http://www.euref.eu/euref_egrs.html – pdf for download). Various guidelines (EUREF Densifications, EPN Analysis Centres, see chapters below) were modified and updated. The visibility of the EPN Data Centres (DCs) in case of publication of EPN station data via global DCs was discussed. The GB emphasized the need of discoverability of the EPN data. The handling of the General Data Protection Regulation (GDPR) is an important and urgent topic, which couldn't be ignored within all EUREF entities. The usage of generic emails in our files is one option to fulfill the requirements. The European Ground Motion Service (EGMS) is starting into a more operational phase and the GB was considering on a valuable contribution from EUREF's side.

The relaunch of the (EUVN_DA) was discussed. Some deficiencies of the original EUVN_DA are known and with new data significant improvement might be expected. The charter of the new Working Group on European Unified Height Reference (see chapter below) was discussed and the WG has been established during the symposium (http://www.euref.eu/euref_gb_workinggroups.html).

New members joined the EUREF Governing Board, either by election or by fulfilling a specific task (http://www.euref.eu/euref_gb_members.html). The work on a Memorandum of Understanding between EUREF and the legal representative of the European Plate Observing System, EPOS ERIC, turned out to be quite complex and is going to be finished next year.



EUREF SYMPOSIUM 2022

BY MARJIAN MARJANOVIC AND DAMIR SANTEK

The State Geodetic Administration of the Republic of Croatia and the Faculty of Geodesy - University of Zagreb will jointly organize EUREF Symposium 2022 in Zagreb from June 1st to June 4th 2022. After successfully organized EUREF Symposium 2001 in Dubrovnik, we look forward to next year's Symposium and invite the EUREF community to come to our country and participate in the symposium.

The symposium is primarily planned to be held as physical meeting in Zagreb, but also due to the unpredictable epidemiological situation, remote participation will be ensured. At the beginning of the next year, in February at the latest, more detailed information on the symposium, venue, registration and accommodation options will be published on the symposium website. We look forward to your arrival in Zagreb.

UN-GGIM GGCE

BY WOLFGANG SÖHNE

In August 2019, the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) requested that the Subcommittee of Geodesy (SCoG) explore the installation of a Global Geodetic Centre of Excellence (GGCE). One year later, UN-GGIM decided to give the GGCE to Germany. Physical location is planned at the so-called “UN-Campus” in Bonn, Germany’s former capital city. For the first step, the GGCE is projected for five years, 2021 to 2025. There should be up to six persons working at the Campus, with two of them coming from BKG staff. The overall goal of the GGCE is “to assist Member States and geodetic organizations to coordinate and collaborate to sustain, enhance, access and utilize an accurate, accessible and sustainable GGRF to support science, society and global development”. The five key areas of the GGCE are: Governance; Geodetic Infrastructure; Policies, Standards and Conventions; Education, Training and Capacity Building; and Communication and Outreach. The start was planned for mid-2021, but some delay caused due to the UN’s approval and other administrative issues. We hope that EUREF with its large expertise for most of the five key areas is able to support and foster the activities of this new entity.

THE EUREF PERMANENT GNSS NETWORK (EPN)

BY CARINE BRUYNINX



GNSS@ROB @be_GNSS

During the 2021 EUREF symposium, the EPN CB organized the splinter meeting “Towards FAIR GNSS data” with the goal to raise awareness of EPN station managers and data centers for FAIR data principles, which increase the Findability, Interoperability, Accessibility and Reusability of the GNSS data. As a first step, all EPN station managers have been encouraged to attach in M3G (<https://gnss-metadata.eu>) a data license to their RINEX data. This has in the meantime been done for 80% of the EPN stations. In addition, the upcoming RINEX 4 observation file format also includes new header lines to insert in a standardized way the data license as well as the Digital Object Identifier (DOI) of the data. Using such a DOI also increases the findability and future tracking of usage of the data.

In 2021, the EPN CB (<https://www.epncb.oma.be>) continued to quality check all incoming daily RINEX 2 and RINEX 3 data using the Anubis software (<https://gnutsoftware.com/software/anubis/>). In June 2021, we upgraded from v2.3 to v3.1 of Anubis.

Concerning the EPN real-time activities, the observation streams on our three EPN broadcasters at ASI, BKG and ROB (https://www.epncb.oma.be/_networkdata/data_access/real_time/status.php) were completely switched from short (5 char) to long (10 char) mountpoint names, e.g. TLSE0 to TLSE00FRA0. According to the rules of the IGS, also the product stream switched to long mountpoints, i.e. EUREF01 to SSRA02IGS0_EUREF and EUREF02 to SSRA03IGS0_EUREF.

In order to comply with EU GDPR, the EPN Central Bureau has removed the EUREF mail, EUREF IP mail, and EUREF LAC mail archives from its public-facing ftp and web portal.

Encouraged by Resolution No 2 of the 2019 EUREF symposium in Tallinn, more than 60% of the EPN stations are sharing their daily RINEX data with the European Plate Observing System (EPOS). These EPN data are made available to EPOS through the ROB-EUREF EPOS data node built on top of the historical EPN data center managed by the EPN CB.

For more news, follow https://twitter.com/be_gnss.

New GNSS stations (in green) integrated in the EPN in 2021. The new Norwegian station is not shown on the map



The Coordinators

Analysis Center Coordinator

BY TOMASZ LIWOSZ AND ANDRZEJ ARASZKIEWICZ

In 2021 EPN Analysis Centres Coordinator (ACC) continued to combine GNSS coordinate solutions (final, rapid, near-real time) provided by the EPN Analysis Centres (AC).

The main changes in 2021 concerning the AC and combined solutions were as follows. Since January 2021 ASI (Centro di Geodesia Spaziale G. Colombo, Italy) AC started using new software for its GNSS analysis - GipsyX (previously GIPSY OASIS II). With this change, ASI started processing not only GPS observations, but also GLONASS and Galileo. The new solutions showed better agreement with the combined solution for the north and vertical components, than the previous solutions. However, for the east component slightly worse agreement was observed (probably due to not fixing ambiguities in the new solutions for the moment). Since April 2021, SUT (Slovak University of Technology) AC started providing to EUREF near-real time (NRT) solutions as a fourth EPN AC. The AC NRT solutions are provided to EPN and combined by ACC every hour. Also, during 2021, 8 new GNSS stations were added to the EPN, and were included in the AC and combined solutions.

In 2021 the ACC, ACs and the EUREF Governing Board members updated the Guidelines for the EPN Analysis Centres. The main changes concern the recommendations on processing Galileo observations with appropriate CODE products, and the modifications of the EPN ground antenna model (with repeated individual calibrations). The new guidelines are available at the EPN Central Bureau website (https://epncb.eu/_documentation/guidelines/guidelines_analysis_centres.pdf).

Troposphere Coordinator

BY ROSA PACIONE

In 2021, 6 new EPN stations, namely NABG00NOR, BUDD00DNK, SUL500DNK, SMI200DNK, MLHD00IRL, ANK200TUR, have been successfully included in the tropospheric combined solutions. The EPN combined solution provides ZTD estimates only for stations processed by at least three ACs. Therefore in 2021, the ZTD combined estimates are available, on average, for 355 stations (compared to 341 in 2020). Starting from GPS week 2139 (January 3rd, 2021) for each combined EPN station Integrated Water Vapour (IWV) is provided along with ZTD. They are disseminated in SINEX_TRO v2.0 format and are available in the EUREF product directory (<https://igs.bkg.bund.de/rootftp/EUREF/products/>) at the BKG data centre. VMF Data Server at the Technical University of Vienna is acknowledged for providing the necessary auxiliary information, surface air pressure and weighed mean temperature of the atmosphere, used in the conversion.

In 2021 for each EPN station, we have updated at http://epncb.oma.be/_productsservices/sitezenithpathdelays/ the following plots: ZTD time series, ZTD monthly mean (period 1996-2020) and inter-technique comparison with radiosonde data (if collocated). From January 2018 onwards, high resolution radiosonde data are used. They are provided by EUMETNET in the framework of the MoU in place between EUMETNET and EUREF.

Reference Frame Coordinator

BY JULIETTE LEGRAND

In May 2021, the EUREF Governing Board made a significant update of the "Guidelines for EUREF Densifications" (available at <https://doi.org/10.24414/ROB-EUREF-Guidelines-DENS>). This update accounts for the new, more refined, station classification that has been presented in 2020 at the EUREF symposium. The Reference Frame Product has also evolved. Since the solution C2145, the positions and velocities of all the stations with more than 3 years of data are published in a SNX and SSC file. In practice, it means that velocities are published for much more EPN stations. For the solution C2145, the positions and velocities of 359 EPN stations have been published compare to the 280 class A stations. In order to evaluate the quality of the EPN stations as reference stations, the “Tool for Reference Station Selection” is available and results are updated at each release of the Reference Frame Product: https://epncb.oma.be/_productsservices/ReferenceFrame/

The Working Groups

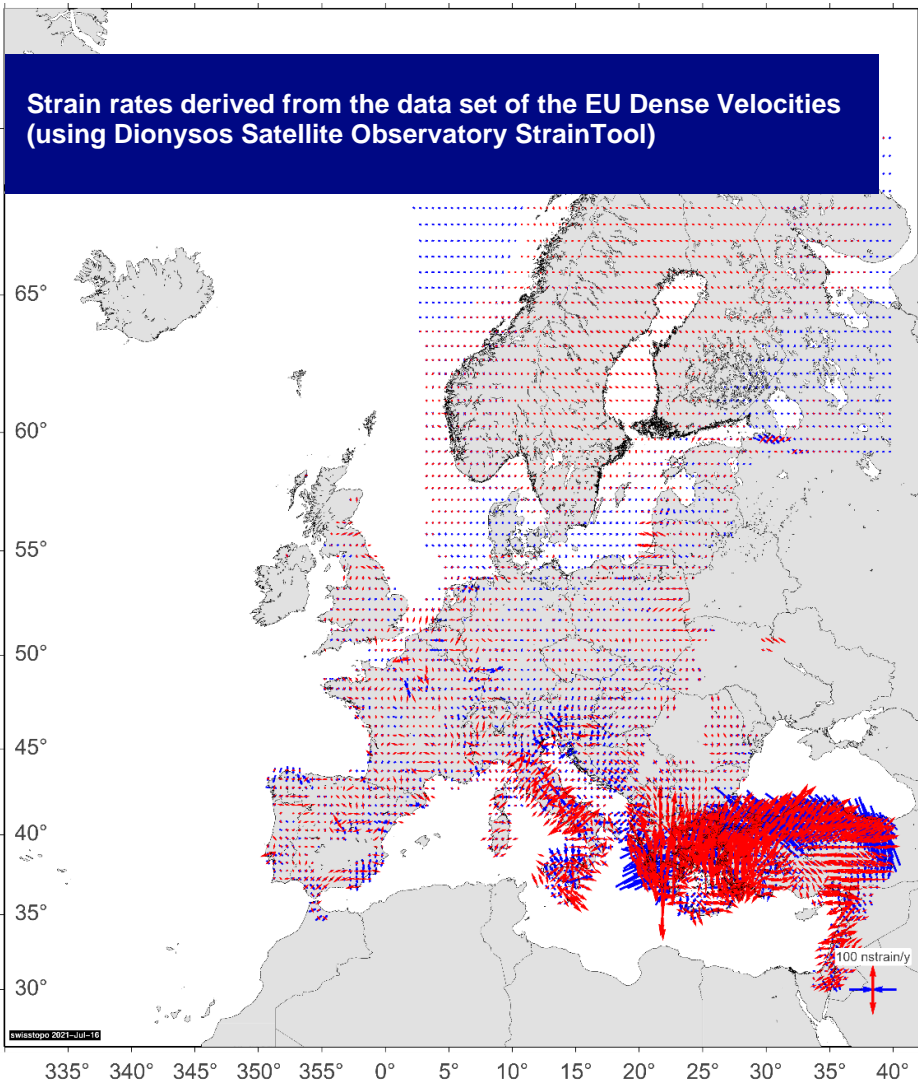
WG on Dense Velocities

BY ELMAR BROCKMANN

Most of the existing velocity fields in Europe are already included in the data set of the Working Group on Dense Velocities. Totally, more than 7000 individual station velocities are available for Europe. Recently, an automated outlier rejection criteria was implemented to further smooth the data set. Originally, it was planned that this step is not necessary and that the contributor will take care of outlier. We ask the contributors to take some attention on this topic when sending updates.

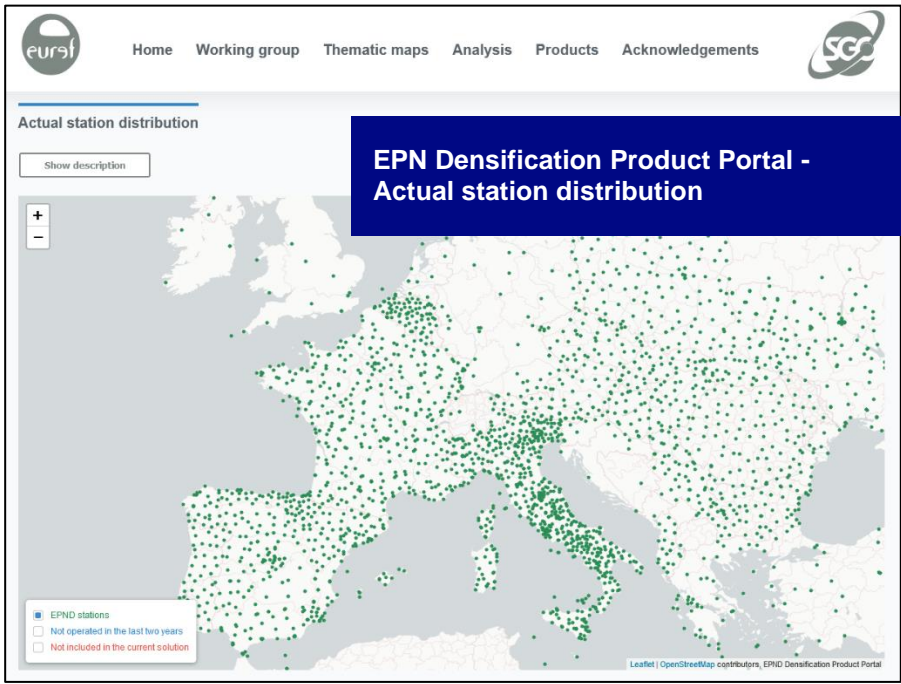
The website of the project, http://pnac.swisstopo.admin.ch/divers/dens_vel/index.html has been extended by “wind animation” visualization as well as strain rate plots.

In parallel, an OGC Coordinate Reference System Domain Working Group met almost every 2 weeks in 2021 to work on standardizations on a deformation model which will be derived from this data set.



WG on EPN Densification

BY AMBRUS KENYERES



The WG is continuing the preparation and delivery of new combination results. The next release is D2150 including weekly SINEX inputs from 28 ACs covering the period from October 2008 up to mid-March 2021. D2150 is released in mid-December, 2021. The EPND metadata database incorporates more than 4500 stations, which ever appeared in any input from an AC solution. The actual combination however includes 2581 stations only due to data access issues and the multilevel filtering approach (e.g. short time series, high noise level). D2150 includes 10% more data than D2100 anyway.

The EPND web portal (<https://epnd.sgo-penc.hu/>) is serving the community with numerous data and product services.

Multi-GNSS WG

BY ELMAR BROCKMANN

Multi-GNSS data processing in operational mode is today standard. The majority of ACs are operationally using GPS, GLONASS, and Galileo data. BeiDou, especially BeiDou-3 processing, is not yet possible. The transition from RINEX 2 to RINEX 3 continuously improves, slowly. End of 2021 a new RINEX 4 format version will be released (and confirmed by RTCM beginning 2022). The biggest changes are for the RINEX navigation files. File naming is identical to RINEX 3 and also the content of the observation files includes some minor improvements. Therefore, the version change from 3 to 4 is not comparable with the version change from 2 to 3.

WG on Reprocessing

BY CHRISTOF VÖLKSEN

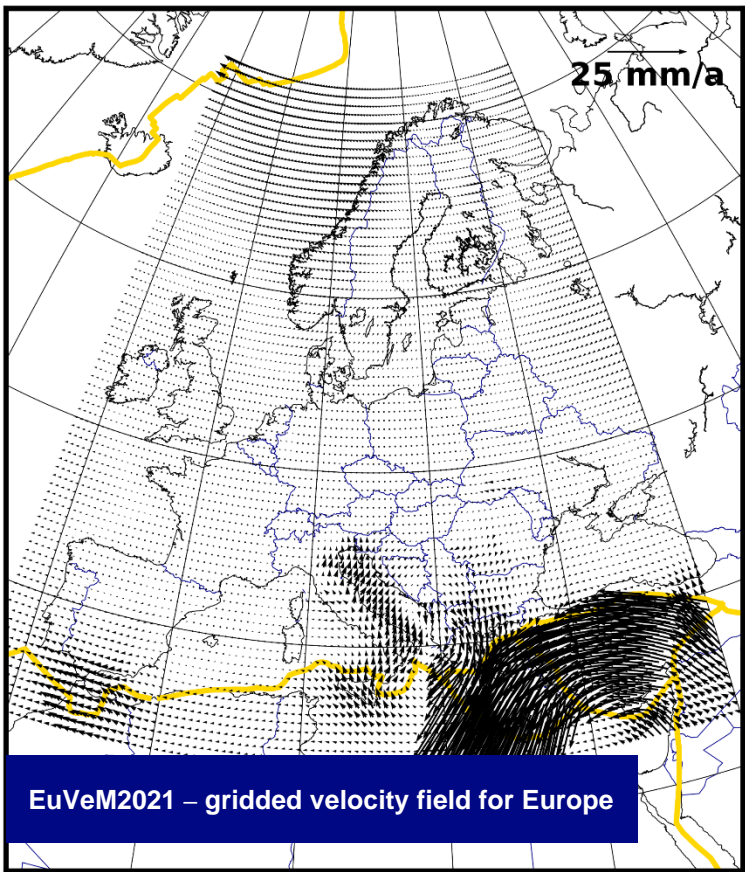
After the introduction of a new global reference frame ITRF, the question of reprocessing all previous data of the EPN always arises in the EUREF community. This is necessary to provide consistent time series of position changes over the years to maintain the European Reference System ETRS. The IGS has been very active reprocessing all the available GNSS data of the past years and finalized its IGS-Repro3 reprocessing. This is one of the key elements in order to generate a new realization of the ITRS as the coming ITRF2020. Reprocessed products like GNSS orbits and clocks are now available. But only after the final release of the ITRF2020 we can start with our reprocessing campaign EPN-Repro3. One prerequisite, however, is that the reprocessed products of IGS Repro3 meet the requirements of the ITRF2020. In the meantime, contact was made with the various ACs of EPN to encourage them to participate in EPN-Repro3. The responses were promising. A clear majority will participate in EPN-Repro3. However, important questions, such as the use of the kind of absolute antenna corrections, still need to be clarified beforehand. This will be the first EPN-Repro campaign that will also include the signals of the Galileo system.

WG on Deformation Modeling

BY REBEKKA STEFFEN AND MARTIN LIDBERG

A gridded velocity field for Europe (EuVeM2021, shown to the right) was derived using the collocation method and the EPND2100 solution. The model was presented at the EUREF 2021 symposium, showing examples for various countries (e.g. Italy, Greece, Latvia, Poland). An article describing the method is currently under review with Journal of Geodesy, and a second article presenting the velocity field model EuVeM2021 is in preparation.

The new velocity model has also been used to calculate strain rates, which have been presented at the EGU General Assembly 2021. To increase the effectiveness of the velocity modeling process, some re-organization of this Working Group is under consideration, e.g., merging it with another Working Group.



WG on European Unified Height Reference

BY JOACHIM SCHWABE

The WG was established through Resolution No. 1 at the EUREF 2021 Symposium. It aims to improve information about the national height coordinate frames within Europe and their transformations to the EVRS; to complement EVRS and ETRS89 with an official European height reference surface (EHRS, to be realized by a combined quasigeoid model); and thereby to enhance the European geodetic infrastructure.

To this end, three main tasks have been defined:

1. Establish a continuously updated inventory of official national height reference surfaces (geoid models) to be included in a redesigned CRS-EU database according to ISO 19111:2019 standards;
2. Work towards a new European GNSS/leveling dataset as a successor to EUVN_DA. In order to emphasize the relevance for the EHRS, a new title “European Height Reference Surface – Control Points” (EHRS_CP) was chosen.
3. Compute a seamless European combined quasigeoid model which is consistent with the latest EVRS and ETRS realizations (currently ETRF2000 and EVRF2019).

A first online meeting of the WG took place on 1 Oct 2021. Meanwhile, a draft for a questionnaire on the national geoid models and a call for GNSS/leveling data has been finalized and sent out to the national contacts for the UELN. A first response will be evaluated and presented at the EUREF Symposium 2022.