

**Time & location:** March 13, 2014: 13:00 -18:00 ; Gävle, Lantmäteriet (Lantmäterigatan 2c)  
March 14, 2014: 9:00 – 12:00 ; Gävle, same building as the Railway Station

## **AGENDA**

*Last update: March 13, 2014.*

1. Opening (Bruyninx)
2. Approval of minutes of 63<sup>th</sup> TWG meeting in Vienna (all)
3. Review of Action Items of 63<sup>th</sup> TWG meeting in Vienna (all)
4. Organization of EUREF symposium in Vilnius
  - a. Organizational aspects (Parseliunas)
  - b. Scientific program (Ihde, Caporali)
  - c. Best students / young scientists presentation award (Ihde)
5. EUREF product catalogue (Söhne et al.)
6. EUREF promotion and outreach (Söhne)
7. Relation FIG-EUREF (Lilje)
8. Multi-GNSS WG
  - a. Navigation message and time scale issues for GPS, Glonass, Galileo, Beidou and SBAS (Caporali)
  - b. Planning (Elmar, all)
9. EPN ACC news
  - a. Report about switch from BKG to MUT/WUT (Szafraneck)
  - b. Update of guidelines
  - c. GLONASS analysis
10. EPN reprocessing (Völksen)
11. EUREF Troposphere (Pacione, Söhne)
  - a. News from COST action
  - b. Web site
12. EUREF real-time monitoring (Bruyninx)
13. EPN Densification (Kenyeres)
14. EPOS and EUREF (Bruyninx)
15. WG on Deformation models (Lidberg)
16. UN activities on GeoInformation (Altamimi, Ihde)
17. Divers
  - a. EuroGeographics KEN (Ihde)
  - b. News about Polish ETRS89 densification (Szafraneck)
18. Next meetings
  - a. Fall 2014 TWG meeting (all)
  - b. Next EUREF symposium (all)
19. Action Items (all)

**Participants****TWG members:**

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

**Guests:**

A. Araszkiewicz  
E. Parseliunas  
Ch. Voelksen  
M. Lilje

## Minutes

### 1. Opening (Bruyninx)

In her property as chairwoman of the EUREF Technical Working Group (TWG), C. BRUYNINX opens the 64<sup>rd</sup> meeting of the EUREF TWG, welcomes the participants and expresses her thanks to the Director of Lantmäteriet for the invitation and organization of this meeting. On behalf of the Lantmäteriet, MARTIN LIDBERG 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 63<sup>th</sup> TWG meeting in Vienna (all)

The minutes are approved with minor changes.

### 3. Review of Action Items of the 62<sup>nd</sup> and 63<sup>th</sup> TWG meeting (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: **in progress**

**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: **in progress**

**AI16\_62 on ML:** organize a dedicated meeting of the WG on Deformation Models in order to take into account contributions from different WG members: **done**

**AI9\_62 on ALL:** Review EUREF Products on the Web and provide feedback. 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: **postponed**

**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: **done**

**AI1\_63 on KS:** keep in touch with the Polish NMA to finalize the Polish ETRF2000 Densification Campaign: **on agenda**

**AI2\_63 on ML:** contact the Head of the Baltic hydro office: **done**

**AI3\_63 on EB:** to send to CB the 4 char id database of E-GVAP: **done**

**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: **postponed to next TWG**

**AI5\_63 on JI:** finish and send letter to Serbia: **done**

**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: **done**

**AI7\_63 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: **on agenda**

**AI8\_63 on RP and JD:** stimulate WG3 of COST Action to work on issue of SINEX\_TRO format standardization: **on agenda**

**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: **done**

**AI10\_63 on KS:** update the Guidelines so that tropospheric gradients are foreseen (Item 9): **done**

**AI11\_63 on CB:** invite Ch. VOELKSEN at the next TWG meeting to discuss the status of repro2 (Item 9): **done**

**AI12\_63 on KS:** solicit the LAC's for GLONASS analysis: **in progress**

**AI13\_63 on JI, JT and AC:** better outline the role of the EUREF CB, and the duration of the terms: **postponed to next TWG**

**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: ?

**AI15\_63 on ZA:** to report at the next TWG on the UN initiatives on Geoinformation, including but not restricted to Geodesy: **on agenda**

**AI16\_63 on JI and AC:** invite the organizers of the next EUREF Symposium: **done**

**AI17\_63 on WS:** prepare, for the next TWG, plan and schedule for a possible EUREF tutorial in connection to the next EUREF Symposium: **on agenda**

#### 4. Organisation of EUREF symposium in Vilnius

##### a. Organizational aspects (Parseliunas)

Parseliunas reviews the organizational aspects of the Symposium, the Venue, the Social Program.

##### b. Scientific program (Ihde, Caporali). It is recommended that invited papers are foreseen and scheduled by the Conveners.

##### c. Best students / young scientists presentation award (Ihde).

#### 5. EUREF product catalogue (Söhne et al.)

It is proposed to publish only the officially validated products. Links to specific Web pages are proposed for such official products. We should have metadata as official products. Internal products are rapid daily/hourly coordinates and can be removed from the official products list. Standardization and Guidelines are also worth to be emphasized. They should be considered as an official product of EUREF. Working Group charter and composition should be published.

#### 6. EUREF promotion and outreach (Söhne)

A questionnaire was distributed at the last Symposium in Budapest. Most of the ca. 30 answers were collected at the Symposium. The majority requests a 1-2 day tutorial on all of the proposed items. EVRS,

ETRS89 and EPN-Multi-GNSS are the most hoped for items. The tutorial could be held first in 2015. It is concluded that 1 day tutorial will be made on one topic.

#### 7. Relation FIG-EUREF (Lilje)

FIG is the International Federation of Surveyors, thus oriented to practical world, whereas IAC is traditional more academic. FIG Commission 5 has focused since 15 years on CORS and Reference Frame issues. Examples are AFREF, SIRGAS, PC-GIAP. IAG and FIG cooperation should be strengthened in the future, but also a stronger cooperation between FIG and EUREF could be of benefit to EUREF in order to allow EUREF to have a closer link with its users.

#### 8. Multi-GNSS WG

- c. Navigation message and time scale issues for GPS Glonass, Galileo, Beidou, QZSS and SBAS (Caporali). The analysis of MGEX data (RINEX 3.x) acquired by European stations with different receivers indicates that a) the various GNSS system times have systematic offsets relative to the GPS system time; b) the receivers introduce different biases in the measurements of various GNSS data. All this affects the accuracy with which a user can determine its position with a multi-GNSS receiver, and clearly impacts on interoperability. It is recommended to continue monitoring these systematic effects and regularly report.

#### d. Planning (Brockmann, all)

Quality control at AIUB of MGEX data is ongoing. BKG's BNC can process Galileo, GOP's Anubis is being tested

at several EPN LAC's. GPS + GLONASS should be processed by all LAC's. BSW v5.3 with simplified access to observation type and more suited for reprocessing is announced to appear. We do not know about the plan of Gamit, Gipsy to process GLONASS and other GNSS. It is recommended to actively stimulate station managers to submit RINEX 3.02 data instead of RINEX 3.01. EPN CB will start monitoring station metadata in RINEX 3 files and send out error messages.

#### 9. EPN ACC news

- a. Report about switch from BKG to MUT/WUT (Szafranek)

Araskiewicz reports that WUT/MUT ACC has started operations in January 2014. Repeated exclusions of non Bernese and Bernese solutions at specific stations (eg. BELL) are emphasized (e.g. ASI and IGN solutions). REPRO2 should provide more insight. The usage of a new set of reference stations for the combined solution is under investigation. It is based on 44 IGB08 sites, instead of the 97 EPN Class A stations used before. The difference between both results in a 1 mm bias in the Y coordinate, and smaller biases in X and Z.

- b. Update of guidelines

Daily final solutions are provided by almost all LAC's, according to the new Guidelines. Different types of Analysis Centers need to be defined. E.g. GOP is working on reprocessing and should be given the status

e.g. of task-specific AC (TAC).

c. GLONASS analysis

10. EPN reprocessing (Völksen)

EPN REPRO2 responds to the input of IGS REPRO2. Three softwares will be used for EPN REPRO2, each of them processing the entire EPN: Gipsy 6.2 (ASI), BSW52 (GOP) and Gamit 1.04 (MUT). However, contributions from other LACs are also welcome. Individual antenna calibrations will be applied. A benchmark test is foreseen for GPS week 1677 to 1680 with the various programs and should be completed by April 2014. Benchmarks on different Mapping Functions are being made at MUT. VMF seems to be preferred. REPRO2 activities (including the weekly combination by ACC) should be finished by Fall 2014. Results will be handed over to the Reference Frame Coordinator to update the cumulative EPN solution.

11. EUREF Troposphere (Pacione, Söhne)

JD reports on GOP REPRO2+IGb08 and a new ZTD for climate. With the new strategy continuity in the time series estimate is ensured. More continuity also on the time series of the formal errors. This seems to better comply with the requirements from climatologists. Results of the real time demonstration campaign for ZTD monitoring were shown. RT positioning applications and development tropospheric augmentation for ZTD/ZWD modeling were discussed.

RP reports on combination efforts at ASI. E-GVAP solutions are combined since November 2008. ASI combination of EPN individual solutions agrees well to BKG combination except of a few weeks, where the BKG individual contribution observed a bug, and few stations (e.g. CREU).

a. News from COST action

The COST action ES1206 activities concern three WGs on Advanced GNSS processing (WG1), GNSS for severe weather monitoring (WG2) and GNSS for climate monitoring (WG3). First Workshop was held in Munich, February 2014. WG1 is active on Products, AC's, Network, Reprocessing and NWP data in positioning, all topics which could be of mutual interest for EUREF-EPN. WG2 dwells on Tomography, nowcasting and high-resolution rapid-update NWP. WG3 concerns climate, homogenization and long term stability of ZTD and IWV time series. Summer School is being organized in Bulgaria this year.

b. Web site

12. EUREF real-time monitoring (Bruyninx)

WS informs on a new Novatel receiver type supporting SSR open standard. EPN CB is developing new tools to monitor the three broadcasters (ASI, BKG, ROB). CB reports that the EPN broadcasters are not yet able to function independently from each other. A standardization of streams and source tables contents is required. Guidelines are necessary.

13. EPN Densification (Kenyeres)

Two contributions are global from UK and France, so the national/regional contributions will eventually be embedded in a global frame. Gamit, Gipsy solutions are included besides Bernese. G. Stangl is providing an important coverage for Austria, Middle East (up to India, including the Arabian plate) and Greece. Poland, Estonia, Latvia, Slovakia, Czech Rep., Hungary, Bulgaria, Italy, CEGRN, Switzerland, France (Global) and UK (Global) also contribute. The total number of sites is about 2300. Some geographical gaps exist: Germany, Nordic Countries. Pending contributions

from Netherlands, Belgium, Spain and Portugal. In general, several antenna models co-exist, only UK solution as a global solution is in IGS08, covering the time frame 1997.0-2013.0 and involving 196 IGB08 core stations and 240 BIGF densification sites. IGB08 antenna model and CODE orbits were used for the entire data set. Focus areas are identified: Spain appears to have a horizontal anomaly, Italy, Alpine region, Greece, Central Europe, UK and Fennoscandia. It is emphasized that the work should be given recognition and visibility at the EPN CB web site. Velocities should be published within 2014, for those stations which have long enough time series.

#### 14. EPOS and EUREF (Bruyninx)

EPOS is in the preparatory phase, funded as FP7 project. It must deliver a proposal for implementation plan. It attempts to merge existing infrastructure in IT sense. WGs are set up to integrate data and information about solid earth. Each WG cares about a particular methodology. We focus on WG4, GNSS Thematic Core Services. A document is expected from WG4, to be used in the implementation phase. What will happen after the preparatory phase. Some Horizon2020 funding for the development of the Thematic Core Services is possible, but in the long term money will come from National Funding. A project for a Horizon2020 call on GNSS for EPOS is on the short list and may be released in 2015-2016. EUREF partners will contribute through their Countries. After the EPOS meeting in Prague meeting (25-27 Feb. 2014) a new version of the EUREF strategic document for EPOS plus the financial part has been distributed. The original pillars have been revised and now they are four + one for absolute gravity (under construction). The TWG

recommends that CB sends the document describing the proposed EUREF contribution and Excel sheet EUREF contribution to the WG4 chair and the EPOS Management.

#### 15. WG on Deformation models (Lidberg)

ML summarizes the outcome of the WG meeting on the previous day. He points out that the number of stations active in the densification is encouraging for the goals of the Deformation WG. Models for deformation have been discussed and exemplified. An update of the Roadmap of the WG is recommended.

#### 16. UN activities on GeoInformation (Altamimi, Ihde)

ZA reports on GGIM Global Geospatial Information Management of the United Nations. Focus is on collection and data sharing of Geospatial Data. Participants are national experts nominated by the Ministry of Foreign Affairs. The need for a global geodetic reference frame GGRF is recognized officially. A report recommending GGRF has been approved by 23 Nations. A UN resolution adopted by the General Assembly is envisioned. Open geodetic data sharing is still a problem for certain Countries, mostly for security reasons. A WG formed by IAG, Australia, Germany, France and Norway has been created. The members are at this time 23 + IAG. The resolution to be adopted by the UN should be ready by June 2014. The resolution consists of 4 main points: establish the WG, encourage the Member states to support geodesy and data sharing, for their own benefit, and commit the contributors to improve the national geodetic infrastructure as a mean to improve the Global Geodetic Reference Frame.

#### 17. Divers

- a. EuroGeographics KEN (lhde)  
EUREF MoU with EUPOS is proposed by JI by Mail, within the KEN of EuroGeographics. The document should be approved at the Symposium in Vilnius. TWG agrees.
- b. News about Polish ETRS89 densification (Szafranek).

#### 18. Next meetings

- a. Fall 2014 TWG meeting (all) in Padova
- b. Next EUREF symposium (all)

#### 19. Action Items (all)

##### a. Left open from previous TWGs

**AI1\_62 on ML and JT:** The Chairman of the Group should be invited similarly to what was done with PAUL DUNKLEY for Eurocontrol. ML to invite the Chairman of the Baltic Mean Sea Level Commission to the EUREF Symposium in Vilnius.

**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.

**AI9\_62 on ALL:** Review EUREF Products on the Web and provide feedback. CB, EB and WS to work on the product catalogue.

**AI1\_63 on KS:** keep in touch with the Polish NMA to finalize the Polish ETRF2000 Densification Campaign.

**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.

**AI8\_63 on RP and JD:** stimulate WG3 of COST Action to work on issue of SINEX\_TRO format standardization.

**AI12\_63 on KS:** solicit the LAC's for GLONASS analysis.

**AI13\_63 on JI, JT and AC:** better outline the role of the EUREF CB, and the duration of the terms.

**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.

##### b. For TWG 64

**AI1\_64 on GS:** GS is asked to keep in contact with Michail Gianniou about the historical RINEX data for the EPN densification at Greece (Item AI4\_63).

**AI2\_64 on AC:** remind JI to make the necessary arrangements for organization of Best Student Award and Support from EuroGeographics to participants from economically weak Countries for the next EUREF symposium. Participants from Ukraine, Belarus, Georgia and Northern African Countries should be solicited (Item 4).

**AI3\_64 on AK:** to make available, especially for scientific users, time series of the EPN coordinates outcome of his cumulative solution (Item 5).

**AI4\_64 on AC:** to contact ML and EB to provide the description of their WG for the TWG page of the EUREF web site (Item 5).

**AI5\_65 on WS:** Update EUREF product catalogue and distribute to the TWG for review (item 5)

**AI6\_64 on ZA, WS, AC, ML:** to set up the program of the ETRS89 tutorial to be announced at the next EUREF symposium: titles and names of the speakers, and timing wrt symposium (Item 6).

**AI7\_64 on JD, ZA and AC:** to provide GNSS position data for the next ICG conference in Prague (Item 8).

**AI8\_64 on KS:** ACC will provide status report on reference frame fixing of combined EPN solution (item 9)



**AI9\_64 on CB and JD:** Update EPN CB web site to reflect new status of GOP analysis center.

**AI10\_64 on CV:** contact the LAC's for possible contribution to the REPRO2 activities (Item 10).

**AI11\_64 on CV:** report on benchmark at the Symposium (Item 10).

**AI12\_64 on WS, RP, JD and CB:** to set up guidelines for EPN broadcasters and revive the EUREF-IP mailing list (Item 12).

**AI13\_64 on CB and AK:** update the EPN CB web site to give more visibility to EPN densification activities.

**AI14\_64 on AK, ML, AC, ZA:** to update the roadmap of the WG on Deformation modelling in time for the next TWG (Item 15).

**AI15\_64 on AK, JI:** to prepare the MoU between EUREF and EUPOS which will be included in a EuroGeographics joint KEN (Item 17a).

**AI16\_64 on AC:** to make a Doodle to propose a date end of October/beginning November (Item 18a).

**AI17\_64 on JI:** to inquire on possible locations for the 2015 EUREF Symposium (Item 18b).