
47th Meeting of the EUREF Technical Working Group in Brussels, 16. June 2008

Next events:

- TWG 2008 Fall Meeting: Munich, 03 – 04 November 2008
- TWG 2009 Spring Meeting: place and date not yet fixed
- TWG 2009 Symposium Meeting: Florence, 26 June 2009 (whole day)
- Symposium 2009: 27 – 29 June 2009 (30 June: technical excursion), Florence

Meeting place: Royal Military Academy, 8, rue Hobbema, B - 1000 Brussels

Time schedule: Tuesday, 16. June, 2008 – 09:00-17:30

Agenda

1. Opening (Bruyninx)
2. Minutes of the 46th TWG meeting in Helsinki
3. EUREF Permanent Network
 - a) EPN real-time activities
 - b) Ionosphere monitoring with the EPN
 - c) EPN Analysis – Products and Report
4. ETRS89/ETRF2005
5. EVRS and the permanent tide: background to conventions
6. Realization of the EVRS/EVRS2007
7. EUREF TWG membership
8. Change of EUREF Terms of Reference
9. Preparation of EUREF 2008
 - a) EUREF 2008
 - b) Best student poster award
 - c) EUREF proceedings
10. INSPIRE
11. Home Page of EUREF
12. EUREF Campaign Data Base
13. Collaborations
 - a) Status of EUREF-EUMETNET collaboration
 - b) ESEAS
 - c) SCO OP Railway Infrastructure Management (FP7 call)
14. EUPOS
15. Next TWG Meeting
16. Action Items

Participants

ZUHEIR ALTAMIMI, Paris	HANS VAN DER MAREL, Delft
ELMAR BROCKMANN, Berne	ALAIN MULS, Brussels (guest)
CARINE BRUYNINX, Brussels (Chair)	MARTINA SACHER guest Leipzig
ALESSANDRO CAPORALI, Padova	HERMANN SEEGER, Bad Neuenahr-Ahrweiler (perm. guest)
WERNER GURTNER, Berne	JAROSLAV SIMEK, Prague
HEINZ HABRICH, Frankfurt a.M. (perm. guest)	WOLFGANG SÖHNE, Frankfurt a.M.
HELMUT HORNIK, Munich (Sub-comm. Secretary)	GÜNTER STANGL, Graz (perm. guest)
JOHANNES IHDE, Frankfurt a.M. (Sub-comm. Chair)	JOAO AGRIA TORRES, Lisbon
AMBRUS KENYERES, Budapest	PIERRE VOET, Brussels (guest)
JULIETTE LEGRAND, Brussels (guest)	
JAAKKO MÄKINEN, Helsinki	

apologized: CLAUDE BOUCHER, Paris; GEORG WEBER, Frankfurt a.M.

Minutes

Remark: The presented papers and view graphs are published, as far as available, on the EUREF homepage (<http://www.euref.eu/TWG/EUREF%20TWG%20minutes/47-Brussels2008/TWG-Brussels2008.html>).

The minutes will be discussed at the next TWG Meeting and after approval be put into the web.

1. Opening

In her property as chairwoman of the EUREF Technical Working Group (TWG), C. Bruyninx opens the meeting and welcomes the participants. She thanks the Royal Military Academy of Belgium for hosting this TWG meeting as well as the ensuing EUREF Symposium in its rooms. On behalf of the Academy which keeps a school for education in geodesy, A. MULS expresses his pleasure to host the meeting of the TWG.

2. Minutes of the 46th TWG meeting in Helsinki

The minutes of the last TWG Meeting in Helsinki, 31.03.-01.04.2008 were distributed among the TWG members. Some few corrections are to be attached. The final text is published in the EUREF homepage <<http://www.euref.eu/TWG/EUREF%20TWG%20minutes/46-Helsinki2008/TWG-Helsinki-minutes.pdf>>.

3. EUREF Permanent Network

a) EPN real-time activities

W. SÖHNE gives a summarizing review on the development of the activities. The EUREF-IP was started in 2002, meanwhile about 88 EPN stations are equipped with real-time data streaming capability. Resolution no. 4 of the 2007 EUREF Symposium in London recommends the transition of the EUREF-IP from a pilot project to operational status on a routine basis within the EPN and further recommends

the support by all EPN station managers. The status of the IGS-RT pilot project can be considered as rather similar to the EUREF activities. Altogether 17 of 25 sites involved are located in Europe. At the recent IGS Workshop from 2 - 6 June 2008 much attention was paid to the RT activities, various recommendations were formulated.

W. SÖHNE is asked to formulate a draft for the new RT activities and present it at the next TWG meeting. As present the BKG is completing most of the work in this field. Therefore it is recommended to make an announcement at the EUREF Symposium in order to involve other colleagues/institutions as far as possible.

b) Ionosphere monitoring with the EPN

The usual EPN report is postponed to the Symposium. C. BRUYNINX reports on the special project STCE (Solar-Terrestrial Centre of Excellence) approved and funded by the Belgian government. The existing expertise of different relevant institutions will be used to come to new insights. The project aims for international collaboration. The contribution of the ROB (Royal Observatory of Belgium) concerns mainly the modelling of the ionosphere and troposphere using the experiences in the EPN. First findings will be presented in a poster *Detection of abnormal ionospheric activity from the EPN and impact on kinematic GPS positioning* presented to the EUREF Symposium by N. BERGEOT et. al. Interesting insights in ionospheric activity could be derived from the analysis of TEC (Total Electron Content) maps.

G. STANGL mentions similar activities at the observatory in Graz. C. BRUYNINX expresses her hope to install a special project in EUREF on this topic. A more detailed report will be presented at the next TWG meeting.

c) EPN Analysis – Products and Report

H. HABRICH then presents his usual report. He gives an overview on the present status of the LAC products. The cumulative solution of the EPN weekly results can be considered as realisation of a European densification of the ITRF2005. A sub-network combination comprising the time span of GPS weeks 860 to 1355, i.e. 496 contributing files has been computed. The processing is now finished, the results are available online. However, the results have to be analyzed in more detail. Comparisons for velocity constraints show that neither no nor full velocity constraints between solution numbers are in full agreement with ITRF2005.

For the EPN Rapid Analysis H. HABRICH formulates various requirements such as automated processing according to a fixed schedule, no manual interaction for day-to-day processing and automated event handling. Moreover the advantage of network solution is emphasized as there single bad performing stations which may degrade a complete sub-network possibly can be detected while in single point solutions even outstanding single station results contribute to monitoring purposes. As next steps of the EPN Rapid Analysis the extension to all EPN sites is planned, further an intensified dialogue with the users and the improvement of outlier handling as well as harmonisation of hourly analysis specifications.

It is proposed that these presented results are compared with the long time series analysis by A. KENYERES, the comparison should be discussed at the next TWG meeting and then a definite decision be made about the official EUREF cumulative solution. Z. ALTAMIMI and the Bernese Group will be contacted for help. Z. ALTAMIMI adds that besides of the analysis it should be also tried to refine the mathematical approach and decide from this point of view on a the most reliable solution.

4. ETRS89/ETRF2005

This topic was intensively discussed at the previous TWG meetings. The interpretation of the differences between ETRF2000 and ETRF2005 can be considered in different ways. To come to a decision C. BRUYNINX has initiated a voting among the TWG members. For the transformation of the ITRF2005 directly in the ETRF2000 two different methods have been under discussion, i.e. using the transformation parameters derived from the global ITRS realizations or using estimated transformation parameters derived from (a subset of) the EPN stations. It is emphasized that the jumps between the ETRF2000 and 2005 are rather large, such jumps might induce a negative impression of EUREF among the user community. Thus a reflection on long-term realization of ETRS89 is urgently necessary.

C. BRUYNINX emphasizes that a voting is not the optimal way of solving scientific problems, however, an intensive debate of the questions and formulation of opinions was induced and gives the TWG a good chance to solve the problem in a best optimal way. Concluding it is stated that the ETRF2005 has been released and used in several

countries, thus its existence has to be accepted. However, coordinate differences with respect to ETRF2000 exceed the noise (cm) level. These differences should not be neglected but procedures to reduce the coordinate differences between ETRF2000 and ETRF2005 be found. The TWG has to provide an adequate way of realizing ETRS89 and the continuity in the coordinates between realizations. For this goal more weight should be given to the EPN and thus the ETRF become less dependent from the ITRF solutions.

As conclusion the TWG decides to present to the plenary of the EUREF2008 Symposium the agreement that the list of coordinates obtained by transforming the ITRF2005 coordinates (for all European stations included in the ITRF2005 list) to ETRF2000 using method B1 by ALTAMIMI and called ETRF2000(R05). The transformation formula (14 transformation parameters) describes the transformation from ITRF2005 to ETRF2000. The “old” transformation formula (6 transformation parameters) will be marked in the memo by ALTAMIMI and BOUCHER is not recommended. Moreover a Working Group on the ETRS89 realization will be set up, proposals for members (in particular not members of the TWG) are to be submitted to C. BRUYNINX. The new WG will be set up at the TWG Fall Meeting 2008.

5. EVRS and the permanent tide: background to conventions

In his presentation *Tidal issues in the EVRS and EVRF2007*, J. MÄKINEN refers to the report presented at the 2008 TWG Spring Meeting in Helsinki (<http://www.euref.eu/TWG/EUREF%20TWG%20minutes/46-Helsinki2008/TWG-Helsinki2008.html>). As items to be considered the choice of a system for the permanent tide and a method to express the present UELN data in the adopted system are to be defined, further the tidal system and the recovery of the NAP from the EVRF2000, the specification of tidal processing standards (other than permanent tide) for future UELN data and considerations for the realization of the EVRF2007 through Earth Geopotential Models (EGM) and European Gravimetric Quasigeoid (EGG). J. MÄKINEN explains in detail the peculiarities of the non-tidal and tide-free system respectively, the mean tidal system and the zero tidal system. The choice of a system for permanent tide in the EVRS has to follow necessarily the resolutions of the IAG formulated at the 1983 General Assembly of the IUGG. The previous and present situation in national, continental and global height systems is described in detail. Concluding J. MÄKINEN recommends to discuss the mentioned questions in more detail before starting to define a zero-tide World Height System.

6. Realization of the EVRS/EVRS2007

M. SACHER gives a preview on *EVRF2007 as Realization of the European Vertical Reference System* to be presented to the EUREF Symposium. At the 1994 EUREF Symposium the need for a Unified Vertical Datum for Europe was formulated. A first EVRS realization was defined at the

2000 Symposium. Later the need for a harmonization of vertical reference of spatial coordinates was expressed as urgent task. The European Vertical Reference System (EVRS) 2007 is defined as a kinematical height reference system and fulfils specific conventions.

Since 1999 altogether 14 countries, mainly in eastern Europe, have provided new or updated data sets to be included into the EVRS.

For the realization of the datum of EVRF2000 point 000A2530 (NAP) is used as reference point. The EVRF2007, however, was realized by a selection of datum points distributed over the stable part of Europe. 19 points were proposed by the participating countries, 13 of them finally have been used. Further the measurements of Finland, Norway and Sweden had been reduced to the epoch 2000 according to the land uplift model NKG2005LU.

The results were handed over to the participating countries in May 2008. Up to now no agreement on data exchange exists. It is still discussed whether the complete results (or at least the adjusted heights and coordinates of the nodal points) should be available to all participating countries. Thus a meeting of the respective representatives will take place on occasion of the ensuing Symposium.

As next steps M. SACHER mentions the computation of transformation parameters between national height systems and EVRF2007 which will be available at <http://crs.bkg.bund.de/crs-eu/> in autumn 2008. Moreover an update of EUVN_DA leveling heights will be accomplished till autumn 2008. For the next years the integration of the new French zero-order leveling network including the measurement through the Euro-tunnel as well as new Spanish leveling data are planned. Finally it is hoped to get access to some bordering loops of Russia for a first step of closing the Baltic Ring.

7. EUREF TWG membership

C. BRUYNINX gives a detailed overview on the members of the TWG. According to the new Terms of Reference or due to personal reasons several TWG members will resign, i.e. C. BOUCHER, W. GURTNER, J. SIMEK, H. V. D. MAREL and G. WEBER. The hitherto existing Permanent Guests, H. HABRICH, W. SÖHNE and G. STANGL, are now Members in Charge of Specific Tasks and receive the status of regular members.

Altogether six applications were received, the TWG concludes to elect four of them for the next four years term. The voting will be carried out by the participants of the ensuing Symposium. The updated list of TWG members can be found in <http://www.euref.eu/html/twg.html>.

8. Change of EUREF Terms of Reference

J. IHDE then presents and comments the new Terms of Reference http://www.euref.eu/html/Overview_of_EUREF_Terms_of_reference.html. The TWG discusses the text.

9. Preparation of EUREF 2008

a) EUREF 2008

P. VOET gives some informations on the course of the ensuing Symposium. At the moment 137 participants are registered. The Session Chairpersons are nominated (Opening Session: P. VOET, Session 1: J. IHDE, 2: W. GURTNER and G. STANGL, 3: A. CAPORALI, 4: H. V. D. MAREL and J. SIMEK, 5: J. MÄKINEN, 6: H. HABRICH and A. KENYERES, Closing Session: C. BRUYNINX.

b) Best student poster award

As announced after the 2007 Symposium in London, C. CALVERT has advertised a *best student poster award*. Three candidates have submitted their posters, a jury (E. BROCKMANN, C. CALVERT (chair) and J. TORRES) is formed to select the best contribution. The winner will be announced at the ensuing Symposium.

c) EUREF proceedings

C. BRUYNINX announces that F. SANSÒ in his property as editor of the Bulletin of Geodesy and Geomatics¹ has declared his interest to publish a selection of about 20 EUREF2008 papers in a Special Issue of the Bulletin of Geodesy and Geomatics (BGG). This kind of publication would have the advantage that the papers would be reviewed, on the other hand it has to be reflected carefully which kind of papers are to be published in the usual series of the German Federal Bundesamt für Kartographie und Geodäsie (BKG) and that this proceedings volume is not considered as a lower quality class. A parallel double publication of all contributions in the BKG issue is firstly held as possible, however turns out to be not suitable. A possible suggestion would be to publish in the BKG volume only the titles and abstracts of the relevant contributions in the BGG.

The TWG decides to nominate the chairpersons of the Symposium sessions (cf. above) as editorial committee. Only publications to sessions Session 1 – Activities of the EUREF Technical Working Group, 2 – Permanent GNSS Networks: New developments, 3 – Systematic errors in GNSS, 4 – Improvements and densifications of the ETRS89 including the relevant posters will be accepted. The contributions have to be submitted till September 15. The review process should be finished after 6 weeks and the publication be done in early 2009.

10. INSPIRE

An overview on the *Contribution of EUREF to INSPIRE* by J. TORRES, A. CAPORALI and H. HABRICH is presented. The legal aspects of INSPIRE (Infrastructure for SPatial InfoRmation in Europe) are regulated in the Directive 2007/2/EC of the European Parliament and of the Council establishing INSPIRE (<http://inspire.jrc.it/directive/>

¹ Previously the *Bolletino di Geodesia e Scienze Affini*

10820070425en00010014.pdf). Guiding principles of INSPIRE are

- the infrastructures for spatial information in the Member States should be designed to ensure that spatial data are stored, made available and maintained at the most appropriate level,
- it is possible to combine spatial data from different sources across the Community in a consistent way and share them between several users and applications,
- it is possible for spatial data collected at one level of public authority to be shared between all the different levels of public authorities,
- spatial data are made available under conditions that do not restrict their extensive use
- it is easy to discover available spatial data, to evaluate their fitness for purpose and to know the conditions applicable to their use.

EUREF is linked to INSPIRE e.g. by the ETRS89 as a coordinate reference system in Europe, adopted by the European Commission (ref COGI action decision 2003 - F/GIS/69/EN). Today the ETRS is realised through a network of more than 200 permanently operating GNSS observing stations gathered in the EPN. This realisation provides static as well as kinematic information of spatial referencing. It can be assumed that the EVRS will receive an according status.

11. Home Page of EUREF

H. HORNİK informs on the recent development of the EUREF homepage (<http://www.euref.eu/>). The TWG asks H. HORNİK and J. IHDE to prepare the draft in more detail to be presented at next TWG meeting. The EUREF website manager (M. VASCONCELOS) to next TWG meeting to come to a conclusion.

12. EUREF Campaign Data Base

H. V. D. MAREL informs that the EUREF Campaign Data Base has been unavailable for some time. It has to be considered that there has been little demand for the database in the past. Therefore it has to be reflected which purpose the continuation of the data base could fulfil realistically. Although the monitoring of the data base is rather time consuming, H. V. D. MAREL emphasizes that this information is a worthwhile documentation on the development of EUREF. Further many countries densify their networks, so the campaigns could serve in this aspect. It is stated that a suitable map of campaigns should urgently be installed. All information should be stored on the EUREF website server, this plan has to be discussed with M. VASCONCELOS.

Under the aspect that H. V. D. MAREL will retire as TWG member, G. STANGL declares to continue this work.

13. Collaborations

a) Status of EUREF-EUMETNET collaboration

E. BROCKMANN remembers the MoU between EUREF and EUMETNET signed at the 2007 EUREF Symposium. The data exchange by password is working very well, EUREF is using data for GNSS data processing for (near) real time as well as long time series processing. The data exchange allows the full access on all relevant data inclusive temperature, pressure etc.

In order to intensify the collaboration, H. HABRICH will prepare a letter for C. BRUYNINX to invite officially a representative from ESEAS to the next TWG Meeting. There a presentation on the hitherto activities and future plans of ESEAS should be presented, then the EUREF TWG will decide on the future collaboration.

b) ESEAS

H. HABRICH informs on the recent meeting from May 16 – 17 in Paris. The data centre has been moved from Norway to the UK. The TWG discusses the question whether to send a delegate to ESEAS. H. V. D. MAREL suggests to invite ESEAS to the next EUREF LAC Workshop or the next TWG meeting to present clearly the ideas and plans and then decide for further cooperation.

c) SCO OP Railway Infrastructure Management (FP7 call)

The topic is postponed to the next TWG meeting.

14. EUPOS

J. SIMEK informs on the coming EUPOS Symposium in September 2008 in Berlin organized by G. ROSENTHAL. J. IHDE declares to represent EUREF by two presentations.

15. Next TWG Meeting

The 2008 TWG Fall Meeting is scheduled for Monday, November 3 – Tuesday, November 4, 2008, noon to noon, in Munich. C. BRUYNINX and H. HORNİK will prepare the meeting and send out relating information in time.

16. Action Items

The complete Action Items will be circulated among the TWG and be put into the web <<http://www.euref.eu/TWG/EUREF%20TWG%20minutes/47-Brussels2008/16-action%20items.pdf>>.