

## **44<sup>th</sup> Meeting of the EUREF Technical Working Group in London, 5. June 2007**

### **Next events:**

- TWG 2008 Spring Meeting: Helsinki, date not yet fixed
- TWG 2008 Symposium Meeting: Brussels, 17. June 2007 (whole day)
- Symposium 2008: Brussels, 18. - 20. June (21. June: technical excursion)

### **Meeting place:**

Royal Institution of Chartered Surveyors headquarters, 12 Great George Street, Parliament Square, London, Gloucester Room

**Time schedule:** June 5, 2007 – 09:00-18:00

### **Agenda**

1. Opening
2. Minutes & action items of the 43rd TWG Meeting in Lisbon
3. EUREF Symposium 2007
4. EUREF presentation at the IUGG 2007 General Assembly – short information
5. EUREF Elections
  - a) EUREF President
  - c) Applications for additional TWG members
6. ICG
7. MoU EUREF – EUMET
8. GPS-Meteorology
9. MoU EUREF – EuroGeographics
10. ETRF2005
11. EPN Analysis Aspects
  - a. Evaluation to use ITRF2005 and absolute PCVs in EPN, Action Item TWG
  - b. EPN rapid analysis products
  - c. Status note regarding EUREF/INSPIRE, Action Item TWG
  - d. Status note regarding ITRF2005 densification
12. Status report of the Time series Analysis SP
13. EUVN\_DA status report
14. Status of EVRS realization
15. EUREF-IP Project
16. Action Item TWG-Lisbon -43-08: "Enhancing EUREF" (agenda – topic 12)
17. Action Item TWG-Lisbon-43-12: "Status report of SP Troposphere" (agenda – topic 17)
18. Next TWG meeting
19. Summary and action items)

## Participants

ZUHEIR ALTAMIMI, Paris (Chairman)  
 ELMAR BROCKMANN, Berne  
 ALESSANDRO CAPORALI, Padova  
 PAUL CRUDDACE, Southampton (guest) (6.11.)  
 MARK GREAVES, Southampton (guest) (6.11.)  
 WERNER GURTNER, Berne  
 HEINZ HABRICH, Frankfurt a.M. (perm. guest)  
 HELMUT HORNIK, Munich (Sub-comm. Secretary)  
 JOHANNES IHDE, Frankfurt a.M.

AMBRUS KENYERES, Budapest  
 HANS VAN DER MAREL, Delft  
 HERMANN SEEGER, Bad Neuenahr-Ahrweiler (perm. guest)  
 JAROSLAV SIMEK, Prague  
 GÜNTER STANGL, Graz (perm. guest)  
 GEORG WEBER, Frankfurt a.M.  
 JOAO AGRIA TORRES, Lisbon (Sub-comm. President)

apologized: CLAUDE BOUCHER, Paris; CARINE BRUYNINX, Brussels; JAAKKO MÄKINEN, Helsinki

## 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/44-London2007/TWG-London2007.html>).

### 1. Opening

On behalf of the LOC, M. GREAVES welcomes the participants to this meeting in London. Z. ALTAMIMI as Chairman of the TWG thanks for the invitation and the hospitality. He expresses his thanks to the Ordnance Survey as well as the Royal Institute of Chartered Surveyors (RICS) for the organization of the TWG meeting and the following EUREF Symposium 2007. – Then the TWG Chairman opens the meeting with the presentation of the agenda. The agenda was already distributed by a circular mail, the plenary accepts the agenda.

### 2. Minutes & action items of the 43rd TWG Meeting in Lisbon

The minutes and action items of the 43rd TWG Meeting in Lisbon, March 5-6, 2007, were distributed by the EUREF Secretary among the TWG members. The text is adopted after some minor corrections and will be put into the web (<http://www.euref.eu/TWG/EUREF%20TWG%20minutes/43-Lisboa2007/TWG-Lisboa2007-Minutes.pdf>).

### 3. EUREF Symposium 2007

As President of the EUREF Sub-commission, J. TORRES presents and explains in detail the newest update of the Symposium agenda and programme. More than 130 colleagues from 28 countries have announced to participate and will present about 80 oral or poster presentations.

### 4. EUREF presentation at the IUGG 2007 General Assembly – short information

J. TORRES has distributed a draft of the contribution of EUREF to be presented to the coming IUGG 2007 General Assembly in Perugia. All comments of the TWG members were collected and put into the updated version. The presen-

tation will be given orally. Further some more papers in context with EUREF will be presented.

## 5. EUREF Elections

### – EUREF President

J. TORRES informs that according to the EUREF Terms of Reference a new President<sup>1</sup> of the Sub-commission has to be elected after a maximum of two 4-years periods. The election has to be performed by the plenary of the EUREF Symposium. J. TORRES suggests to recommend J. IHDE to the plenary to chair further on the EUREF Sub-commission. However, further nominations are welcome.

### – TWG Chair

The IAG has nominated Z. ALTAMIMI as future President of IAG Commission 1 – Reference Frames. Therefore Z. ALTAMIMI declares to retire a chairman of the EUREF TWG. He explains that the TWG should elect the relevant person and the plenary of the EUREF Symposium should confirm the nomination. As only candidate C. BRUYNINX is proposed to chair further on the EUREF TWG, the proposal is adopted and will be submitted to the Symposium plenary.

### – Applications for additional TWG members

Z. ALTAMIMI informs that two applications for additional TWG members have been submitted. It is stated that the TWG is principally an open club, however, the number of participants should be limited to keep the group flexible. Moreover it is emphasized that the task of the TWG is to discuss and solve problems related with EUREF. Therefore it is not principally necessary to have any representatives of organizations or regions among the group but specialists for relevant problems.

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<sup>1</sup> According to the new rules of the IAG, regional Sub-commissions are no more led by a “president” but by a “chairperson”.

J. IHDE recommends to nominate a new TWG member in order to replace him in his duties concerning the ECGN for the case that he will be elected for the EUREF chair and thus shift a part of the duties to an other person.

The TWG concludes to leave the decision on new TWG members to C. BRUYNINX as nominated future EUREF chairperson.

#### – WEGENER representative in EUREF

Z. ALTAMIMI has written a letter to S. ZERBINI as chair of the WEGENER Group to nominate a representative, however, no response was received up to now. It is stated that EUREF is represented in WEGENER by C. BRUYNINX and A. CAPORALI and it should be waited up for decisions by WEGENER.

### 6. ICG

The EUREF Sub-commission is engaged as observer in the International Committee on Global Navigation Satellite Systems (ICG). G. STANGL informs that after a preparatory meeting a few weeks ago a next meeting will be hold in Bangalore/India. As the newest developments show, China and India are preparing each an own GNSS. G. STANGL states that EUPOS is recognized among the ICG society, EUREF, however, is unfortunately not very well known. He emphasizes the need to present concerning contributions to the next ICG meeting, especially to the topic reference systems.

J. TORRES mentions that he tried to get into contact with R. NEILAN offering cooperation by EUREF, however, up to now no response returned. He explains to continue the efforts at the coming IUGG General Assembly. J. TORRES also emphasizes that the IAG should be informed in order to assure the adequate position of EUREF within GGOS.

### 7. MoU EUREF – EUMET / 8. GPS-Meteorology

The draft text for a Memorandum of Understanding (MoU) between EUREF and EUMET has been prepared and is intensively discussed. The final MoU ([http://www.euref.eu/documentation/OtherDocuments/EUREF\\_EUMETNET\\_MoU.pdf](http://www.euref.eu/documentation/OtherDocuments/EUREF_EUMETNET_MoU.pdf)) will be signed by both groups at the Symposium. A relevant resolution of the EUREF Symposium will be formulated. The TWG asks E. BROCKMANN and H. V. D. MAREL to set up the guidelines for the MoU and to report on their findings at the next TWG Meeting.

### 9. MoU EUREF – EuroGeographics

J. IHDE explains the history of the cooperation between EUREF and EuroGeographics. Many members of EuroGeographics are active in EUREF, too. Further various items which were handled in the ExGG are also relevant within the EUREF TWG. After the analysis of a questionnaire sent out by J. IHDE and E. BROCKMANN it was concluded together with N. LAND to dissolve the ExGG and transfer the tasks to the TWG. Consequently J. IHDE formulated a MoU to regulate the connection between EUREF and EuroGeographics. Among others a paragraph “EuroGeographics acts as legal representative of EUREF in

specific matters to be defined case by case and when required by EUREF” will be adopted to regulate clearly the responsibilities. A relevant resolution (<http://www.euref.eu/symposia/2007London/09-01-resolutions.pdf>) is going to be prepared.

### 10. ETRF2005

Z. ALTAMIMI explains that the influence of a transformation from the ITRF to the ETRF is visible in the formula. A relevant article related to the new ITRF2005 is accepted for publication in the JGR.

The velocity field 2005 is significantly better than in 2000 due to more data, longer time series, more sites etc. Meanwhile also non-linear motions can be better monitored, moreover the tectonic plates are defined more accurate, their number was increased from 6 to 15 with individual rotation poles. As example Z. ALTAMIMI mentions the subdivision of the former African Plate into two different plates.

EUREF is fixed to the Eurasian Plate which was adopted to be more or less stable. In comparison to other plates the motion is indeed rather small, however, the speed of about 0,5 mm/y accumulates since 1989 to more or less 1 cm which should not be neglected. The jump between ETRF 2000 and 2005 amounts to 1 cm as well. Moreover it has to be considered that the Eurasian Plate does by far not cover the complete area of the European continent but some parts do not coincide and the relevant velocities there are rather large. On the other hand the definition of the ETRS89 as reference for a wide field of users should be kept as stable as possible and not be changed if not really necessary. It is also emphasized whether the ETRS89 could be improved by use of the available better and more data.

As very important aspect it is stated that the users should not be confused but have to be convinced that it is useful to refer the national systems to a common ETRS89 also further on.

A long discussion concerning the new ETRFyy realisations takes place. Finally a Symposium resolution (no. 5, <<http://www.euref.eu/html/resolutions.html#London>>) is prepared.

The topic will be investigated more in detail and put onto the agenda of the next TWG Meeting. Z. ALTAMIMI, E. BROCKMANN, C. BRUYNINX, W. GURTNER, H. HABRICH and H. V. D. MAREL are asked to prepare the topic, Moreover, Z. ALTAMIMI will work out a proposal summarizing the different ways of the realization of ETRS89 without too many changes for the users. The proposal will be presented asap.

## 11. EPN Analysis Aspects

- Evaluation to use ITRF2005 and absolute PCVs in EPN, Action Item TWG
- EPN rapid analysis products
- Status note regarding EUREF/INSPIRE, Action Item TWG
- Status note regarding ITRF2005 densification

H. HABRICH gives a summarizing report on the items concerning the EPN analysis. A detailed study of the use of ITRF2005 in the EPN has been distributed per e-mail among the TWG members. The IGS05 has been aligned to ITRF2005 on the global level, but no regional differences present. Therefore it has to be reflected how to use the ITRF2005 to be transformed into ETRF2005 for the realization of the ETRS89. The influence of the new parameters for ITRF2005 on the ETRF2005 induces shifts of 8 mm for the east component and 20 mm for the height. The values are partly superposed by the station specific height changes.

## 12. Status report of the Time series Analysis SP

A. KENYERES has prepared a detailed report (<http://www.euref.eu/symposia/2007London/03-05-kenyeres.pdf>) for the EUREF symposium on EPN time series analysis before and after GPS week 1400. The findings are also documented in EUREF mails and described in the relevant web pages. GPS week 1400 marks the change from ITRF2000 to ITRF2005 and the transition from relative to absolute antenna phase centre variation. Despite of careful preparations, coordinate jumps could not be avoided. The re-processing of the time series showed that the EPN weighted weekly time series still contain considerable variations which are to be analysed further on.

## 13. EUVN\_DA status report

A. KENYERES presents the final report on the EUVN densification action prepared by the EUVN\_DA Working Group (A. KENYERES, M. SACHER, J. IHDE, H. DENKER and U. MARTI, <http://www.euref.eu/symposia/2007London/01-04-Kenyeres.pdf>). The EUVN\_DA as a densification action of the EUVN was initiated in 2003 and planned to be completed in 2006. Fortunately all countries which took part in the original EUVN campaign also are submitting data to the EUVN\_DA. Due to unexpected slow delivery of data the completion was not possible within the planned time period. The EUVN\_DA represents a continental homogeneous GPS/Leveling network and database basing on a selection from the national networks. It should support the realization of an accurate height reference surface using a fitted geoid. As products for EUREF the EUVN\_DA delivers a high quality, homogenous, continental set of reference GPS/leveling points. The data should be freely available for the data providers as well as for non-commercial and scientific users. For the European Gravity and Geoid Project (EGGP) an accurate continental height reference will result. In the last years the computation of the European Geoid which started with the EGG97 solution made a considerable progress towards the EGG07.

Detailed information on the EUVN\_DA is provided in the website [crs.bkg.bund.de/evrs/draft\\_euvnda.html](http://crs.bkg.bund.de/evrs/draft_euvnda.html).

As tasks and schedule by the end of 2007 it is planned to complete the data set by the new data, to finish a validation per country, the inclusion of EUVN\_DA benchmarks into the UELN adjustments (UELN DC), further the compilation of a draft report. After the completion of the EGG07 a EUVN\_DA – EGG07 combination will be computed.

## 14. Status of EVRS realization

J. IHDE presents a preview of the report to be submitted to the following symposium (<http://www.euref.eu/symposia/2007London/02-01-Sacher.pdf>). After the UELN-95/98 solution the data base could be extended by the networks of Bulgaria, Estonia, Latvia, Lithuania and Romania. Moreover the old data of Finland, the Netherlands, Norway, Sweden and Switzerland could be replaced by new ones. Several others are announced. France and Great Britain agreed to connect their networks by the potential difference observed through the tunnel connecting Great Britain with the European continent.

The EVRS2000 datum was defined by the adopted zero level of the NAP, realized by one point in the Netherlands. The new EVRS2007 solution, however, will be based by realizing the datum by various points distributed over the stable part of Europe. The level of the new EVRS datum will be defined by the geopotential values of the UELN-95/98 solution of a selected number of points in Europe. The future time evolution of the EVRS will be monitored by the observation of time series of selected ECGN stations.

## 15. EUREF-IP Project

G. WEBER gives a detailed report on the progress of the project (<http://www.euref.eu/symposia/2007London/04-01-weber.pdf>). Meanwhile about 100 stations within Europe are contributing, ca. 50 of them make their data continuously available. G. WEBER suggests to consider the *Real-Time GNSS EUREF-IP Pilot Project* further on as a routine service and no more as a pilot project (cf. <http://www.euref.eu/symposia/2007London/09-01-resolutions.pdf>, resolution #4). According to a conclusion of the last TWG Meeting a White Paper on the subject has been formulated, the text is available from [http://www.epncb.oma.be/\\_organisation/](http://www.epncb.oma.be/_organisation/). Guidelines have been developed for reference stations, NTRIP Broadcasters, high-rate RINEX Data Centers, Real-time Analysis Centers and the role of EPN Central Bureau. With a review on the history of the project G. WEBER explains the reasons for the installation of the EUREF-IP, i.e. the integration of real-time EPN stations in regional DGPS/RTK networks because they are the best real-time monitored long-term sites being available as reference stations on the continent, allow easy real-time data exchange and save costs, and finally to enable EUREF to support on dm-level to European-wide positioning which is consistently referred to the ETRS89.

The TWG ask G. WEBER to represent EUREF in the RTIGS (Real-Time IGS) Working Group and let the TWG know if support is needed. His major focus should be on making available the upcoming RTIGS resources for EUREF.

**16. Action Item TWG-Lisbon -43-08: "Enhancing EUREF"**

According to the action items of the last TWG Meeting in Lisbon, 5-6.3.2007, W. SÖHNE has prepared a poster on high rate GPS analysis at BKG and possible applications in other fields (cf. <http://www.euref.eu/symposia/2007/London/p-15-soehne.pdf>). H. HABRICH gives a short review of the contents.

**17. Action Item TWG-Lisbon-43-12: "Status report of SP Troposphere"**

Another poster on this item is presented by H. HABRICH.

**18. Next TWG meeting**

Z. ALTAMIMI invites the TWG to hold its 2007 Fall Meeting in the IGN at St. Mandé/Paris. For the date the days November 19-20 or 22-23 are proposed<sup>2</sup>.

On a invitation by J. MÄKINEN the TWG will hold its Spring Meeting 2008 in Helsinki.

The plenary thanks Z. ALTAMIMI and J. MÄKINEN for the kind invitations.

**19. Summary and action items**

The Action Items will be distributed as soon as possible.

Closing the meeting, the TWG chairman Z. ALTAMIMI expresses the heartfelt thanks of the TWG to the British hosts for the excellent organization and hospitality.

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<sup>2</sup> After clarifying some organisational problem the date was fixed for Thursday, Nov. 29 to Tuesday, Nov. 30, 2007, noon to noon.