

55th Meeting of the EUREF Technical Working Group in Padua, 03.-04.03.2011

Place: Dipartimento di Geoscienze, Università di Padova, Sala del Consiglio, second floor, Via Gradenigo 6, 35131 Padova Italy

Date: 03.03.2011, 13:00 - 18:00; Tuesday, 04.03.2011, 09:00 - 12:00

Next events:

- EUREF TWG 2011 Symposium Meeting: Chisinau/Moldova, Tuesday, 24.05.2011 (full day)
- EUREF 2011 Symposium: Chisinau/Moldova, Wednesday, 25.05.2011 – Friday, 27.05.2011; technical excursion: Saturday, 28.05.2011
- EUREF TWG 2011 Fall Meeting: Frankfurt a.M., date not yet fixed

Agenda

1. Opening (Bruyninx)
2. Minutes of the 54th TWG meeting in Lisbon (all)
3. Review of Action Items of 54th TWG meeting in Lisbon (all)
4. Partnerships
 - a) CEGRN/EUREF partnership (Caporali)
 - b) Other (Torres)
5. EUREF (re) elections (Torres)
6. ECGN Report (Poutanen)
7. EUREF campaigns - Web presentations and submitted data (Stangl)
8. Lifetime of ETRS89 coordinates (Caporali)
9. Transformation parameters between national height systems and EVRF2007 (Sacher, Söhne)
10. Information about the circular letter ETRS89 and EUREF products (Ihde, Habrich)
11. ITRF2008 and transformation to ETRF2000 (Altamimi)
12. Reports from EPN Coordination group
 - a) EPN stations in the ITRF2008 (Bruyninx)
 - b) EPN antenna calibrations (Bruyninx)
 - c) Reference frame of combined EPN solution: ITRF2008 or IGS08 (Habrich, Brockmann)
 - d) ITRF densification: datum definition (Dousa, Kenyeres)
 - e) Real-time activities (Söhne)
 - f) TIGA CfP (Habrich)
13. EUREF symposium 2011 (Hornik)
14. Divers
 - a) CODE annual meeting (Brockmann)
 - b) Galileo GGRI WG (Söhne)
15. Next TWG Meeting (All)
16. Action Items (all)

Participants

ZUHEIR ALTAMIMI, Paris
 ELMAR BROCKMANN, Berne
 CARINE BRUYNINX, Brussels (TWG Chair)
 ALESSANDRO CAPORALI, Padua
 JAN DOUSA, Prague
 HEINZ HABRICH, Frankfurt a.M.
 HELMUT HORNIK, Munich (Sub-comm. Secretary)
 AMBRUS KENYERES, Budapest

PARIDE LEGOVINI, Padua (guest)
 MARKKU POUTANEN, Helsinki
 HERMANN SEEGER, Bad Neuenahr-Ahrweiler (hon. member)
 WOLFGANG SÖHNE, Frankfurt a.M.
 GÜNTER STANGL, Graz
 JOAO AGRIA TORRES, Lisbon (03.03.2011)

apologized:

RUI FERNANDES, Covilhã
 JOHANNES IHDE, Frankfurt a.M. (Sub-comm. Chair)
 MARTIN LIDBERG, Gävle,
 JAAKKO MÄKINEN, Helsinki

Minutes

1. Opening

In her property as chairwoman of the EUREF Technical Working Group (TWG), C. BRUYNINX opens the 55th meeting of the EUREF TWG and welcomes the participants and expresses her thanks to A. CAPORALI for the invitation and organization of this meeting. On behalf of the Università di Padova, Prof. D. RIO, Director of the Dept. of Geoscience, 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. Minutes of the 54th TWG meeting in Lisbon

The minutes of the 54th TWG Meeting in Lisbon, 22.-23.11.2010, were distributed among the TWG members. Some few corrections are to be attached. The final text is to be published in the EUREF homepage.

3. Review of Action Items of 53th TWG meeting in Lisbon

C. BRUYNINX presents an overview on the Action Items of last TWG meeting and remembers those items which have not completely been worked out. These are in particular:

- 4: EUREF IE/UK 2009: C. BRUYNINX and G. STANGL will contact M. GREAVES to deliver the complete data of this campaign to be put into the EUREF campaigns data archive as soon as possible.
- 5: ETRS89 realization of the HEPOS network: G. STANGL will contact M. GIANNIOU to clear definitely which reference is used for this campaign. Then the data are to be put into the EUREF campaigns data archive.

- 6: EUREF densification campaign in Republic of Serbia: G. STANGL will remind Z. VELJKOVIC to present the results to the plenary of the next symposium.

- 8: EUREF home page: A. KENYERES will provide a relevant link to EUPOS as soon as possible. Moreover M. VASCONCELOS will remove the links to individual institutions (BKG, JPL, DGFI), but keep SIRGAS (via DGFI), also IAG Comm 1.

All TWG members are asked to provide permanently news to M. VASCONCELOS to be included into the homepage. News which are no more relevant are to be removed.

4. Partnerships

a) CEGRN/EUREF partnership

A. CAPORALI informs on the development and scope of CEGRN (Central European GPS Geodynamic Reference Network). As prior objectives of partnership the network densification for reference frame and geokinematical applications is mentioned. The expected results of the partnership are aiming on a combined network SINEX file with densified position and velocities in ETRF2000 as well as the support to the IAG Dense Velocity Field Project.

Currently 19 European countries are participating in CEGRN. In the first campaign CEGRN'94 10 countries with 30 sites were involved. Then 10 more campaigns followed, at present altogether 85 sites distributed over all 19 partner countries are occupied. A considerable number of sites is overlapping with EPN stations. The processing is done by 7 ACs, then the partial blocks are melt within a combined solution. The processing is

rather similar to the EPN. In the next phase the 9 campaigns since 1996 will be combined in one solution.

As items of a possible partnership between CEGRN and EUREF, A. CAPORALI lists:

- Test and optimize guidelines for approval of networks with position and velocities,
- Test consistency and mutual improvements of offset treatment in time series,
- Involve more nations into the ‘ETRS89’ standards as contribution for INSPIRE,
- Provide better and more consistent data for geokinematics,
- Stimulate reprocessing of old EPN data.

C. BRUYNINX states that there are no objections against a closer co-operation between EUREF and CEGRN if the EPN guidelines as strictly followed.

In order to intensify the cooperation A. CAPORALI will discuss the future common work with the active CEGRN delegates at the next meeting in April 2011 and propose to set up a MoU similar as already signed with EUMETNET or EuroGeographics. J. TORRES then will prepare a draft before and distribute the text to the TWG in time before the next meeting.

b) Other

Concerning a partnership with WEGENER, J. TORRES reports that up to now this plan has not been developed considerably. It has to be analyzed which actual common interests and realistic possibilities for a co-operation exist. For a possible co-operation participation the topics tide gauges, ESEAS and IGS are mentioned.

As another item J. TORRES mentions the chance for EUREF to become better known by a broad co-operation with other partners. That would also refer INSPIRE, IERS and others.

A. CAPORALI mentions EPOS – this group provides networks for seismology for which precise geodetic networks and in particular station velocities are needed as well. L. BASTOS is involved in this action, too and has contacted already various groups and colleagues for a common effort to push the work forward. Z. ALTAMIMI adds that EUREF can provide numerous data as well as experiences. On the other hand it has to be minded that an exchange must be a benefit for all partners and not a one-way delivery of data.

Summarizing C. BRUYNINX states that numerous interesting projects could be worked out, however, it has to be made sure that sufficient manpower for the relevant time period is really available. Therefore EUREF should be engaged only in such projects which offer a realistic chance for practical results.

The TWG asks J. TORRES to prepare a proposal for a potential partnership with WEGENER and distribute the text among the TWG soon and then to be presented at the next symposium.

5. EUREF (re) elections

As President of IAG SC1.3 – Regional Reference Frames, J. TORRES refers the EUREF Terms of Reference (TOR) <<http://www.euref.eu/documentation/EUREF-ToR-2008.pdf>> concerning the terms for officers in the EUREF Sub-commission:

- Chair of EUREF: Appointed by the President of IAG Commission 1, under TWG proposal, which must be ratified by the Plenary. The term is 4 years, in a maximum of 2 terms;
- Secretary of EUREF: Appointed by the EUREF Chair. The term is 4 years, and may be renewed;
- TWG Chair: Elected among and by its members. The term is 4 years, in a maximum of 2 terms.

As the EUREF Sub-commission is a body of IAG, all officers should come from countries being full IAG member countries. All officers mentioned above started their terms on occasion of the 2007 EUREF Symposium in London. Thus new (re-)elections/nominations have to be performed at the coming 2011 EUREF Symposium in Chisinau.

For the EUREF Chair, J. IHDE has declared to be ready a candidate for a second term. – H. HORNIK as EUREF Secretary explains that he will retire in 2014, thus a new 4 years term would overstep this date. Therefore a new Secretary has to be nominated. A. CAPORALI declares to be willing to take over the task of the Secretary. – C. BRUYNINX as Chairwoman of the EUREF TWG declares to be available for a second term.

The TWG forms a nomination committee (H. HORNIK, J. TORRES, Z. ALTAMIMI) to submit to the plenary of the next Symposium the following proposal:

- EUREF Sub-commission Chair: J. IHDE (election by the plenary)
- EUREF Secretary: A. CAPORALI (to be nominated)
- EUREF TWG Chair: C. BRUYNINX (election by the plenary)

If J. IHDE is elected by the plenary as EUREF Sub-commission Chair, the IAG EC has to be informed to confirm the election.

6. ECGN Report

Together with other 12 co-authors, M. POUTANEN has compiled a paper on the future, need and structure of the European Combined Geodetic Network (ECGN). The text has been distributed among the TWG by e-mail. Referring on the development and current status M. POUTANEN describes the future objectives and tasks of the ECGN.

He emphasizes that only a sufficiently high precise and dense network with long observation time series can fulfil the requested needs of the ECGN.

Before the work can be started a call for participation has to be sent out to all European NMAs in order to secure manpower and computer facility to perform the work over a longer time period. Concerning the funding, M. POUTANEN mentions as example the COST initiatives.

Z. ALTAMIMI adds that even in the IAG Project GGOS the work does not proceed as fast as expected before due to the rather difficult modelling of the combination of gravity and geometrical data. He suggests to connect the ECGN with GGOS as a densification of this global network, then the necessary data and software possibly could be obtained more easily. A well-known problem is the lack of a common data centre for gravity data, the relevant agencies often refuse to make their data available. Moreover these data are not homogeneous.

M. POUTANEN declares that the Nordic Geodetic Commission has access to data sets within their countries to fulfil the requests for a combined network as the ECGN. So it is proposed to start the work for a partial network in this region. If the results are promising other countries could better be urged to join the project.

Basing on the discussions, M. POUTANEN is asked to re-formulate especially the objectives of the presented paper "Future and development of the European Combined Geodetic Network ECGN <draft February 28, 2011> to be distributed before the next TWG meeting for discussion and possibly be presented at the next Symposium.

7. EUREF campaigns – Web presentations and submitted data

G. STANGL presents some examples of the data collected in the EUREF campaigns data base. The data base can be addressed via <<http://www.euref-iag.net/>> or <ftp://olggps.oeaw.ac.at/pub/EUREF_camp/EUREF_campaigns_google.html>. However, at present this link does not work and TWG members are asked to provide feedback on the access to the EUREF campaign data base to G. STANGL so that this access problem can be solved. At present the data of the campaigns Italy 2008, Greece 2009, Latvia/Lithuania 2005, UK/EIR 2009, Czech 2009 are stored, comprising sites with names, location, ETRF coordinates, equipment, link to campaigns and other meta-information as far as if provided. G. STANGL mentions that usually the presentations at Symposia do not provide sufficient information in order to yield a complete description of the relevant campaign.

As the collection of all data needs a lot of work, it should be reflected whether this initiative is really useful. In practice the older observed sites are no more

used. The really important EUREF sites are only those with long term data files and gathered in the EPN.

Nevertheless the TWG decides to continue this work especially as documentation of the activities within EUREF.

8. Lifetime of ETRS89 coordinates

A. CAPORALI presents an investigation on the time-dependent stability of ETRS89 coordinates. ETRS89 is basically referred to the "stable part" of Europe. However, horizontal and vertical residual velocities relative to the Eurasian pole exist in various parts of Europe, these residuals may reach considerably large values. As the coordinates of campaigns are validated as realization of the ETRS89 at the epoch of the campaign and the usually assigned validation of "class B" has no expiration date, it makes sense to consider the size of horizontal and vertical deviations from the original coordinates within a certain time period.

In order to secure the validity of coordinates, the campaigns should either be repeated within useful time periods and new coordinates values be determined or the velocities be modelled and applied to the coordinates. For the application of velocities on coordinates a comparison with the ETRS89 realization in neighbouring countries is recommended.

A. CAPORALI then presents various maps showing the known velocity vectors in the various regions as well as the time period when the coordinates derived from relevant EUREF densification campaigns would be reach a discrepancy of 3 cm or more.

The TWG asks A. CAPORALI to present his findings at the next EUREF Symposium to be discussed in the plenary and then to decide how to proceed further on.

9. Transformation parameters between national height systems and EVRF2007

At the last TWG meeting the topic has already been discussed in detail. J. IHDE was asked to prepare a list of transformation parameters and an overview on the situation in the participating countries. This action also should urge the feed-back of the countries about the free access of the data. W. Söhne refers the already established website of the BKG <http://www.bkg.bund.de/nn_149594/EN/FederalOffice/Geodesy/GeodInfoServices/Details/EN_Details_CRSEU.html_nnn=true> for the CRS-EU (Coordinate Reference Systems for Europe).

In order to push forward J. IHDE is asked to contact the countries again on behalf of INSPIRE to agree to the release their data. A report on this topic then will be presented to the next Symposium.

10. Information about the circular letter ETRS89 and EUREF products

This topic has been discussed at the last TWG meeting and J. IHDE was asked to complete the prepared questionnaire on the use of ETRS89 in the participating countries as well as the use of the various EUREF products. It was concluded to contact D. LOVELL in order to issue the letter via the EuroGeographics website. The questionnaire then was issued in the first days of March 2011 <<http://www.eurogeographics.org/content/use-etr89-and-euref-products>>.

The answers will be compiled in an overview to be presented to the next Symposium.

11. ITRF2008 and transformation to ETRF2000

On occasion of the last TWG meeting Z. ALTAMIMI had presented Version # 8 of the “Boucher-Altamimi Memo”. The TWG discussed the paper in detail and asked Z. ALTAMIMI to check the computed values once more and to extend the relevant parameters backwards till 1989.

Z. ALTAMIMI announces to publish an article in the JGR on this subject, in particular the considerable improvement of the ITRF2008 compared to the ITRF2005, the impact of PGR, the modelling of reference systems in regions with very sparse data (e.g. Antarctica) and the connection to realistic geophysical modelling.

He expresses his hope that the IGS08 will provide more consistent data to enable a more reliable computation of GNSS networks.

The TWG discusses the memo again and suggests some updates. Z. ALTAMIMI will compile a final version and distribute it among the TWG again. As far as there are no severe objections the Memo will be issued officially.

12. Reports from EPN Coordination group:

a) EPN stations in the ITRF2008

C. BRUYNINX reports that the GNSS contribution to the ITRF2008 comes from the IGS. However, the IGS submitted sites to the ITRF2008 which are not official IGS sites but involved and monitored by the EPN. Recent intensive analysis showed that the results submitted by the IGS to the ITRF2008 for some of these sites are worse than what is obtained within the EPN (e.g. the EPN reprocessing by MUT) and consequently the ITRF2008 shows EPN sites with a degraded behaviour.

C. BRUYNINX informs that she has been elected to be a member of the IGS Governing Board.

b) EPN antenna calibrations

C. BRUYNINX reports in detail on the problems in context with the changeover by the IGS from IGS05 + igs05.atx to IGS08 + igs08.atx. The computation of the

ITRF2008 is based on igs05.atx antenna calibration models, while this model will be replaced by igs08.atx in April 2011. To account for that the IGS08 was created, based on the ITRF2008 corrected for the antenna calibration switch. The numerical investigations show for Zimmerwald max. deviations of up to 4 mm in the horizontal and 8 mm in the vertical between the new and old antenna calibration models.

As the IGS soon will change its antenna calibrations, EPN will follow the IGS concerning the antenna calibrations. But, within the EPN individual calibrations might be used further on. C. BRUYNINX points to the fact that each change of the calibration also is influencing the time series.

The EUREF densification of ITRF2008/IGS08 is based on the reprocessed cumulative EPN solution (with the igs05.atx antenna model) and antenna correction models need to be applied to obtain positions consistent with igs08.atx. A set of EPN Class A stations in IGS08/ITRF2008 frame will then be computed to be used for future EUREF densifications.

c) Reference frame of combined EPN solution: ITRF2008 or IGS08

H. HABRICH gives a detailed report on his investigations concerning the consistency of coordinates with respect to transformations between different reference systems. The investigations were applied for the validation of the continuity of the ETRF2000 by transforming ITRF2005 to ETRF2000 and ITRF2008 to ETRF2000 respectively using the parameters of Memo V8.0.

For the test 9 sites were selected all located on the stable part and computed at 5 different epochs. The consistency of the residuals between ITRF2005 and 2008 after a 7 parameter Helmert transformation does not exceed 5 mm in the horizontal and 10 mm in the height component. The results show that the change from ITRF2005 to ITRF2008 close to epoch 2010.0 does not change the ETRF2000 coordinates within a useful limit of accuracy.

E. BROCKMANN then presents his investigations for the validation of an ITRF2008 to ETRF2000(R08) transformation and IGS2008 / ITRF2008 validation. For this test the ITRF2005/ITRF2008 coordinates of 43 EPN sites related to epochs 2000, 2005, 2010, 2015 were transformed according to Memo V8.0 to ETRF2000 (R05) / ETRF2000 (R08). The results show that most of the 43 sites are stable within the level of 1 cm STD (3-dim.) as far as these sites are really located on the stable part of Europe. ETRF2000(R08) is in average more time consistent than ETRF2000(R05). This improvement occurs mainly in height due to smaller ITRF2008 velocities.

Concluding this topic the TWG recommends that C. BRUYNINX should update the Guidelines for the EPN

Densification as far as necessary according to these findings and report at the next Symposium.

H. HABRICH will prepare the list of reference stations to tie to the weekly EPN solution to the IGS08 Reference Frame. He will take the IGS08 Stations into the EPN and compliment them with non-IGS08 EPN stations not affected by the antenna calibration change. A detailed report will be presented at the next Symposium.

d) ITRF densification: datum definition

In a first presentation J. DOUSA reports on his investigation of the datum definition of ITRF densifications. As motivation he refers to the recently presented EUREF Campaigns Serbia 2010, IE/UK 2009 and Czech 2009. The results of the first two campaign show tilts in North-South. A reason for the derived tilts might be caused by the fact that national densification usually are based on the latest data and short observation periods, neglecting velocities. For this purpose the EPNC datum was tested in a long-term period (1996-2010) and comparisons using Helmert transformation between weekly solutions performed. Then comparisons of the used datum with recent observations were done. It was found out that the EPN cumulative solution might be influenced by a N-S tilt represented by E-rot (north/east/up) of about 0.2mas/year.

J. DOUSA states that these investigations are to be worked out more in detail in order to explain realistically the above mentioned effects.

In the following A. KENYERES presents a summary of his contribution to ITRF regional densifications. A more detailed report will be given at the next TWG meeting. However, it is decided not to change historical EPNC solutions but to focus on future ITRF densifications.

e) Real-time activities

W. SÖHNE reports on the current status of the real-time activities in the BKG. Several stations are now upgraded for GPS, GLONASS and GALILEO data. The RTCM –spring meeting was held in Mannheim/ Germany from 09.-10.02.2011 with 40 participants. The agenda comprised the topics state space issues, multiple signal messages and potential RINEX/RTCM relationship.

f) TIGA CfP

H. HABRICH gives a summarized report on the IGS GPS Tide Gauge Benchmark Monitoring (TIGA) project, started 10 years ago. The weekly EUREF solutions are sent to the TIGA Computing Centre in Potsdam. Recently TIGA has changed its status to a working group within the IGS. A call for participation (deadline 15.03.2011) has been sent out, in particular for the delivery of data as well as for institutions to act as computing centres. H. HABRICH proposes that EUREF should be engaged as an Analysis Centre for the processing of tracking data.

H. HABRICH has elaborated a draft and explains the contents. The TWG asks H. HABRICH to complete the text and to submit the proposal for a co-operation between EUREF and TIGA.

13. EUREF symposium 2011

H. HORNIK reports that the preparations for the EUREF 2011 Symposium in Chisinau/Moldova are going on.

14. Divers

a) CODE annual meeting

E. BROCKMANN informs on the last annual meeting. A new version of the Bernese Software will be released by the end of 2011.

b) Galileo GGRI WG

W. SÖHNE gives a summarizing report on a meeting of the Working Group in Noordwijk a few days before, several members of the EUREF TWG participated. A detailed report will be given at the next TWG meeting.

16. Next TWG Meeting

The EUREF TWG 2011 Symposium Meeting will take place as usual the whole day before the Symposium in Chisinau/Moldova, i.e. on Tuesday, 24.05.2011.

17. Action Items

H. HORNIK will compile the action items of this meeting as soon as possible and distribute the text among the TWG members.

C. BRUYNINX closes the 2011 Spring TWG Meeting with cordial thanks to the hosts, especially to A. CAPORALI, for the excellent organization.