Time & location:
1st part: Thursday, October 21, 2021, 1400 – 1615 CEST
2nd part: Thursday, November 04, 2021, 1400 – 1600 CET

AGENDA/MINUTES
Last update: October, 26, 2021

1. **Opening (Söhne)**

2. **Approval of minutes of 86th GB meeting (Kollo, Söhne)**

   CV asks for the number of EPN stations used in IGS repro3 (item 5c). JL will check the numbers again. Updated version will be sent to GB with two remaining questions[1].

3. **Review of Action Items from previous GB meetings (Söhne, Kollo)**

   WS reviews the action items of last meeting, which all of them having status 'done'. Open point is the potential representative from EUREF to GSSC ("Galileo Science Service Center") scientific board. BM: GSAC ("Galileo Science Advisory Committee") is a high-level board. They give recommendations for main research areas and GALILEO. Discussion on additional position for EUREF. CB: did we receive a written invitation – no, we don't –, we could react after receiving an invitation. ZA: could also be a personal invitation, not for an organization. WS: contact actively GSSC people for clarification? – GB is not in favour.

   Action Item to WS: ask ESA / GSSC colleagues for clarification with respect to the GSSC or GSAC board

4. **EUREF Symposium 2022 (Marjanovic – invited guest)**

   MM gives overview. In progress agreement with Faculty of Geodesy. Possible dates – 30th of May – 4th of June or 7th-11th of June. COVID-problem – it is uncertain, whether it is possible to held physical meeting. WS: When it could be decided the exact date of EUREF Symposium? MM: By the end of the year need to be decided. WS: tutorial not to be held, too complicated, maybe dedicated splinter meetings instead. MM: some kind of online conference will be provided. WS: sessions structure to be finalised. If there is idea to reformulate session or create new session, please let us know, otherwise we keep the structure as it has been.

   Action item to ALL: provide ideas (title, abstract, conveners) for alternative or modified sessions (all)

5. **EUREF**

   a. **Handling of General Data Protection Regulation (GDPR) within EUREF (Bruyninx, Söhne)**

      WS gives an example of application of article 33 of the GDPR at the BKG. What kind of personal data do we have to consider in EUREF? GNSS: Station logs, RINEX, SINEX; EVRS, EUREF Web Page (symposia papers, GB information, e.g. minutes, group photos, and more. Possible solutions: protect everything, remove everything of every natural person, delete all personal data from documents, and ask permission, in future only data/products with generic emails. CB: IGS asks personal contact information to be replaced with generic emails. EPNCB is ready to delete all personal information from site logs. Same for RINEX files and EUREF-mails. KK: For ELB (Estonian Land Board) our contact information is publicly available anyway. EB: not urgent to start all the cleaning, because most of the organisations are governmental organisations. CB won't take the risk of being confronted with a violation of the rules. For example, what about the group photos on the EUREF web page? AC: it makes sense to have names in RINEX/SINEX files because of having a

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[1] Updates/corrections by CB, JL, and JS done Oct 22

contact in the case of questions. CV: GDPR is a rather urgent topic, everyone should ask in her/his agency how to proceed with this question.

Action item to ALL: Contact your own organisation on the knowledge and usage of the GDPR, possibly with use cases

Action item to WS, CB: Stay in close contact with IGS concerning the application of the GDPR

b. Progress towards FAIR GNSS data (Bruyninx)

Update by CB. One should get RINEX data with metadata. New RINEX4 version will have new header lines (DOI, license of use, link to sitelog or GeodesyML). Work continues to update GeodesyML format, standardization, etc. RINEX file metadata proposal to use DCAT-AP, GNSS extension to DCAP-AP. Next step implementation of GNSS-DCAT-AP, for DOI propose standard populating DOI, Data licenses – some EPN data have already data licenses in M3G, for example GDT).

c. EUREF-EPOS MoU (Söhne, Bruyninx, Lidberg)

Overview by WS. General agreement, between EUREF and EPOS European Research Infrastructure Consortium (ERIC), must also be discussed and agreed in EPOS ERIC and EPOS Thematic Core Service (TCS) "GNSS data and products". 1st version on 2020-08-05, discussion at EUREF GB85. 2nd version 2021-02-15, comments from GB, 3rd version 2021-08-10 by WS – not distributed to GB members prior to this meeting. CB: we should start to discuss MoU with EPOS ERIC. ML: if we have acceptable version should be discussed with EPOS ERIC. AC: we do not know what EPOS expects from us and what to expect from EPOS. We should have a formal discussion from EPOS what they expect from EUREF. EB: we should discuss on duplications, which could be by intention. ML: common interests shall be taken in account, not only GNSS but as well other disciplines we are delivering. CB: original version was the template by EPOS ERIC. Duplications avoidance as example (site logs for example). AC: duplications – processing standards (EPOS has their own standards). CB: EPOS has its own standards, EPN has own standards, as well IGS has own standards. Every organisation can decide themselves which process standards they use in processing. EB: might be useful to classify something, in which topics we can work together. CV: we have to define clear boundaries between two groups. CB: At first EPOS thought that EUREF could be the organisation handling the GNSS component of EPOS. But, EUREF's ambition was not to manage and process thousands of GNSS stations. In addition, the European geophysical GNSS community was not involved in EUREF, but had to be involved in EPOS. However, EUREF has its place in EPOS. JL: Some EUREF products had benefited from EPOS, both EUREF and EPOS benefits from the cooperation. AK: supports the cooperation, EUREF densification is important part of EPOS, at the moment no benefits from EPOS AC, EPOS ACs do not use Bernese, but Gipsy and GAMIT, but as much as possible they follow EUREF guidelines.

Action item to WS: send updated version to GB members prior to the second part of the meeting[2]

d. Standardization and registry for geodetic reference frames (Lidberg)

ML gives an overview. Request from ISO Geodetic Registry Control Body to promote national realizations of ETRS89 to be included to ISO GR. ISO GR is a standard to serve as the primary source for authoritative data on coordinate reference systems and transformations. EUREF evaluates national realizations/densifications of

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[2] Sent out on Friday, Oct 22

ETRS89. Several registries exist, i.e. ISO GR, EPSG, CRS-EU. EUREF GB informs national contact persons and describes the ISO GR and asks for providing the information of national ETRS89 realization, which will be therefore added to ISO GR (some work shall be done describing the information and sending official letter to chairman of the ISO GR and chairman of the EUREF). CB: GeodesyML refers EPSG codes.

Action items to ML: continue with this activity on ISO Geodetic Registry

6. **EPN**

   a. **Analysis Centre Coordinator (Liwosz)**

   TL gives an overview. Continuing creating combined solutions (final, rapid, NRT), 5 new EPN stations integrated. Action item 5.b – distribute proposed update of the EPN Analysis Centres guidelines to the ACs and GB. Guidelines finished on October 1st and sent to EPN CB. Overview of changes: (1) added recommendation about processing Galileo observations; (2) update of the EPN antenna model; (3) new description of the cumulative position/velocity solution (by JL); (4) more details added concerning rapid and NRT solutions. EPN products are currently available only at the BKG EPN regional data center (and not at the BEV). WS: products should be available from both data centres – BKG and BEV. CB: BEV should get the products independently, AC should upload them to two places in parallel. WS will contact BEV in order to implement it.

   Action Item to WS: contact BEV to be prepared to receive EPN products[3]

   Action Item to TL and WS: when BEV is ready, contact EPN ACs to upload the EPN products also to BEV

   b. **On the potential accuracy of Broadcast Ephemeris (Caporali, Zurutuza)**

   AC gives a presentation. Problem with broadcast ephemeris – clock and orbit information is not precise enough. Broadcast ephemerides are distributed in real time. This arises questions – are there limitations in the model of the broadcast ephemerides or (2) the model is good enough, but numbers in broadcast ephemerides are not well calibrated. Solutions might be as follows: For GPS, Galileo, Beidou it is sufficient to adjust the three clock parameters and M0, Crs, Crc, Cis, Cic, Cus, Cuc every two hours and seven Helmert parameters once per day. For Glonass it is sufficient to adjust the three clock parameters, a 9D vector of state with positions, velocities and Luni Solar accelerations every hour. Potential applications: (1) broadcast the modified message using RTCM messages 1019, 1020, 1042, 1045, 1046 for GPS, Glonass, Beidou and Galileo I/NAV and F/NAV respectively, and 1021 for Helmert parameters, (2) use the modified broadcast message as compact version of SP3 orbits, (3) use the modified broadcast message as basis of computation of SSR corrections for PPP. WS: is there already a data stream available with all these messages, can it be used for testing? AC: no, nothing is available yet, but these possibilities exist.

   c. **Future of individual antenna calibrations (Bruyninx)**

   CB introduces the topic. GB discusses whether to continue with using individual antenna calibrations or to use type-mean calibrations in future. ML points to the advantage of type-mean calibrations to be in line with IGS. AK mentions the problems of inconsistent use of individual and type mean calibrations. JL points to the fact that individual calibrations often do not contain all signals. CV: we have never been able to get every AC to apply individual calibrations only, mixture of

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[3] Email sent on Friday, Oct 22

possibilities, individual calibrations alone are not sufficient to correct all effects , the mounting of the antenna is important, approach should be as close as possible to IGS solution. JZ: some conversion from individual to type mean, should be straightforward. WS: look for the consequences of a change. CB: don't wait too long with a decision, look for some volunteers to summarize the pros and cons. RD: AA did some exercises in the past; AA: differences were small, but he prefers keeping the individual calibrations.

Action Item to AA, CV, RD, TL, WS, JL: summarize the pros and cons of using individual antenna calibrations vs. type-mean calibrations in the EPN processing

d. **EPN (Bruyninx)**

EPN has approx. 100 stations providing both RINEX2 and RINEX3 files, which causes additional work for data centres and the EPN CB. Ask station managers to stop providing RINEX2, and change guidelines accordingly. CV: announcement that from a certain date only RINEX3 data will be considered, while the RINEX2 data will be ignored. EB: points out that many users download RINEX2 more often than RINEX3, as an example he mentions the use of data from the Zimmerwald station in December 2020. Usage should be checked prior to change anything. TL: sometimes problems with RINEX3. RP: a few stations send both with mixing the short and long names. RD: convenient for many users to continue using RINEX2 because it's there. The IGS RINEX WG is deciding on RINEX4 format soon. It mainly changing the navigation part.

Action Item to WS: BKG data centre look for statistics (download numbers) of daily and hourly RINEX2 and RINEX3 files

Action Item to CB: prepare a EUREF mail that the EPN is planning to stop supporting RINEX2, without a certain date

e. **Reprocessing WG (Völksen)**

CV gives overview on the status and the feedback he has received from the various ACs following his circular email. A large number of the ACs are willing to participate in Repro3, but not all. It seems that the analysis of a smaller network by each AC using their typical software is preferred. He has also received some questions from the ACs such as: Use of Galileo required, what is meant by experiments, is the final IGS2020 very different from IGSR3. A LAC workshop in advance of REPRO3 is not foreseeable at this time due to Corona. CV proposes a teleconference with the ACs in January 2022.

Action Item to CV: organize a digital meeting with the EPN ACs in January 2022

f. **AC-wise EPN Densification (Zurutuza)**

JZ on the news on his processing. New release could be produced in 15-20 weeks, currently 6 AC-s providing data for the tests. Major problems due to different names and Solution Numbers between the ACs and EPN D. Procedure is that JL, JZ, AK and ACs agree on the discontinuities. AK mentions the importance of keeping the EPN guidelines for the contributions, in particular the use of type-mean or individual antenna calibrations. JZ: the main parameters of the used antennas can be checked from the SINEX files but not all.

g. **CEGRN 2021 campaign (Zurutuza)**

JZ explains this year's CEGRN campaign. RINEX data as well as SINEX files from different countries will be used. First results may be expected for the next GB meeting in spring 2022. Full network computation will be ready for the EUREF2022 Symposia.

7. **Height and Gravity**

 a. **European Unified Height Reference (Schwabe)**

JS gives an overview. 1st online meeting on Oct 08, 2021. Four GB members participating. Some additional members should be invited. Geoid questionnaire prepared, new working title EHRS_CP ("European Height Reference Surface – Control Points"). Deadline for the feedback from the countries should be April 30, 2022, i.e. enough time for the countries. List of recipients almost complete. Splinter meeting at the next Symposia. AC thanks JS and MS for their work. AC asks for the tilt – he means the tilt between southern and northern countries (i.e. systematic differences between gravimetric geoid and EVRF), if the presented roadmap is capable to solve this problem. JS: roadmap, stage two: (1) transformation grid between EVRF and ETRF, (2) homogeneous and consistent systematic effects considered between gravimetric geoid and levelling, to observe quality of EVRF solutions, to study potential differences in levelling adjustment. ML: distinguish between real and virtual tilts, e.g. coming from transformations from ITRF to ETRF. JS: artefact of transformation, it is not static, it changes over time.

Action Item to ALL: send comments on the draft letter for EHRS_CP to the countries to JS and MS

8. **AOB**

 a. **Wrap-up from 1st part**

  i. **Symposium**
  Possible date for the symposium is converging to May 31 to June 04, 2022. Final decision until end of November.

  ML emphasizes looking for a country hosting the 2023 symposium.

  ii. **EUREF EPOS MoU**

  Action Item to ML: send our latest version of the EUREF EPOS MoU to EPOS ERIC (in person of Lilla Freda) and EPOS TCS "GNSS"

  iii. **GDPR**

  CV reports that the data protection officer at his workplace strongly recommends the use of functional email. CB agrees but points to the conflict we have until then. Proposes an email to strip the natural persons from the files. AC agrees. CB is going to continue "cleaning" of the EPN CB portal with respect to the GDPR before writing such an email.

 b. **EUREF newsletter**

 Shall be issued for this year as well, should be available one or two weeks before Christmas as in 2020.

 Action item to ALL: consider your contribution to the 2021 EUREF newsletter

 c. **Next GB meeting(s) (Kollo, Söhne)**

 Will be held online in February.

PARTICIPANTS
Z. Altamimi excused for 2nd part
E. Brockmann
C. Bruyninx
A. Caporali

R. Dach   excused for 1st part
A. Kenyeres
K. Kollo
J. Legrand
M. Lidberg
T. Liwosz
B. Männel   excused for 2nd part
R. Pacione
M. Poutanen   excused for 1st part
M. Sacher
J. Schwabe
W. Söhne
J. Torres   excused for 1st part
C. Völksen
J. Zurutuza   excused for 1st part

A. Araszkiewicz
M. Marjanovic
H. Ribeiro   1st part