

Time & location:

Monday, May 20, 2019, 1300 – 1800

Tuesday, May 21, 2019, 0830 – 1200

Estonian Land Board main building at Mustamäe tee 51, Tallinn

MINUTES

Last update: May, 20, 2019

1. Opening (Kenyeres)

The GB chair Ambrus Kenyeres opens the meeting and thanks the local organizers for inviting the Governing Board to Tallinn.

2. Welcome (local organizers)

On behalf of the Estonian Landboard, Artu Ellmann welcomes the EUREF GB members and gives an overview on the activities on Maa-amet. There are four main departments: Implementation of national land policy, Land cadastre, Geoinformation, and Geodesy. In particular, there are three so-called “spheres”, on geomatics, cadastre and real estate. AE highlights the national geodetic GNSS network and he mentions two commercial networks which also exist in the country.

3. Approval of minutes of 79th GB meeting in Budapest (Söhne)

WS displays the minutes from last GB meeting in Budapest. There were no more comments on the minutes, so they are ready for publication on the EUREF web page (to be send to Manuela Vasconcelos).

4. Review of Action Items from previous GB meetings (Söhne)

Most of the Action Items of last meeting were done, in progress or on the agenda. One open point is the permanent storage of documents and presentations to be accessible for the GB members. Google drive, which has been used for the exchange of the IUGG paper and the strategy paper, does not seem to be suitable for this due to legal issues. CV declares his willingness to investigate in more detail on this topic.

Action Item for CV: investigate on permanent storage of EUREF documents etc. and clarify the restrictions, e.g. data protection rules, legal acceptance, etc. which have to be taken into account

Action Item to WS: distribute the complete version of the 2015-2019 report of IAG commission 1.3 (i.e. with the contributions of all regional sub-commissions)

5. EUREF symposium 2019**a. Latest news (Ellmann, Kollo)**

KK summarizes the status of the symposium and the tutorial. There are more than 110 participants registered for the symposium and approx. 50 for the tutorial. A last minute change is necessary due to the absence of Rolf Dach. Due to the complexity of the antenna topic and the short time available for adequate preparation there will be no replacement. ZA shortly recalls some key points from the IGS workshop in Wuhan in October 2018.

b. Draft resolutions 2019 (all)

In a mail prior to this meeting, AK asked for ideas on resolutions. However, no proposals for resolutions were distributed prior to this meeting. Some resolutions are already (konzeptioniert): One resolution will be on EVRF2019, one on the Estonian campaign (if it was accepted by the GB), one on the resigning positions, one on the new positions, one on the local organizers, as usual. CB proposes to have a resolution on EPOS. The GB would like to see a draft for this asap. WS raises the question on the general procedure of going forward with resolutions. Does the GB need a dedicated resolution committee? Should a EUREF mail be distributed as call for participation e.g. one month before the meeting?

Another EUREF mail distributing the draft resolutions closely before the symposium? The GB sees the need for a schedule on the resolutions in the future.

c. Review of 2018 resolutions (all)

WS shortly reviews the resolutions of 2018, their status and if or what should be communicated to the plenary. Resolution no. 2 on a Gravity Working Group is still open. With respect to resolution no. 4 on InSAR, MP mentions a project on InSAR reflectors or transponders, led by Thomas Gruber from Munich. However, there are no coordinated actions on EUREF level. The GB asks for a status report of this project on one of the next meetings. MP is urged to say a few words on resolution no. 5 on the EUREF strategy plan during his opening talk. He agrees.

6. Computation of the Estonian GNSS station network as EUREF densification (Kollo)

KK summarizes the content of the report which has been reviewed by the GB, in particular JL, CB, EB and WS, and where the second version has been distributed to the GB mid of last week. She explains the added time series for transformation parameters. She also explains the added velocity comparisons with respect to results on the “WG on Dense velocities” but during the discussion some misunderstanding on the results is identified. The GB asks for some more explanation to this section in the report. ZA misses some general remarks on the national reference frame and the goal of the exercise. Why are coordinates also in ETRF2000 listed? ML asks, if and why the results are given in ETRF89, not in ETRF96.

ZA adds some more comments to the second version: a) confirmation that no coordinates were fixed, only minimum constraints? – yes; b) why such scattered wrms time series (Figure 12)? Are they coming from CATREF? Wouldn't it be better to plot rms instead of wrms? Other proposal are to exclude outliers, to spread Figure 6 for the reason of better visibility, to clarify Table 7.

JL adds some further comments, in particular on section 5.2 to correct. Minor things like typos to will be communicated directly to KK. AC emphasizes that this report is the third one with velocities in it. EB explains the reason why he proposes to include the Table 9 on differences to the EPN cumulative solutions for the four EPN stations in the network.

ZA asks on the epoch of the results distributed to the user. How are the coordinates mapped back to this epoch? Are the velocity time spans long enough - and realistic enough, adds AK. KK refers to the comparison with the NKG2016 land uplift model.

AK summarizes that this report is a good example for future requests for validation. He asks if there is a general agreement in the GB to accept the report as a densification and to go for the resolution, with the necessary corrections. The GB accepts this proposal.

AE asks for publication. The link on the EUREF symposium's web page is a good point but may be not visible enough. The GB encourages Maa-amet to go for a dedicated publication of the results and analyses.

Action Item to KK: update the report and the results with respect to the discussion in the EUREF GB and distribute to the GB.

7. EPN

a. Antenna calibration – news from the IGS (Brockmann, Völksen)

Due to the absence of RD, the GB decides to skip this topic today and to postpone to the next meeting. CV suggests to invite someone from Geo++ to the planned AC workshop (see below) in October. The GB proposes to consider a participation from the chamber calibration group as well.

Action item to CV: contact qualified colleagues from the receiver antenna calibration community with the goal to invite them to the next AC workshop.

b. Real-Time: Coordinates in real-time streams (Bruyninx, Söhne)

CB explains the situation of the coordinates given in the EPN real-time streams, in particular the differences to the ETRS89 coordinates provided by the EPN CB. Approx. 11 % of the EPN streams show coordinate difference above 1 m. While

“scientific” users may be aware of the problem and usually do not refer to the given coordinates, other users – their number is growing – may believe in the transmitted EUREF coordinates. She presents different approaches how to solve or to overcome the problem.

AC replies that this problem is known in the RTK network where a wrong coordinates will result in wrong ambiguities for example. WS and JD point to the fact that many users are doing “real” RTK, not network RTK. JD is not in favor to block any streams. CB points to the discrepancy between non-reliability of coordinates and the responsibility of EUREF for the ETRS89 coordinates. Is there a similar problem if using RINEX files? Likewise above, scientific users usually don’t “trust” the RINEX header but other users may do. WS is asked to raise the coordinate issue during his talk for the symposium.

Action Item to CB, AC and WS: form a small group of experts, e.g. with the chair of IGS RT WG, André Hauschild, to discuss and overcome the problem.

c. Central Bureau: Update of “Guidelines for EPN stations & operational centres” (Bruyninx, Söhne)

CB refers to an action item of last GB meeting concerning the data delivery of RINEX v2 and/or RINEX v3 files. She had sent out the necessary EUREF mail on March 01, 2019. She discusses the proposed changes in the guidelines. CB explains the discussion within the IGS Infrastructure Committee (IC) about the proposed changes, in particular stopping of upload of RINEX v2 files. The IGS IC has very recently shifted the deadline for the change to the end of 2019, which also takes pressure off the EUREF GB.

In the following, CB discusses some more updates needed for the guidelines, for example to section 3.1.4 on quality checks (drop explicitly naming of software), real-time issues etc.

8. Coordinators

a. Report of the ACC (Liwosz)

TL reports on the issues and the progress of the ACC. Since GPSweek 2044, 10 LACs are providing solutions including Galileo. Mean rms is slightly higher / worse than before GPSweek 2044. For the presentation he has only four weeks of results available after this change. TL also discusses the residuals for some stations like OBE4 and PTBB, in particular with respect to BeiDou. Discussion on how to handle chamber calibrations which might have incorrect BeiDou calibration. CB mentions that BeiDou is not part of the official EPN solution. CV is in doubt that it is unambiguously to identify which solution is off. AK asks for the message of this discussion. The proposal is to observe the behaviour, in particular station PTBB which is also an IGS station.

Next point of the ACC report is the introduction of global stations. Three global solutions are combined for the investigations, COF, IGG and WUG. TL asks the GB on the advantage to add global stations now. ZA mentions that an alignment of a global solution instead of a regional solution to the ITRF fits better due to the network effect. JL says that the impact on the most recent solutions is not visible, just in a few years. For a third EPN reprocessing, inclusion of global stations is another question. JL mentions that it is always easier to remove stations, e.g. the global ones, than to add global stations afterwards. CB raises the question on the usefulness of the same set of European stations as the solely reference stations. In that case one will get (almost) the same solution for Europe but some kind of “rubbish” for the global ones. If, on the other case, one switches the reference stations, then this will result in jumps. Discussion on what the combinations or comparisons between EPN global and other global solutions are telling. AK asks what concretely has to be done if global stations were added to the processing.

The GB asks the ACC to continue with the effort to combine in parallel and to get in contact with other ACs if they could consider to contribute with a global solution.

b. Report of the RFC (Legrand)

JL reports on the RFC activities. There were three new solutions since the last meeting. A new file type has been created with more digits (5 digits) for positions and velocities (naming convention ‘_ext’, no other changes). She explains in detail a new approach to select the best set of EPN reference stations. The definitions of Class A and Class B are not flexible enough from her point of view, in particular regarding the missing velocities for Class B stations. To overcome this shortcoming and to get reasonable velocities, she uses a set of different tools, e.g. time series STD, 1-year amplitude, realistic velocity uncertainty coming from the software HECTOR applying sliding windows with different lengths, last position and last velocity differences. She defines thresholds for each criterion, named A1 to A5, plus not reliable, grey zone and no velocities. Her suggestion is to adopt the new scheme, change the respective guidelines on EPN Densifications with respect to long-term, medium-term and short-term solutions, stop publishing class A and class B stations after a transition period. AK asks for usually good stations with shorter period of bad behaviour. AC points to the Allan variance which is doing something similar. AK agrees that the estimated velocity errors usually are too optimistic, mainly due to the non-application of coloured noise, which is also agreed by ZA for CATREF. JL is not in favour to mix CATREF and HECTOR results. ZA proposes to keep the CATREF results but to add additional information on some place. Clarification on the so-called border stations, which is meant as a geographical definition. ML asks for the outcome of HECTOR for long time spans, which might be too optimistic also. AC raises the question on sufficiency of the velocity criterion, which is a necessary but not a sufficient criterion. ZA points to the procedure for the user to compare his final solution with the reference frame solution. He refers to the example of the IGS on the selection of reference stations, which may degrade over time. AK asks how the criteria in the table (green/OK, red/No, with care) will be visible. JT suggests to have a kind of extended list with the characteristics.

Action Item to JL: prepare a web page (or something similar) reflecting on the proposed changes and criteria.

Action Item to JL, CB: prepare an update of the “Guidelines on EPN densification” reflecting the proposed changes on selection of reference stations.

9. Working Groups

a. EPN Densification – towards the exploitation (Kenyeres)

AK picks up some highlights of his talk on the EPN Densification for the symposium. The paper in GPS Solutions is accepted with minor modifications needed. The GB is pleased to hear that after waiting for such a long time. He discusses the metadata harmonization of the three large networks, IERS – EPN D – E-GVAP, in particular the site naming. The IGB08 to IGS14 conversion is referring to JZ’s talk for the symposium. He explains the usage of the IGS conversion tool (IGb08 to IGS14). The latitude dependency used in the model is due to the gap in the skyplot which is different with latitude. He discusses the issues of some of the solutions. Next solution D2050 is to be expected in autumn this year as the earliest. AC asks for the number of contributions which fulfil the EPN guidelines. AK answers that most of the contributing ACs are using Bernese and states that they are complying with the guidelines. The D2050 solution should come out with realistic uncertainties for the velocities and similarly to the EPN solutions a

realistic velocity estimate, stemming from HECTOR software will be attributed. With regard to the European Ground Motion Service the velocities with realistic uncertainties and the time series are important and should be delivered regularly from 2020 on.

b. WG on Deformation Models (Lidberg)

ML reports on the collocation method applied for the work of the WG. He is going to give the talk at the symposium instead of Rebekka Steffen. The GIA model is removed before the interpolation. ZA asks for the quality of the GIA models for the horizontal component. ML replies that they are not that confident for, for example, the Russian part in the east. The results of filtering are quite good for, for example, for Germany, but there are only few stations available. Italy is even worse but below the rms of the whole area. ML discusses the further steps to be done. He mentions that is too early to name the result a EUREF product. ZA reminds on the 1 mm per year bias of the ETRF2000 for the vertical velocity estimation and proposes to use ETRF2014. Discussion on to invite more groups to work on velocity models. Invite contributions with models of crustal deformation from regional studies? – Maybe too early. AC asks for the correlation length used in the least square collocation, if it is the same over the whole continent. The GB is in favour of publishing a paper, led by Rebekka Steffen, on this interesting topic soon.

10. ECGN: web pages (Söhne)

WS recalls how and why the ECGN pages disappeared from the EUREF web page, in particular from the BKG pages. The reason to look into this was that a link in the “guidelines for stations and operational centres”, section 2.4.1 is no longer valid. On BKG pages only a small text is still visible without any links. WS suggests to add specific documents to the EUREF web page. AK suggests to put the documentation into a future EUREF archive. A discussion follows on if ECGN is still alive or needed in the future. AC would like to see a kind of map on co-location stations and the characteristics, e.g. gravity, levelling, time, etc. Maybe there is an overlap between ECGN and GGOS. MS recalls a list and map on this characteristics but both are on the status of 2007.

Action Item to WS and MS: store the existing ECGN documentation for future long-term storage in a EUREF archive.

11. EVRS: Feedback to EVRF2019 – distributed data and publication questionnaire (Sacher)

MS goes through the most important slides of her talk prepared for the symposium. The content is similar to the report distributed in due time to the GB. New or updated data of six countries (Slovenia, Italy, Norway, Czech Republic, Slovakia, and Austria) are taken into consideration, plus some countries announcing last minute data (Southern Italy, Bulgaria, North Macedonia). Minor update is coming from Switzerland. Spain agreed with the results of the adjustment after discussion. MS explains the results or feedback to the questionnaire. 25 of 29 countries replied, except Hungary, Croatia, Norway, and Bosnia&Hercegowina¹. 3 countries refused the publication of the results on the web page, namely Belarus, Russia, and Ukraine. The GB discusses the procedure of the introduction of the new realization with respect to the last minute data, in particular the right time for the resolution. WS asks for a shorter time span between new realizations but this heavily depends on new data.

12. EUREF

a. EUREF representatives & GB membership (Kenyeres, Poutanen, Torres)

JT explains the procedure, in particular who is allowed to vote. The candidates for EUREF chair, AC and ML, present themselves in short statements. The secret voting results in that ML is elected. Since there was only one candidate for the GB

¹ After the end of this meeting, MS received the – positive – answer of Norway.

chair, the GB dispenses with a secret voting and appoints WS for the GB chair. KK is appointed for EUREF secretary. It is emphasized that the new terms officially start after the IUGG in July.

13. AOB

a. IAG elections (Altamimi)

ZA informs about the elections which were finalized this week or going to be finalized end of this week. He reports on the provisional results which have to be confirmed at the IUGG General Assembly in Montreal in July. Provided this confirmation, EUREF and the EUREF GB will be very well represented in the IAG in the next four year's period.

b. AC Workshop & next GB meeting (Liwosz)

The workshop will be held October 16-17, 2019, with the GB meeting being on October 15. CV asks if we could invite people from the antenna calibration groups. A dedicated web page will be opened soon. TL shall give a reminder in his talk during the symposium.

Action Item to TL: identify main topics for the AC workshop, set up web page, send reminder to the potential participants

c. Review of Action Items (Kenyeres, Söhne)

AK and WS will prepare the minutes and the action items asap.

PARTICIPANTS

Z. Altamimi
 E. Brockmann
 C. Bruyninx
 A. Caporali
 R. Dach *excused*
 J. Dousa
 R. Fernandes *excused*
 A. Kenyeres
 J. Legrand
 M. Lidberg
 T. Liwosz
 R. Pacione *on Tuesday only*
 M. Poutanen
 M. Sacher
 W. Söhne
 J. Torres *on Tuesday only*
 C. Völksen

A. Araszkievicz
 A. Ellmann *on Monday only*
 K. Kollo
 J. Zurutuza