Location: BEV central office, Schiffamtsgasse 1-3, 8th floor, 1020 Vienna

Time: Oct.22, 2013: 13:00 -18:00
      Oct. 23, 2013: 9:00 – 12:00

AGENDA
Last update: October 21, 2013

1. Opening (Bruyninx)

2. Approval of minutes of 62th TWG meeting in Budapest (all)

3. Review of Action Items of 62th TWG meeting in Budapest (all)

4. EPN Densification (Kenyeres)

5. EUREF-CEGRN MoU: repro2 of CEGRN campaigns and densification of EPN in Central Europe (Caporali)

6. EPOS News (Fernandes, Lidberg, Dousa, Bruyninx)

7. EPN News

    a. CB (Bruyninx)

    b. EPN Real-Time Monitoring (Söhne)

8. EPN ACC report and update of AC guidelines (Szafranek)

9. EUREF Troposphere (Pacione, Söhne)

10. Multi-GNSS WG

    a. Tracking of GPS, GLONASS, Galileo and other GNSS signals / enhancing the EPN infrastructure
        i.   RINEX3 format, MGEX monitoring at CODE (Brockmann)
        ii. Status Q-monitoring RINEX3 (Dousa)
    b. Analysis of GLONASS data
        i.   News from BSW5.2 and usage of GLONASS (Szafranek)
    c. Analysis of new GNSS signals
        i.   IGS-MGEX data analyses (Brockmann)
        ii.   Data processing test EUREF-MGEX (Söhne)
        iii. Navigation message and time scale issues for GPS Glonass Galileo Beidou and SBAS (Caporali)
    d. Planning (Elmar, all)

11. EUREF ToR (Torres, Ihde)

12. EUREF product catalogue (Söhne et al.)

13. EUREF promotion and outreach (Söhne)

14. WG on Deformation models (Lidberg)

15. Divers

    a. Report on the EuroGeographics General Assembly (Torres)

    b. Report on EUPOS activities (Kenyeres)

16. Next meetings

    a. TWG meeting, Feb. or March 2014 in Gävle (Lidberg, Caporali)

    b. Next EUREF symposium in Vilnius, June 4-6, 2014 (all)

17. Action Items (all)

Participants

TWG members:

Z. Altamimi	
E. Brockmann	
C. Bruyninx	
A. Caporali	
R. Dach	Excused
J. Dousa	
R. Fernandes	
H. Habrich	Excused
J. Ihde	
A. Kenyeres	
M. Lidberg	
R. Pacione	
M. Poutanen	Excused
W. Söhne	
G. Stangl	
K. Szafranek	
J. Torres	

Guest:
A. Araszkiewicz

Minutes

1. Opening (Bruyninx)

In her property as chairwoman of the EUREF Technical Working Group (TWG), C. BRUYNINX opens the 63rd meeting of the EUREF TWG, welcomes the participants and expresses her thanks to the Director of BEV for the invitation and organization of this meeting. On behalf of the BEV, W. HOFMANN welcomes the TWG and submits his best wishes for a successful meeting. A draft of the agenda has been distributed among the TWG. The participants accept the agenda after some minor corrections.

2. Approval of minutes of 62nd TWG meeting in Budapest (all)

The minutes of the 62nd TWG Meeting in Brussels 21-22.03.2013, were distributed among the TWG members. The final text is published in the EUREF homepage.

3. Review of Action Items of 62nd TWG meeting in Budapest (all)

AI1_62 on ML and JT: The Chairman of the Group should be invited similarly to what was done with PAUL DUNKLEY for Eurocontrol (Item 6). Will be done for the next TWG

AI2_62 on All: provide input to WS to complete the table on international representations of the TWG members (Item 7). Done

AI3_62 on WS: to provide the feedback on the questionnaire by the first week of June (Item 7). Done

AI4_62 on CB: write a letter to the head of the Cartographic Office encouraging further refinement of the report according to the guidelines (Item 12). Done

AI5_62 on CB: better rephrase and complete the first bullet on sect. 3.2. of

the Guidelines concerning use of IGb08 reference stations in alternative to EPN class A stations (Item 13). Done

AI6_62 on ML and AC: based on the information available from the literature and recent presentations, propose at the next TWG an updated roadmap on how to proceed (Item 14). In progress

AI7_62 on AC: send a mail to the TWG members inquiring on this option as a date for the Wien TWG (Item 19). Done

AI8_62 on ALL: All TWG members are invited to check their responsibilities related to EUREF. It is stated that this document is only for internal use of the TWG (Item 7). Done

AI9_62 on ALL: Review EUREF Products on the Web and provide feedback (Item 7). CB, EB and WS to work on the product catalogue. In progress

AI10_62 on KS: The ACC will report on progress at the upcoming TWG meeting regarding tests concerning global or regional processing (Item 9).

AI11_62 on CB: send a EUREF Mail announcing the new ACC (Item 9). Done

AI12_62 on KS: status report of the new ACC activities to be presented at the next TWG (Item 9). Merged with AI 9. In progress.

AI13_62 on CB: send to M. Ryczywolski copies of Campaign reports (e.g. Czech, UK) as an example (Item 12). In progress.

AI14_62 on CB: distribute to the TWG members the approved Guidelines for Densification Campaigns (Item 13).

AI15_62 on AC: update web site with the new guidelines for Campaign Densification (Item 13). Merged with AI14. Done.

AI16_62 on ML: organise a dedicated meeting of the WG on Deformation Models in order to take into account contributions from different WG

members (Item 14). In progress

AI17_62 on AC: distribute the Guidelines for EPN Stations and Operational Centers via EUREF Mail and update the web page (Item 16). Done.

AI18_62 on CB: inform the station managers of the proposed stations KOSE, CORT and PNGS on the decision of the TWG (Item 17a).Done

AI19_62 on WS: distribute the presentation on real-time monitoring to CB and RP and come up with proposals for a common monitoring of the three regional broadcasters (Item 17b). In progress.

AI20_62 on GS: look for alternative dates for the TWG fall meeting (Item 19).Done.

4. EPN Densification (Kenyeres)

Progress report on the European dense velocity field: contributions from Germany (GREF), UK BIGF (260 sites), Spain+Portugal (>150 sites) Switzerland and Greece (20 HEPOS sites). These groups contribute with weekly SINEX files, except Switzerland (cumulative) and Greece (RINEX). SAPOS contribution is yet undefined. Problems with duplicate 4 char station id are dealt with by renaming stations at the combination level. The problem will disappear with the new RINEX station naming but CB informs that it is at present unclear if this naming will finally go ahead. ZA points out that within the IERS some general discussion on the problem of station naming and DOMES numbering will be initiated, possibly in the context of ISO.

A cumulative position/velocity solution based in the weekly SINEX input from 6 ECC countries from GPS wk1300 to wk1740 was generated: mixed igs05 – igs08 antenna models are present in the combined solution. No correction formula is for the moment foreseen. This solution agrees well with the EPN Cumulative Solution C1740. Preliminary tests comparing this solution with the ETRS89 realization on 100 Polish stations (2 campaigns) also shows very good results. Unfortunately very few data are available from Balkan regions. Contacts are underway with Serbia. A letter to Serbia and Croatia will be signed by JI to solicit SINEX data. In order to recognize the work done by the analysis centers submitting weekly SINEX solutions to the reference frame coordinator, the possibility to give these analysis centers (AC) a more official label is discussed. Also some EPN LAC considers becoming a Densification Analysis Center (DAC?)(OLG, SGO?). AK is asked to prepare a document providing a proposal for description and status of the DAC to be discussed at the next TWG.

5. EUREF-CEGRN MoU: repro2 of CEGRN campaigns and densification of EPN in Central Europe (Caporali)

CEGRN campaigns from 1996 to 2013 have been reprocessed with IGS08 consistent antenna, orbits and ERP's. Both Bernese 5.0 and 5.2 have been used, but final product is intended to be based on BSW5.2. EUREF guidelines for EPN local densification have been implemented. Alignment to ETRF2000 by Minimum Constraints on coordinates of common Class A EPN sites. The 1999 Campaign may be affected by eccentricity errors in 2-3 sites. The deformation in the shear zone in Western Greece can be described by an analytical model and can be verified with independent data.

6. EPOS News (Fernandes, Lidberg, Dousa, Bruyninx)

RF presents the EPOS WG4 presentation given at the IAG in Potsdam and shows the structure of the WG4. Partner Nations are

reviewed: 18 partners. Geodetic component in EPOS is represented by WG4 : permanent GNSS stations and other geodetic data. Discussion is ongoing on including sea level data, Static gravity data but so far not considered in WG4. Absolute gravity (AG) and superconducting gravity (SG) is investigated, following resolution 4 of the EUREF symposium 2013 in Budapest. For the moment focus is on continuous GNSS stations. EPOS database includes potentially 2200 cGNSS stations from 49 research infrastructures. Scientific applications focused on Solid Earth science applications. However, it was also can be used for other geodetic related applications : reference frame,meteorology, climate change, space weather. Relation to other projects, such as CEGRN, E-GVAP, TIGA, EUREF are discussed. Cooperative effort with UNAVCO is foreseen on GSAC (Geodetic Seamless ArChive Data Dissemination). EPOS could be considered within Horizon2020 as a Research Infrastructure, according to a recent EU Consultation. CB points out that EPOS is not creating new science but assembling in a homogeneous manner several contributions on specific themes of Solid Earth. The question for the TWG is the role of EUREF within EPOS. According to M. Cocco, EPN is one of the core thematic services for WG4. However, according to RF, this role is recognised only by some components of the EPOS WG4 community. It is discussed if the Support and Governance column of the document describing the EPOS Thematic Core Services (TCS) can be reconsidered, in order to put in proper evidence the role of EUREF, or, alternatively a new column on Standardization is added as an additional thematic core service. It is decided that the 'Support and Governance Infrastructure' column should have below in brackets '(based on existing and future EUREF Permanent Network experience)'. RF is asked to distribute the full TCS document to the TWG.

7. EPN News

    a. CB (Bruyninx)

All new stations observe GLONASS. EPN CB has updated files specifically for Bernese 5.2 users and CB is requesting feedback. Recent problems with the generation of EPN rapid time series were caused by rapid daily solutions giving an inversion error in CATREF. The problem was caused by one solution with Regularization of NEQ's set to 'no'. New EPN stations have been proposed. The major problem is timeliness of data transfer to the Data Centers. Some 20 new stations are proposed by Sweden. They have individual antenna calibrations, observe GPS, GLONASS and Galileo. Some are co-located with absolute gravity. In addition the MGEX stations provide RTCM3, RINEX 3.02. This feature is foreseen for all stations. CB points out that these proposed stations are ideal stations from the technical point of view and asks the TWG if she can start with the official inclusion procedure in the EPN. The TWG confirms it.

Within the EPN, the last 5 digits of the Antenna Serial Number are used in the antenna calibration file. Now 2 stations with duplicate A5 have shown up and a procedure needs to be developed to deal with this.

Following the ANTEX format the antenna SN should be A20 and not just A5. As to the station naming and file naming in Rinex3, it is noted that the long names are not yet implemented, not even in the MGEX community.

b. EPN Real-Time Monitoring (Söhne)

Three regional broadcasters are located in Italy, Germany and Belgium. Only the BKG is monitored by the EPN CB, but also the others should be. This could be done based on a new web page with information updated every 5 min in the GDC (Geodetic Data Center). For more complete information the casters should allow for access to a number of files. WS will investigate if it is possible to adapt the present information in order to provide information specific for each EPN station. Hermann Seeger celebrated in September his 80th birthday. Heinz Habrich sent a wishful message to the TWG.

8. EPN ACC report and update of AC guidelines (Szafranek)

Daily and weekly combined solutions are ready for delivery. Also rapid daily solutions are available. Likewise for the TIGA subnetwork solution. It is proposed that Jan 2 2014 is the appropriate date for the switch BKG→WUT/MUT. Plots are presented, which show full consistency between the combined solutions generated by BKG and WUT/MUT. Operational options are presented. A. ARASKIEWICZ presents the new EPN ACC Web page: Helmert parameters and rms repeatability (=agreement between the different solutions) can be inspected interactively. BSW 52 will be used for all types of combinations. H. HABRICH's policy for exclusion of a station from the combined solution has been reviewed. It is planned to use metadata in addition to rms repeatability for this process. Metadata should be considered for station exclusion, with reference to the station log sheet and the antenna calibration file, based on past experience. 'Repeatability' should be replaced by 'agreement' when it comes to the comparison of the solutions generated for the same week or day by different LAC's. Changes in the Guidelines: final daily solutions become mandatory. LAC's have been asked by the ACC to speak up as to their willingness to do specific tasks. Unfortunately the response has been lower than expected. A fixed deadline for submission to the IGS of the combined solution is recommended. If LAC's are not on time in providing their solutions, their solution for that week will not be included.

9. EUREF Troposphere (Pacione, Söhne)

As requested during the retreat a position paper on the troposphere has been prepared. The EUREF web site is reviewed in relation to the activity in tropospheric research and products. VLBI information for collocated European sites is proposed. The version of the SINEX TRO format officially accepted and applied for the EUREF tropo solutions is 0.01 (March 1997). This version seems to be outdated and due to the lack of standardization different organizations (IGS, IVS) have started using different field names to refer to the same variables. Discussion on format standardization has been recently revitalized among members of the IGS troposphere WG. A new

standard format is hoped for; two gradients, each with its sigma, should be allowed for in the new format.

It is proposed to add in the EUREF Web page/Organization/Project a link to the MoU with EUMETNET. It is unclear how many users are using the tropo products. It is unclear how the pertinent information could be made available by BKG. It is recommended to stop sending data to IGS as IGS is no more generating a combined troposphere product. Several options for improvement are described. A controversial issue is gradients. These are estimated but not submitted, according to the LAC Guidelines, because the official SINEX TRO format does not allow for gradients. It is suggested to submit the gradients in an unofficial SINEX TRO format for test purposes. KS will inform the LAC about this decision and adapt LAC guidelines accordingly. Calibration of meteo sensors at EPN GNSS stations is discussed. However their importance is questionable, precisely because of lack of calibration. The importance of repro2 is stressed.

10. Multi-GNSS WG

   a. Tracking of GPS, GLONASS, Galileo and other GNSS signals / enhancing the EPN infrastructure

      i. RINEX3 format, MGEX monitoring at CODE (Brockmann)

         Current RINEX is v3.02. Till today, typos, "optional" to "mandatory" replacement, concretizations concerning the various navigation messages are iterated in the RTCM group. Generally, the release mechanism is under discussion because formats are only released after interoperability tests, which were never realized for new published RINEX versions. CODE and GOP are monitoring the MGEX files using independent software.

      ii. Status Q-monitoring RINEX3 (Dousa)

         GOP is developing tools for quality check of multi-GNSS data. G-NUT/Anubis is open source and freely available. It reads RINEX 2 and 3 (RTCM2 and 3), including GPS, GLONASS and Galileo observations. RINEX3.x encoder is in progress. Multipath is estimated for code relative to phase for all the GNSS. Output data are available in ASCII and XML formats. Several plots are available with observation/statistics. Once on a web page they provide feedback to the data provider.

   b. Analysis of GLONASS data

      i. News from BSW5.2 and usage of

GLONASS
(Szafranek)

GLONASS observations are processed by 8 LAC's (according to their LAC files). Some discontinuity in scale is reported, when updating BSW to 5.2, at a number of LAC's.

c.   Analysis of new GNSS signals

i.   IGS-MGEX data analyses (Brockmann)

CODE can process already Galileo data. In the framework of MGEX they generate Galileo orbits with a reasonable accuracy. These products can be used to fist Multi-GNSS analyses tests. LPT does combined GPS+GLO for a zero baseline in Zimmerwald (ZIM2-ZIM3)..

ii.   Data processing test EUREF-MGEX (Söhne)

MGEX homepage of IGS shows 35 stations in Europe. A number of stations are broadcasting RTCM MSM real-time data. A number of DC are providing multi-GNSS ephemeris and data in RINEX format. BSW5.2 has been tested with

Galileo data and RNX2SNX script. Comparison of results obtained with RINEX V2 vs RINEX V3 input data yields coordinate differences at the mm level (should be smaller, according to EB's experiences). Galileo metadata are not available.

iii.   Navigation message and time scale issues for GPS GLONASS Galileo BeiDou and SBAS (Caporali)

Orbits and clocks for GPS GLONASS Galileo and QZSS have been compared: Broadcast vs. SP3. Broadcast ephemeris is at submeter agreement with final SP3 orbits for GPS. GLONASS and Galileo have somewhat poorer performances, in the order. Complicated is the situation for the clock of Galileo, due to the coexistence of the F-NAV and I-NAV models. Update rates of the broadcast message are nominal for GPS, more irregular for the others and often inconsistent with the expected validity time of the broadcast data. BeiDou satellites

appear to have no synchronization among each other. System Time biases listed in the RINEX NAV files are verified by direct computation. Data are confirmed for all receivers and days, except that for one type of receiver. RINEX NAV data for SBAS (EGNOS, GAGAN GSAT) are often incomplete and unusable, although the quality code is set to 'usable'. It is recommended that the Quality control on the MGEX files addresses not only the basic information (data types, number of observations, skyplots etc.) but also the completeness and exactness of the contained information, including the metadata in the RINEX NAV header. More at the next TWG.

d. Planning (Brockmann, all)

A date for the AC's to switch to full inclusion of GLONASS was not defined. Q-Rinex3-Tools development is encouraged.

11. EUREF ToR (Torres, Ihde)

We will have elections in two years. Some preparation of the ToR should be done in view of the next Symposium. Are the ToR adequate and up to date? Different structure of the document? Include INSPIRE in the text. Should the structure 'Chair of EUREF, Chair of TWG, Secretary' be kept or changed? Membership is also unclear, in relation to the membership to IUGG. More at the next TWG meeting. Working Groups should be mentioned in the ToR. Activities should include product and services to European users and providers. Universities and Research Centers should be included as involved entities, together with NMCA's. Do we need a CB (Central Bureau) for EUREF? Participation to EUREF should be open to Countries in the Mediterranean area and Asia. Strategic Partners, i.e. partners with whom EUREF has a MoU, should be listed.

12. EUREF product catalogue (Söhne et al.)

List has been sent out. Services should exist as operational entities. Difference between 'product' and 'service' should be strictly considered. The discussion will be continued at the next TWG.

13. EUREF promotion and outreach (Söhne)

List is completed, but where to put it? To be discussed at the next TWG.

14. WG on Deformation models (Lidberg)

Inventory of reported activities has been done according to the Charter. Station velocities and deformation models should be elaborated in more details. WG meeting the morning before next TWG: focus on Fennoscandia, Iberia, Italy, CEGRN, ALPS, Anatolia/Greece. Alternatively, have a separate meeting.

15. Divers

a. Report on

the EuroGeographics General Assembly (Torres)

JT planned to present EUREF at the Eurogeographics General Assembly 2013, but it was not foreseen in the program. An important initiative is called UN-GGIM by the UNO on global reference frames and gravity. The European UN-GGIM has started, in conjunction with EuroStat. EUREF should continue to contribute, and try to have better recognition.

b. EUPOS Meeting (Kenyeres).

In EUPOS organizational changes are foreseen.. EUPOS will attract more RTK service providers in Europe to better represent the user and service provider needs in international organizations and at receiver manufacturers. EUPOS will initiate a MoU with EUREF in order to clarify the common interests and strengthen the cooperation. Next EUPOS meeting Oct, 29, in Berlin.

16. Next meetings

a. TWG meeting, 13-14 March 2014 in Gävle (Lidberg, Caporali). Could be in Stockholm instead of Gävle. It is decided in favor of Gävle.

A meeting of the w.g. on deformation models will be arranged in the morning (9-12) of the 13:th before next TWG meeting.

b. Next EUREF symposium in Vilnius, June 4-6, 2014 (all)

Action Items (all)

AI1_63 on KS: keep in touch with the Polish NMA to finalize the Polish ETRF2000 Densification Campaign (Item 2).

AI2_63 on ML: contact the Head of the Baltic hydro office (Item 3).

AI3_63 on EB: to send to CB the 4 char id database of E-GVAP (Item 4).

AI4_63 on AK: is asked to prepare a document providing a proposal for description and status of the Densification Analysis Centers to be discussed at the next TWG (item 4)

AI5_63 on JI: finish and send letter to Serbia (Item 4)?

AI6_63 on AC, ZA and AK: Test if SNX2NQ0 applied to the cumulative SINEX file generated with CATREF yields a correct STA file and a NQ0 usable for stacking with campaign solutions and network densifications (Item 5).AI7 on WS: investigate if it is possible to adapt the present real-time monitoring information in order to provide information specific for each EPN station (item 7)

AI8_63 on RP and JD: stimulate WG3 of COST Action to work on issue of SINEX_TRO format standardization (Item 9).

AI9_63 on RP: a detailed proposal on update of the EUREF Web site with the results of the tropo activity/COST action will be sent to CB (Item 9).

AI10_63 on KS: update the Guidelines so that tropospheric gradients are foreseen (Item 9).

AI11_63 on CB: invite Ch. VOELKSEN at the next TWG meeting to discuss the status of repro2 (Item 9).

AI12_63 on KS: solicit the LAC's for GLONASS analysis (Item 10d).

AI13_63 on JI, JT and AC: better outline the role of the EUREF CB, and the duration of the terms (Item 11).

AI14_63 on JI: to write a letter to a number of high ranking Officers of European Organizations highlighting the role and activity of EUREF (Item 15a).

AI15_63 on ZA: to report at the next TWG on the UN initiatives on Geoinformation, including but not restricted to Geodesy (Item 15a).

AI16_63 on JI and AC: invite the organizers of the next EUREF Symposium (Item 16a).

AI17_63 on WS: prepare, for the next TWG, plan and schedule for a possible EUREF tutorial in connection to the next EUREF Symposium (Item 13).