

XXXXIth Meeting of the EUREF Technical Working Group in Riga, June 13, 2006

Next events:

- EUREF TWG Fall Meeting: Frankfurt a.M., Monday, November 6-Tuesday, November 7 (2 full days)
- TWG 2007 Spring Meeting: not yet fixed
- TWG 2007 Symposium Meeting: 5. June 2007, London
- Symposium 2007: 6.-8. (9. = technical excursion) June 2007: Institute of Mechanical Engineers, London Riga, Tuesday June 13, 2006 (whole day)

Meeting place: University of Latvia, Rector's meeting hall

Time schedule: Begin: 09.00; end: 18.00

Agenda

1. Opening (Altamimi)
2. Minutes & action items of the 40th TWG Meeting in Padova
3. GRF2006 IAG-Symposium and XXIII International FIG Congress in Munich
4. AFREF – Some information on installation of GNSS stations and letter
5. Validation of Campaigns
 - Bulgaria 2004 (BG-2004)
 - Improvement and extension of EUREF89 in Latvia and Lithuania based on the NKG 2003 GPS campaign
6. Status of ITRF2005
7. European Dense Velocity Field
8. EPN Analysis Report:
 - Report from LAC Workshop in Padua
 - Status of EPN multiyear solution for ITRF2005
 - Proposal for Near Real-time EPN Monitoring from Poland
9. Absolute antenna calibrations used by IGS and EPN
10. New realization of EVRS 2007
11. Status report of EUVN_DA
12. Special Project Troposphere – Status Report
13. EUREF-IP Status report
14. EUREF and gravity (in response to one of questions J. Ihde put at the last meeting in his topic "Enhancing EUREF")
15. UN International Committee on GNSS (ICG) (short statement)
16. Current status of INSPIRE drafting teams
17. EUREF Symposium 2006 – Riga: Programme etc.
18. EUREF Symposium 2007 – London
19. Nordic Commission of Geodesy regarding membership in EUREF Technical Working Group

20. Varia

- EUMETNET GPS water vapour programme (EGVAP)
- Defence Imagery Exploitation 2006
- Next TWG Meeting – Frankfurt a.M. – reminder
- EUREF homepage

21. Review of action items

Participants

ZUHEIR ALTAMIMI, Paris (Chairman)

WOLFGANG AUGATH, Springe (guest)

JANIS BALODIS, Riga (guest)

ELMAR BROCKMANN, Berne

ALESSANDRO CAPORALI, Padova

PAUL CRUDDACE, Southampton (guest)

DENISE DETTMERING, Frankfurt a.M.(guest)

IVAN GEORGIEV, Sofia (guest)

MARK GREAVES, Southampton (guest)

HEINZ HABRICH, Frankfurt a.M. (perm. guest)

HELMUT HORNIK, Munich (Subcomm. Secretary)

JOHANNES IHDE, Frankfurt a.M.

JANIS KAMINSKIS, Riga (guest)

AMBRUS KENYERES, Budapest

JAAKKO MÄKINEN, Helsinki

HANS VAN DER MAREL, Delft

PETER PESEC, Graz (guest)

HERMANN SEEGER, Bad Neuenahr-Ahrweiler (perm. guest)

JAROSLAV SIMEK, Prague

GÜNTER STANGL, Graz (perm. guest)

JOAO AGRIA TORRES, Lisbon (Subcomm. President)

apologized: CLAUDE BOUCHER, Paris; CARINE BRUYNINX, Brussels; WERNER GURTNER, Berne; WOLFGANG SÖHNE, Frankfurt a.M.; 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-iag.net/TWG/EUREF%20TWG%20minutes/Agenda_2006_Riga/TWG_Riga2006.html).

1. Opening

On behalf of the hosts, I. LACIS, Rector of the University of Latvia welcomes the TWG participants. Z. ALTAMIMI as chairman of the TWG expresses his cordial thanks for the warm welcome and points out the importance to have a first meeting of EUREF in this northeast region of Europe. He welcomes the guests, especially J. BALODIS and J. KAMINSKIS from the hosting country as well as P. PESEC who attends officially the last time at a EUREF meeting before he will retire.

The agenda was distributed among the TWG members by e-mail and is adopted by the plenary.

2. Minutes & action items of the 40th TWG Meeting in Padova

The minutes and action items of the 40th TWG meeting in Padova, 13.-14. March 2006, were distributed by the EUREF Secretary among the TWG members. The text is

adopted after some corrections and will be put into the web (<http://www.euref.eu/TWG/EUREF%20TWG%20minutes/40-Padova2006/TWG-Padova2006.html>).

3. GRF2006 IAG-Symposium and XXIII International FIG Congress in Munich

On occasion of the FIG Congress (8.-13.10.2006) and INTERGEO (10.-12.10.2006) as well as the IAG-Symposium GRF2006 (9.-13.10.2006) a common one day meeting on 12.10.2006 will be organized by H. DREWES as IAG-Commission 1 President. On behalf of EUREF, C. BRUYNINX will present a paper on the EPN, J. IHDE will report on the European Vertical System and Z. ALTAMIMI give a presentation on the ITRF2005. As President of IAG Sub-commission 1.3 Regional Reference Frames, Z. ALTAMIMI will remember all the other sub-organisations to present contributions. In this context he also encourages all colleagues to put relevant abstracts or papers into the EUREF homepage (<http://www.euref.eu/>).

4. AFREF – Some information on installation of GNSS stations and letter

Concerning a previous call for participation, J. TORRES informs that he has sent a letter to the UN as well as IAG announcing that the EUREF Sub-commission would be ready to help in the installation and first beginning of the operation of a continental network in Africa. J. TORRES also presents a newspaper article reporting the installation of a permanent GPS station in Mozambique by a Portuguese agency. At present a main problem besides many others is the lack of reliable long-term communication. The AC Delft has announced to process the delivered data at least for a certain period.

R. WONNACOTT, President of IAG SC1.3 d – Africa will organize an AFREF Technical Workshop in Cape Town, South Africa, from 9-13 July 2006. EUREF will be presented there by Z. ALTAMIMI, C. BRUYNINX and G. WEBER with adequate reports on the EUREF project.

5. Validation of Campaigns

Bulgaria 2004 (BG-2004)

I. GEORGIEV presents a detailed report on the BG-2004 campaign. The campaign was mainly carried out by the Bulgarian military. In all, the campaign comprises 112 sites, however, at present only one permanent site (Sofia) is operable. The stations of the BULREF 1993 campaign initiated by the BKG as well as EUVN97 are included. Comparisons of the new results with those derived from the older campaigns fit partly rather well, some stations, however, show considerable differences. These residuals may partly results from tectonical movements, but other reasons may be more dominate. So these effects are to be investigated carefully before assigned as station velocities. Further it is pointed out that the station Ankara is still rather insecure as fiducial point due to relatively large jumps which are probably due to the instrumentation.

J. IHDE and A. KENYERES recommend to consider carefully also the levelling points in order to use these as valuable contribution for the UELN/EVRS and EUVN_DA vertical networks.

The TWG concludes to recommend a resolution to the EUREF plenary to accept the new BG-2004 campaign as contribution on Class B standard (about 1 cm at the epoch of observation) to the current realisation of ETRS89.

For practical reasons the number of sites within the EUREF data base should not exceed more than 25 sites, in this number the old stations as far as available should be included. The data together with the station descriptions are to be sent as soon as possible to H. V. D. MAREL in Delft to be put into the data base. The other stations are not to be treated as official EUREF stations, however can be considered as densification stations with the EUREF class B label.

I. GEORGIEV is further asked to prepare a new report till end of June to be published in the proceedings with a limit of about 10 pages. The presented rather voluminous report could be published in the EUREF homepage.

Improvement and extension of EUREF89 in Latvia and Lithuania based on the NKG 2003 GPS campaign

Referring on a presentation by L. JIVALL to the EUREF 2005 Symposium in Vienna¹, J. KAMINSKIS reports on the elaborated results for the Baltic countries. J. KAMINSKIS points out that in the nineties much work was done for the primary survey, meanwhile a phase of densification and higher precision of the existing system is going on. The reference system within the Baltic countries is still basing on the 1992 campaign which only has class C standard. In order to improve this insufficient situation the Scandinavian colleagues extended the 2004 campaign of the Nordic Geodetic Commission to the Baltic countries. The complete campaign covers about 130 sites, each 6 sites are located in Latvia and Lithuania, one in Estonia. The old sites of the 1992 campaign are included in the new one.

In all, 4 independent solutions partly using also different software were computed by the respective countries, the results were intensively compared and discussed. The differences to the 1993 data range on the cm level. Further comparisons with the EUREF-POL, SWEREF and an Estonian campaign were carried out. Finally a subset of the coordinates for 12 stations in Latvia and Lithuania was derived and published.

It is discussed whether a subset of sites as a result of a larger campaign can be evaluated and be proposed as part of EUREF without the evaluation of the whole campaign. In this case the TWG was not asked for an evaluation of the NKG 2003 GPS campaign but only concerning the subset within Latvia and Lithuania². Finally the TWG accepts the proposed sub-set and concludes to recommend it to the symposium plenary to be adopted as part of ETRS89 on class B level.

6. Status of ITRF2005

Z. ALTAMIMI informs on the status of the new solution of the ITRF. A preliminary solution is already available on the website. The results of this 2005 computation offers not only station coordinates and their velocities, but also earth rotation parameters and time series which represent a completely new method. The final solution will hopefully be completed within a few weeks. Furthermore, this computation was carried out by several institutions, i.e. the IGN France, the German DGFI and the NRCan. The derived solutions will be compared in detail and differences be analysed. At the end a unique set of parameters will be published as official solution.

¹ Jivall L., Lidberg M., Nørbech T., Weber M.: *Processing of the NKG 2003 GPS Campaign*. International Association of Geodesy, Commission 1 – Reference Frames; Sub-commission 1.3a Europe (EUREF), Publication No. 15: Report on the Symposium of the IAG Sub-commission for Europe (EUREF) held in Vienna, 1 – 4 June 2005. Mitteilungen des Bundesamtes für Kartographie und Geodäsie, Band 38, p. 132-146, Frankfurt a.M. 2006.

² The described campaign mainly covered the Nordic countries as well as Latvia and Lithuania, Estonia on the contrary was already covered by a common campaign with Finland in 1996/97.

7. European Dense Velocity Field

Z. ALTAMIMI introduces the latest work on this topic. A series of 2.5 years of observations had been analysed, the used least squares collocation method allows the integration of any data set of a velocity field. The derived formal error is estimated to be less than 3 mm/yr for the velocity vectors. A test computation with the EPN shows that in some regions the station density is not sufficient to deliver reliable results with the desired accuracy.

The relevant report will be presented at the EUREF Symposium in detail by J. LEGRAND.

8. EPN Analysis Report

Report from LAC Workshop in Padua

H. HABRICH informs on the results of the 5th Local Analysis Centre (LAC) Workshop 2006 in Padua, Italy, March 15 – 16, 2006. Altogether 37 registered participants from 15 European Nations met, representing 15 LACs (only one LAC was not represented after a short-term cancellation). In 5 Working Sessions the topics

- Reports from the EPN Coordination Group
- Local Analysis Centres reports
- Experiences with new processing strategies
- Site, receiver and antenna issues
- Wrap-up and closing session

were treated. The conclusions concern

- absolute phase centre variations
- tropospheric gradients
- GLONASS
- re-processing
- real-time strategies
- near real-time processing
- divers.

The planned changes in the EPN Analysis refer the simultaneous computation of APCV (antenna phase centre variation), ITRF2005 and tropospheric gradients as well as the use of IGS ANTEX (antenna exchange format) files as reference for APCV.

The minutes of the workshop can be found in the web at http://www.epncb.oma.be/_newsletters/workshops/EPNLACWS_2006/minutes.php.

Status of EPN multiyear solution for ITRF2005

H. HABRICH summarizes the activities of the EPN relating the contribution to the ITRF in the last years. The densification of the ITRF2005 was initiated by Z. ALTAMIMI as president of IAG Sub-commission 1.3 – Regional Reference Frames. In this call for participation all regional sub-commissions were asked for contributions. The input delivered by the EPN to the IGS concerns weekly SINEX files for the time span between January 1996 till December 2005. The time series are intensively investigated for jumps, outliers and inconsistencies as well as time series.

The results of the ITRF2005 will be made available to the EPN for further investigations.

Proposal for Near Real-time EPN Monitoring from Poland

At the LAC Workshop in Padua (see above) it was concluded to establish a near real-time (NRT) processing for monitoring the EPN station coordinates in cooperation with dense national GPS networks, e.g. from meteorological projects. The Warsaw University of Technology (WUT) offered to take up the duty to run a “rapid EPN service”.

The planned re-processing of the whole EPN is decided to be postponed till the new IGS orbits are available.

For the organisation of the future work a questionnaire to the LACs should be sent out asking whether they can deliver hourly and daily SINEX files (at least for a subset of the existing stations) and on their analysis strategy. Further a contract with the WUT has to be formulated for a detailed proposal and confirmation for a long term collaboration. Then the TWG should decide on its next meeting how to proceed, also considering other ideas and proposals concerning the computation of (near-)realtime coordinates. In this context it has also to be discussed how to react in the practical case as in reality never 100% of the data will be available in time, so adequate strategies for the practical daily work have to be developed, too. Besides the computational work it also has to be also reflected in general which products EUREF can/should provide in future.

9. Absolute antenna calibrations used by IGS and EPN

E. BROCKMANN explains the decisions by the IGS relating absolute antenna calibrations and the consequences for the EPN. With the change to ITRF2005 the IGS will change to absolute antenna phase center values aiming on an improvement of the consistency with VLBI and SLR for coordinates and troposphere. A proposal of Geo++ (cf. <http://gnpcvdb.geopp.de/>) to deliver group values from the data base to the IGS05_www.atx file on the basis of a user licence for EUREF ACs is decided to be not acceptable for EUREF as generally all work is agreed to be done free of charge as well as the results are freely available.

The Bernese version 5.0 implies the new specifications for the new antenna model realization as well as other model changes (radome codes, ITRF2005, gradients, ocean loading), so all LACs should adapt the software in time.

It is emphasized that EUREF in its quality of a partner of the IGS has to adapt the IGS guidelines to be conform. So the existing guidelines have to be updated and formulated strictly in order to avoid any misunderstandings or errors. E. BROCKMANN will contact C. BRUYNINX as manager of the EPN CB to formulate and install an adequate set of guidelines.

10. New realization of EVRS 2007

J. IHDE mentions that by the EUREF network the European continent is widely covered with an accurate and dense horizontal reference system. An adequate system concerning

especially the vertical component is in preparation since many years and various efforts have been undertaken e.g. with the enormously intensive work for UELN. At the EUREF 2000 Symposium in Tromsø, the installation of an European Vertical Reference System (EVRS) as a gravity-related height reference system following the IVRS conventions was concluded.

The characteristics for a new EVRS 2007 are as follows:

- request of EC, consideration of user requirements in Europe,
- realization of an up-to-date European Height Reference Frame,
- continuation of the previous development of European Vertical Reference System,
- guarantee of a 1 cm accuracy level for datum and network realization,
- alignment to IVRS/WHs.

In this project also the European Combined Geodetic Network (ECGN) (cf. <http://gibs.bkg.bund.de/ecgn/index.html>) should be integrated.

J. IHDE emphasizes that meanwhile for the majority of the European countries a large amount of good data has been collected and is ready for use, for some regions also data records covering several time epochs are available. The collection of tide gauge data and others has also made good progress. Unfortunately the gravity network is not yet developed sufficiently, so a series of absolute gravity measurements should still be carried out. At the end in each European country at least one ECGN station equipped with all kinds of observations should be available.

For the next future the following steps are scheduled:

- Selection of identical levelling points (\Rightarrow Sept. 2006).
- Selection of ECGN/EVRS datum points by participating countries and determination of all measure elements (\Rightarrow Dec. 2006).
- New adjustment of the UELN (\Rightarrow Feb. 2007).
- Time series analysis of ECGN stations (\Rightarrow beginning Jan. 2007).
- Full parameter determination with EGG07 and IVRS realization (\Rightarrow Sept. 2007).

J. IHDE and J. MÄKINEN are asked to clarify the selection of the adequate tide system to be associated with the EVRS and report on their findings at the next TWG meeting.

11. Status report of EUVN_DA

On behalf of the EUVN_DA Working Group (H. DENKER, J. IHDE, A. KENYERES, U. MARTI, M. SACHER) A. Kenyeres as chairman reports on the recent activities. As superior goals of this project the items

- continental homogeneous GPS/levelling database (quality selection from the national networks!),
- supports the realization of an accurate height reference surface,
- close cooperation with the computing centre of the European Geoid in Hannover

are to be mentioned. After a difficult and slow start the initiative is developing now encouraging good.

The practical work is still concentrated on the collection of data. This task should be completed till end of 2006. For early 2007 it is planned to release the results, i.e. high quality, homogenous and continental set of reference GPS/levelling points and an accurate continental height reference surface for the practice. The data will be freely available for the data providers and non-commercial or scientific users.

J. IHDE points out that it has to be carefully reflected how the term “reference surface for Europe” should be defined. It strictly has to be observed to avoid any confusion for the practical users. All officially released results have to be referred on a common reference, otherwise misunderstandings are rather probable. The EUVN_DA can serve as a helpful tool for the improvement of the EUVN97 and can deliver useful input for the ECGN and EVRS, however should not be published as an independent reference system.

12. Special Project Troposphere – Status Report

In place of W. SÖHNE, H. HABRICH gives a summarizing report on the development of the Special Project Troposphere. The stations Cagliari, Metsahovi and Reykjavik include two independent equipments on each one site, thus giving an interesting opportunity to compare the different results and to seek for possibilities to improve the troposphere model.

13. EUREF-IP Status report

In place of G. WEBER, D. DETTMER presents the activities of the EPN Real-time Working Group. The EUREF-IP is meanwhile developing from the a pilot project to a professional service. In the report it is recommended to upgrade all EPN stations to real-time sites. As requirements for becoming an EPN real-time station the long term commitment, a continuous data stream and a sufficient internet bandwidth are needed. The software for transport, dissemination and monitoring is available.

Z. ALTAMIMI remembers the nomination of a working group (C. BRUYNINX, A. CAPORALI, W. GURTNER, H. V. D. MAREL, J. TORRES, G. WEBER) at the last TWG Meeting in Padova (13.-14.3.2006) which was asked to formulate a “white paper” for the next meeting to define the basic definitions of EUREF-IP. G. WEBER is asked to issue this text as soon as possible to be discussed in the TWG in order to come to practical conclusions how to proceed further on.

14. EUREF and gravity (in response to one of questions J. Ihde put at the last meeting in his topic “Enhancing EUREF”)

J. IHDE emphasizes that the advanced goals of EUREF such as the ECGN also need the input of refined gravity data and especially a common high accurate gravity model. He recommends to prepare a position paper basing on the previous report by J. SIMEK handling the connection of EUREF and gravity on the European continent as well as on international level. The colleagues who will attend the

coming IGFS2006 (International Gravity Field Service) Meeting from 28.8.-1.9.2006 in Istanbul are asked to prepare a detailed report for the next TWG meeting.

15. UN International Committee on GNSS (ICG) (short statement)

J. SIMEK gives a summarizing report on the activities. A draft of the Terms of Reference of the ICG is distributed (cf. <http://www.itu.int/jive/servlet/JiveServlet/download/454-1252-287289-766/ICG%20DraftToR-02032006.pdf>). J. TORRES is asked to contact the ICG on behalf of EUREF if possible before end of July.

16. Current status of INSPIRE drafting teams

The multi-national project Infrastructure for Spatial Information in Europe (INSPIRE) is introduced by H. HABRICH. The mission of INSPIRE is to establish a general infrastructure for spatial information. After a Preparatory Phase 2005 – 2006 to elaborate draft Implementation Rules (dIR) the transposition into national legislation of member states should be done in 2007 – 2008, the final implementation is planned for 2009 – 2013. EUREF has submitted its interest for the preparatory phase in April 2006 and is registered as Spatial Data Interest Community (SDIC). EUREF will contribute to the review phase for the dIR. EUREF is especially asked by INSPIRE to comment on topic 1.6 – Coordinate Reference System and Units Model.

H. HABRICH will formulate a short note on deliverables to the chairman of drafting team. The text will be distributed among the TWG before end of July to be discussed and then be sent to INSPIRE.

17. EUREF Symposium 2006 – Riga: Programme etc.

J. KAMINSKIS informs on the preparations for the EUREF Symposium June 14 – 17, 2006. J. TORRES and H. HORNIK have set up the agenda basing on the announced altogether 64 oral reports (24 of them national reports). Further 12 posters will be presented.

As members of the Resolution Committee the TWG will propose Z. ALTAMIMI, M. CRUDDACE (chair), H. HABRICH, H. HORNIK, J. IHDE, H. V. D. MAREL and J. TORRES.

18. EUREF Symposium 2007 – London

The British colleagues have invited the EUREF Sub-commission to hold the 2007 Symposium in the UK. M. GREAVES and P. CRUDDACE present their ideas on the organization of the Symposium. The Symposium is planned

for June 6 – 9 in the Institute of Mechanical Engineers, London. The traditional TWG Meeting will be held the day before the Symposium beginning, i.e. June 5. The plan to hold this meeting in the Ordnance Survey HQ, Southampton is considered as nice but too complicated, so the organizers are asked to check the possibility to arrange all events on the same place.

19. Nordic Commission of Geodesy regarding membership in EUREF Technical Working Group

The TWG discusses the application of the Nordic Commission of Geodesy to nominate one of its members for membership in the EUREF TWG. In the very beginning of the TWG it was considered as useful to have representatives of special regions in the group. This geographical aspect, however, is no more important. On the contrary the TWG should gather its members as experts on the various fields of interest. Furthermore the number of members should be held as low as possible to keep the group flexible. Z. ALTAMIMI as chairman of the TWG will write a letter to the Nordic Commission of Geodesy explaining these considerations.

20. Varia

EUMETNET GPS water vapour programme (EGVAP)

The item is shortly discussed. E. BROCKMANN, H. V. D. MAREL and J. TORRES will prepare a memorandum of understanding to be circulated within the TWG and then be sent to H. VEDEL. The topic will be put again onto the agenda of a next TWG meeting.

Defence Imagery Exploitation 2006

This topic is deleted due to the lack of time.

Next TWG Meeting – Frankfurt a.M. – reminder

As already concluded the TWG 2006 Fall Meeting will take place in the Federal Agency for Cartography and Geodesy (Bundesamt für Kartographie und Geodäsie – BKG) in Frankfurt a.M. from Monday, November 6, to Tuesday, November 7, 2006. In contrast to the former meetings with two half days a meeting of two full days is planned.

21. Review of action items

The action items of the meeting are projected and discussed. H. HORNIK will distribute the text immediately among the TWG members and participants of this meeting.