

## XXXXIII<sup>th</sup> Meeting of the EUREF Technical Working Group in Lisbon, 5. – 6. March 2007

### Next events:

- TWG 2007 Symposium Meeting: 5. June 2007, Royal Institute of Chartered Engineers Surveyors, London (whole day)
- Symposium 2007: 6.-8. (9.: technical excursion) June 2007: Institute of Mechanical Engineers, London

### Meeting place:

Instituto Geográfico Português (IGP)  
R. Artilharia Um, 107  
P - 1099 – 052 Lisboa  
Meeting Room at the 4th level

**Time schedule:** Monday, May 5, 2007 – 09:00-17:30  
Tuesday, May 6, 2007 – 09:00-16:00

### Agenda

1. Opening
2. Minutes & action items of the 42nd TWG Meeting in Frankfurt a.M.
3. EUREF Symposium 2007
4. EUREF presentation at the IUGG 2007 General Assembly
5. EUREF Elections
6. EUREF – WEGENER Relationship
  - a) WEGENER Representative at the TWG
  - b) Joint WG on European Velocity Field
7. Report on joint ideas with WEGENER for proposals within FP7 and other financing bodies
8. Report on GGOS Retreat
9. Complement to GGOS: Regional Densification
10. EUREF/INSPIRE Relationship
11. EC *Green Paper* on satellite navigation applications
12. Enhancing EUREF
13. MoU EUREF-EUMETNET
14. ICG
15. EPN status report
16. EUREF-IP Status Report
17. RT activities at GOP - present and outlook
18. Status report of the SP Troposphere
19. Trimble Dimension 2006 conference
20. ITRF2005 and consequence for ETRF2005

21. Status Analysis Reports
  - a. Change since week 1400
  - b. EPN long-term solution for ITRF2005 densification
  - c. Near real time analysis
22. EPN time series analysis after ITRF2000 (Kenyeres)
23. EUVN\_DA: preparation for closing
24. Status of EVRS2007, ECGN
25. Next meeting
26. Varia, summary and action items

## Participants

ZUHEIR ALTAMIMI, Paris (Chairman)  
 ELMAR BROCKMANN, Berne  
 Carine Bruyninx, Brussels  
 JAAKKO MÄKINEN, Helsinki  
 ALESSANDRO CAPORALI, Padova  
 PAUL CRUDDACE, Southampton (guest) (6.11.)  
 JAN DOUSA, Prague (guest)  
 MARK GREAVES, Southampton (guest) (6.11.)  
 HEINZ HABRICH, Frankfurt a.M. (perm. guest)  
 HELMUT HORNIK, Munich (Subcomm. Secretary)  
 JOHANNES IHDE, Frankfurt a.M.

AMBRUS KENYERES, Budapest  
 HELENA KOL, Lisbon (organizer)  
 JAAKKO MÄKINEN, Helsinki  
 RUI MANUEL DA SILVA FERNANDES, Lisbon (guest)  
 WOLFGANG SÖHNE, Frankfurt a.M.  
 HERMANN SEEGER, Bad Neuenahr-Ahrweiler (perm. guest)  
 JAROSLAV SIMEK, Prague  
 GÜNTER STANGL, Graz (perm. guest)  
 GEORG WEBER, Frankfurt a.M.  
 JOAO AGRIA TORRES, Lisbon (Subcomm. President)  
 MANUELA VASCONCELOS, Lisbon (organizer)

apologized: CLAUDE BOUCHER, Paris; WERNER GURTNER, Berne, HANS VAN DER MAREL, Delft

## 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\\_2007\\_Lisbon/TWG\\_Lisbon2007.html](http://www.euref-iag.net/TWG/EUREF%20TWG%20minutes/Agenda_2007_Lisbon/TWG_Lisbon2007.html)).

### 1. Opening

Prof. Dr. RUI PEDRO JULIÃO, Vice-president of the Instituto Geográfico Português (IGP) welcomes the TWG in Lisbon. He mentions the TWG as driving force of the EUREF Sub-commission and expresses his wishes for a successful meetings. Z. ALTAMIMI as Chairman of the TWG thanks for the hospitality and thanks the IGP for making available personnel and computer facility for the long term maintenance of the EUREF homepage. 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 42nd TWG Meeting in Frankfurt a.M.

The minutes and action items of the 42th TWG Meeting in Frankfurt a.M., November 6-7, 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/42-Frankfurt2006/TWG-Frankfurt2006.html>).

### 3. EUREF Symposium 2007

M. GREAVES announces that the website the coming symposium in London, June, 6-9, 2007 has been completed and the registration opened. As usual, the TWG will meet the day before the symposium. i.e. on June 5. M. GREAVES informs on some details concerning the social programme and the technical excursion. The TWG discusses the organization and time schedule. On behalf of the Local Organizing Committee, M. GREAVES asks to register as soon as possible in order to facilitate the organisational preparations. Therefore H. HORNIK and J. TORRES will send out EUREF-mails repeatedly remembering the deadline for registration and further announce the Symposium in journals, websites (IAG, etc.). H. SEEGER proposes to enable a registration onsite for colleagues who cannot register till the deadline due to special reasons. A possibility for such cases will be given.

J. IHDE announces that EuroGeographics will give again a financial support for participants from economically weak countries. According to the rules only one participant per

country can be supported, the respective country has to be a full member of EuroGeographics. Registrations forms and the deadline for concerning applications are published in the website.

G. WEBER proposes to change the programme such that a special session for real time topics should be possible. It is concluded that the session *EPN-related applications* is changed to *EPN-related applications and real time*. The question where to put contributions to the topic *Galileo* into the programme is answered that the session part *GNSS* will comprise all concerning contributions, however, the term *Galileo* will be added as sub-title.

#### 4. EUREF presentation at the IUGG 2007 General Assembly

J. TORRES has prepared an abstract *Status of the European Reference Frame (EUREF)* to be presented to the IUGG 2007 General Assembly in Perugia. The text will be distributed to the TWG members to be discussed and refined.

#### 5. EUREF Elections

J. TORRES remembers that he was elected as President of the Sub-commission at the Prague Symposium in 1999, so his second term will finish with the coming symposium in London. Due to the terms of reference ([http://www.euref.eu/html/Overview\\_of\\_EUREF\\_Terms\\_of\\_reference.html](http://www.euref.eu/html/Overview_of_EUREF_Terms_of_reference.html)), the period of the President is limited to two terms. Therefore a new president has to be elected. The term in office for Z. ALTAMIMI as TWG Chairman is not yet finished, another term is possible.

Z. ALTAMIMI declares that elections at a symposium are normal, however, proposals for new candidates should be collected and prepared in time. He further proposes to wait for the development in the IAG commission in May before deciding for the EUREF presidency.

It is emphasized that all nominations and elections should be carried out in a most possible democratic way. Everybody can be proposed or propose himself as a candidate, however, the proposals should be made in time. The TWG proposes W. GURTNER, H. HORNIK and J. TORRES as members for the nomination committee, all proposals should be directed to the committee. As soon as the nominations in the IAG are completed, the committee will start its work.

#### 6. EUREF – WEGENER relationship

Z. ALTAMIMI welcomes R. M. DA SILVA FERNANDES as representative of WEGENER in this meeting. He states the need to continue the cooperation between EUREF and WEGENER, the common activities give a benefit for both groups. In order to stabilize the cooperation, each group should send an official representative into the other one. From the EUREF side A. CAPORALI is nominated. A letter to S. ZERBINI will be formulated with this proposal and the question for an official WEGENER representative in the EUREF Sub-commission.

As a common goal the establishment of a European velocity field is mentioned. This proposal was already submitted by EUREF, an answer is not yet received. It is emphasized that such a velocity field then should be adopted and used by all as well as the data be freely available for everybody. The EPN could serve as a suitable framework for this activity. A common working group *European Velocity Field* is proposed, as members are suggested Z. ALTAMIMI, C. BRUYNINX, A. CAPORALI, H. HABRICH, A. KENYERES and G. STANGL (EUREF), further M. BECKER, P. CLARKE, J.-M. NOCQUET, R. M. DA SILVA FERNANDES and W. SPAKMAN (WEGENER).

#### 7. Report on joint ideas with WEGENER for proposals within FP7 and other financing bodies

A. CAPORALI informs on meetings in Bologna and Padova on the *Framework Programme (FP) 7 – Capacities Work Programme: Infrastructures* with a systematic recognition on the topics to be worked out. An important item is GEODAC (Geodynamic Data and Analysis Center), J. M. NOCQUET and L. BASTOS formulated a concerning proposal. As an option for GEODAC, *INFRA-2007-1.2.1: Scientific Digital Repositories* was formulated to support the deployment of digital repositories for the scientific communities by collecting existing resources. By this activity, synergies could be won and thus help to solve manifold tasks. As contribution of EUREF, the EPN could play a leading role in this project.

Another theme is *Environment* as contribution to the development of a worldwide network of in-situ observatories for seismogenic hazards, as examples AFISO (Anatolian Fault Integrated Seismogenic Observatory) and MAGINOT (Mediterranean Alpine Geophysical In situ Observatories) are mentioned.

Further on the NATO initiative *Science for Peace* is presented. By this initiative funds for projects comprising also non NATO countries can be received. In this context the support of AFREF is recommended – this topic was discussed in EUREF repeatedly.

Z. ALTAMIMI proposes urgently to issue a memorandum on the EPN in order to make this data base better known to the relevant organizations which partly have knowledge of the existence of the EPN and therefore might support the establishment of additional data bases and thus produce a lot of useless double work.

In order to intensify the cooperation, A. CAPORALI is asked to contact M. BECKER as representative of WEGENER as far as there is progress in this topic.

#### 8. Report on GGOS retreat

Z. ALTAMIMI reports on a meeting from 19-21.02.2007 in Mandalay Beach Resort/Oxnard/California. Various papers were presented and working groups initiated.

A main goal is to combine the geometric and gravity parts of geodesy to a common object and thus come to a considerable progress in geodesy for describing the system Earth in a better way. Hereby the different groups engaged

in gravity should be organized more efficiently within an IAG Service.

The various IAG Services need clear instructions which kind of data to record and collect. A special item is the contribution of regional data sets to GGOS.

It is strongly recommended that GGOS should be kept as a central project of the IAG and no new organizations need to be created but the already existing ones be engaged with clear rules in the work to be done. Otherwise it might happen that parallel actions would be carried out which produce no benefit for GGOS but lead to useless competition. GGOS should be understood as an interface between the scientific part within the IAG and its services.

### 9. Complement to GGOS: regional densification

J. IHDE informs on an e-mail by H.-P. PLAG as Vice-chairman of the GGOS Steering Committee concerning the GGOS implementation. In this e-mail a more intensive link between GGOS and regional organizations is demanded. The TWG expresses its opinion that EUREF is ready to contribute to GGOS and the present organisational structure is very sufficient. This is also documented in the EUREF terms of reference. The TWG warns to establish more bureaucracy, all available forces should be concentrated to the essential tasks of GGOS.

### 10. EUREF/INSPIRE relationship

According to an action item of the TWG Meeting in Riga, 13.6.2006, H. HABRICH has circulated a document to this topic. He gives a sketch of the hitherto development. At present a consultation on more INSPIRE Draft Implementing Rules to be started shortly is going on. In a transposition phase from 2007 – 2008 the member states should transpose INSPIRE into their national legislation, followed by the implementation phase scheduled from 2009 – 2013.

EUREF will provide the coordinate reference system for INSPIRE through ETRS89. All technical specifications have to be considered in the INSPIRE conceptional model. Further EUREF will provide additional products as far as these products contribute to the goals of INSPIRE, e.g. the Unified European Height System. EUREF also should formulate its requirements against INSPIRE.

J. IHDE states that INSPIRE has a legal entity as a political institution, so EUREF should try to be based on a similar status in order to be accepted as a partner on an equal basis. In this context EUREF could also prove to be a group which can offer interesting data as well as a reliable and useful cooperation.

It is concluded that Z. ALTAMIMI, E. BROCKMANN, H. HABRICH (chair), J. MÄKINEN, G. STANGL and J. TORRES will formulate a document to explain clearly what INSPIRE is and what EUREF/INSPIRE expect/can deliver from/to each other. The document will be circulated among the TWG before the next meeting.

### 11. EC Green Paper on satellite navigation applications

W. SÖHNE presents on the contents of the *Green Paper* on satellite navigation applications, published in Dec. 2006 by the European Commission. The paper addresses all stakeholders to launch a discussion on the influence of the public sector on the policy and the development of satellite navigation applications. In particular young people are called up to formulate their ideas on the use of satellite navigation technologies and services. Considering the structure of the *Green Paper* the TWG regrets that the term geodesy is hardly mentioned although the whole subject finally is a part of geodesy. Therefore it should be tried to get more influence on the formulation of such issues in time before texts are published.

The TWG concludes to ask W. SÖHNE and J. TORRES to fill out the questionnaire of the *Green Paper* as good as possible and then circulate the draft among the TWG for comments/additions/corrections. Then the topic should be put on the agenda of the next TWG meeting.

### 12. Enhancing EUREF

J. IHDE explains his paper distributed before. The discussion whether and how to enhance EUREF was started at the TWG Meeting in Padova, 13.-14.03.2006. Meanwhile some conditions have changed, so the topic has to be considered under the actual point of view. In all, this project has to be accepted as a process permanently moving on. Concerning the development of EUREF, it should be reflected whether the hitherto successful strategy used for EUREF will also hold for the next decade and will fit with the IAG's GGOS.

J. IHDE mentions that within the IAG a fundamental discussion on the tasks of geodesy is going on. As keywords which also can be adopted as valid for EUREF are to be mentioned

- premier source of the highest-quality GNSS data and products;
- promote the value and benefits to society, the broader scientific community and in particular to policy makers and funding entities;
- facilitate the integration (into more broadly based systems);
- understand and consider user needs;
- recognition of political, scientific and academic aspects;
- addition of products, tools, applications with respect to natural hazards;
- raise profile and visibility;
- support the contacts to experts as well as the public using all tools which might be useful;
- support new ideas/projects;
- improve the global participation/cooperation.

As consequence for EUREF, in particular the general policy as well as the modernization of EUREF in a general as well as technical sense are to be discussed.

A central item concerns the integration of space techniques and gravity. The determination of any height systems and

especially height changes requests an accurate knowledge of the regional/global gravity field. So it has to be reflected how EUREF can receive sufficient accurate and dense data for the determination of e.g. an EVS. In all the number of absolute gravity observations is increasing considerably, parallel to this progress it becomes familiar that the fundamental importance of gravity for the understanding of the system Earth and the monitoring of global change processes is visible. Moreover, accurate gravity data are essential in many fields of geosciences.

In the discussion J. TORRES emphasizes that EUREF is responsible for the European Terrestrial Reference System, so the need for an accurate gravity field is obvious. Therefore it has urgently to be tried to contact the competent colleagues for receiving the respective data. J. TORRES recommends that the EUREF Sub-commission should not be engaged in the field works in gravity but only in the acquisition of reliable data sets.

The TWG decides to ask J. IHDE, A. KENYERES, J. MÄKINEN, J. SIMEK and J. TORRES to write a one-page position paper on the need for gravity in EUREF till the next TWG meeting.

As next item J. IHDE presents his ideas on an approach of EUREF by upgrading the EPN with the use of GLONASS and in future GALILEO. It is emphasized that EUREF can have own ideas and generate any own products very well. However, it should keep the IGS guidelines to be compatible with this global system. On the other hand new techniques are to be used as far as useful. Another question concerns the inclusion of European countries, e.g. Serbia, which are not yet involved in the moment.

It is concluded that C. BRUYNINX will submit a list of countries which do not yet contribute to the EPN. J. TORRES then will write a letter to those countries to install permanent stations/make available already operating stations. Moreover J. SIMEK will participate at the next EUPOS meeting and make adequate contacts to include already operating stations into the EPN.

W. SÖHNE describes the activities within the BKG for monitoring the EPN. So the sub-daily analysis allowed to find various irregularities e.g. in ocean loading parameters, mistakes and other incorrect data. Precise investigations showed that the computed station velocities generally turn out to be not linear. This result has to be considered in the European station velocity field. W. SÖHNE will contribute to the London-Symposium with a presentation on high rate GPS analysis at BKG and possible applications in other fields.

Z. ALTAMIMI then mentions the question for the relative motion of the geocentre and its reliable determination. As comparisons show, SLR and VLBI yield slightly differing results for the geocentre. These questions are to be investigated further on.

Concerning the link to other geo-disciplines, J. IHDE points out that such relations have to be put on a common basis of understanding. J. IHDE describes EUREF as a group

which does not only provide coordinates but represents a scientific organization with a suitable infrastructure to care about the development in geo-referencing at all. H. HABRICH emphasizes the need for an open policy for data. At present the structure is worldwide different, various institutions request money for their data, moreover more and more private companies get into the scientific business and try to make business as much as possible. EUREF is defined as a purely scientific organisation of the IAG, however, it could enter a close cooperation with EuroGeographics which has a legal entity and thus could act on an economical basis.

J. IHDE then gives a review of the relationship between EUREF and EuroGeographics in the last years. The Expert Group on Geodesy (ExGG) is working as the direct link between both groups. At the 2006 EUREF Symposium in Riga it was already discussed to replace the ExGG by a Memorandum of Understanding (MoU). A position paper on this item was sent out in August 2006 to the 44 members of EuroGeographics, however only few of them gave their view on this matter. Therefore it was tried to decide this problem in direct contact with EuroGeographics. J. IHDE explains that the majority of topics in the ExGG agenda is discussed in the TWG anyway. As EuroGeographics has a legal entity, a closer contact to EUREF could be of considerable benefit. J. TORRES mentions that the EUREF Terms of Reference (ToR) only need are to be a little extended to serve for the new requirements. The relations between EUREF and the National Mapping Agencies (NMAs) are urgently necessary and EUREF should sorrow for intensive contacts.

In order to find a suitable solution, it is decided that Z. ALTAMIMI, J. IHDE, J. TORRES (EUREF) and N. LAND (EuroGeographics) will meet in Paris in mid April to formulate a MoU on the future cooperation between EUREF and EuroGeographics. The MoU then will be circulated among the TWG for immediate discussion. At the London-Symposium the MoU will be presented to the plenary for discussion and then be signed officially. The ExGG will then be closed and replaced by the new cooperation.

### 13. MoU EUREF-EUMETNET

J. TORRES gives a short review on the already circulated papers. i.e. a MoU between EUREF and EUMETNET represented by the Danish Meteorological Institute (DMI) and two annexes concerning the data exchange and EUREF's access to additional SYNOP data. The benefit for EUREF is to be seen in the access to more and better data which can be used for detailed meteorological investigations.

The TWG asks E. BROCKMANN and J. TORRES to continue their work on this item together. E. BROCKMANN will report at the next TWG-meeting on the decisions taken at the EUMETNET-meeting in April 07.

## 14. ICG

G. STANGL reports on the International Committee on Global Navigation Satellite Systems (ICG). The ICG is structured as a non executive committee, its members are countries, associate members and observers. A preparatory meeting was held on 21.2.2007 in Vienna – the next meeting is planned for Sept. 2007 in Bangalore. The main goal of the meeting in Vienna was to establish relevant work groups. A contribution was presented by EUPOS. It is regretted that neither the IGS nor EUREF are considered by the ICG and there might arise the impression that EUPOS represents the only competent institution for geo-referencing. The new installed Work Groups are

1. Compatibility and interoperability (chair: USA and Russia);
2. Enhancement of performance of GNSS Services (chair: ESA and ITU(?));
3. Information dissemination (chair: UNOOSA);
4. Interaction with national and regional authorities and relevant international organizations (chair: FIG and IGS).

The participation of EUREF could cover the nomination of experts for certain actions, the development of a strategy for regional reference systems (presently a model for ASREF is urgently needed) and the clarification of responsibilities within ICG with IGS (e.g. reference systems, ionospheric and tropospheric models).

The TWG asks J. TORRES to contact R. NEILAN to clarify the responsibilities EUREF/IGS. H. SEEGER will participate at the next EUPOS meeting in Riga and keep the interests of EUREF.

## 15. EPN status report

C. BRUYNINX presents the new status of EPN tracking network. The EPN now comprises 199 stations; 7 are kept as inactive, 7 are newly accepted, 1 was withdrawn. Moreover 4 new sites are proposed to be included into the EPN. Considering the equipment of the stations (GLONASS, IP) which were accepted in the EPN in the recent time, it can be stated that the EPN is more and more on the way with multi-GNSS.

According to the decisions of the last TWG meeting in Frankfurt a.M., 6.-7.11.2006, an update of the EPN Guidelines ([http://www.epncb.oma.be/\\_organisation/guidelines/index.php](http://www.epncb.oma.be/_organisation/guidelines/index.php)) was worked out and circulated for comments among the TWG members. Finally the guidelines for the

- Procedure for becoming an EPN Station (update: 5.12.2006 );
- Guidelines for EPN stations and operational centres (5.12.2006, 3.3.2007)

were adapted to the new requirements.

C. BRUYNINX remembers the discussion at previous TWG meetings on the influence of the introduction of absolute antenna phase center models on IGS reference frame stations. An extraction of EPN stations showed mean differences of

- N = -0.2 mm ± 1.0 mm ;
- E = -0.4 mm ± 1.4 mm ;
- U = 5.3 mm ± 6.5 mm.

As conclusion it is stated that the IGS needs to generate its own realization of ITRF2005, and this realization should be consistent with the absolute APC. A suitable procedure was proposed by R. FERLAND (IGS mail 5547, 19.10.2006).

## 16. EUREF-IP Status Report

G. WEBER informs on the status of EUREF-IP. Currently 48 contributors are engaged in the project with altogether 87 streams, the data are used by roughly 600 registered clients, most of them are not end-users. The EUREF-IP real-time clocks are available now through [www.euref-ip.nt/clock](http://www.euref-ip.nt/clock). Moreover with the beginning of 2008 the Bernese Software will offer a real time component enabling clock estimation which can be used for precise point positioning (10 – 15 cm within 15 min.). It can be stated that the initial EUREF-IP Pilot Project is developing to an EUREF-IP Service. G. WEBER is asked to formulate a proposal for a resolution at the coming London-Symposium to switch from the EUREF-IP Pilot Project to an official EUREF-IP Service.

The NTRIP version 2.0 is ready for implementation, a detailed documentation will be available mid of 2007. An IGS Real Time call for participation was responded by EUREF, offering access to real time observation streams, real time clocks, high-rate RINEX and software resources. G. WEBER will contribute to the formulation of the call for participation of RT-IGS, expected in 6 – 9 months.

A practical application will possibly be found in AFREF, in the moment 3 stations are operated on the African continent (Sao Tome, Addis Abeba, Giza).

Finally the TWG asks C. BRUYNINX to prepare the publication of the EUREF-IP White Paper on the EPN website. G. WEBER will formulate a short text for the corresponding EUREF mail.

## 17. RT activities at GOP – present and outlook

J. DOUSA presents a report on the real time (rt) activities of the GOP (Geodetic Observatory Pecny, Czech Republic). The GOP is active in real time analysis as well as submitting products. Currently several real time streams are provided including ultra rapid orbit determination. As recent improvements are to be mentioned in particular

- switch to official Bernese V5.0 (source modified);
- revised network configuration and processing startup;
- parallel analysis using clusters (4 CPUs & 2 PCs);
- handling of unhealthy satellites, manoeuvres in analysis;
- ambiguity fixing (in 6 hour sessions);
- estimated ionosphere model supporting ambiguity resolution;
- real-time data supported from RT-IGS;
- datum definition: fiducial sites are iteratively checked;
- new IGS standards (since Nov 2006).

As next step the GLONASS rapid solution will be installed.

J. DOUSA states that the EPN could provide real time products very well e.g. for station behaviour monitoring, GPS meteorology for numerical weather prediction (NWP), hazard monitoring etc.

G. WEBER means that rt application is especially useful for short-live products while for the traditional EPN products long term resolutions should be used. It is agreed that J. DOUSA and G. WEBER will work together on these topics and report on their finding in detail at a next meeting.

## 18. Status report of the SP Troposphere

In the following W. SÖHNE gives his status report on the Special Project Troposphere. With a summarizing chronology, he remembers the development of the project. The first solutions were carried out in GPS week 1108, 4 LACs (ASI, BKG, COE, UPA) contributed with their data. In the meantime about 300 weeks have passed and numerous changes were introduced such as new reference frames, software and processing strategies. The number of participating LACs has increased considerably. The analysis shows that still various jumps and periodic signals may influence the accuracy of the results. The EPN CB implemented the plots into the web to demonstrate the findings. The TWG asks W. SÖHNE to prepare a more detailed report to the London-Symposium.

## 19. Trimble Dimension 2006 conference

A short report on this conference is given by E. BROCKMANN. G. WEBER proposes to urge the relevant companies to include the freely available EPN stations into their rtk files. By this way the reliable EPN stations could help to stabilize the data.

## 20. ITRF2005 and consequence for ETRF2005

Z. ALTAMIMI explains the relation between the ETRS89 and the new ITRF2005 and the influence of the new definition of the ITRF2005. The well known transformation formula by BOUCHER/ALTAMIMI has been updated as a draft version with respect to the new solution. E BROCKMANN points out that with the draft formulae an East-offset of 2 cm is visible for most of the European sites. Z. ALTAMIMI will check the transformation parameters to finalize the memo giving the transformation between ITRF2005 and ETRF2005 and to be published in the web. It is emphasized that there are differences in the vertical on the cm level depending on the use of the ITRF2000, ITRF2005 or IGS05. In principle the ITRF2005 and IGS05 should be compatible globally, however, for individual stations height differences up to some cm can occur.

## 21. Status analysis reports

H. HABRICH informs that the relevant **changes since week 1400** which are all documented in LAC mails. As changes are mentioned in particular:

- Receiver/satellite antennae: use of APCV, consideration of radome codes;

- Reference Frame: IGS05 for all analysis steps, alignment to ITRF2005 and subsequent transformation to ETRF2005;
- Ocean tidal loading (OTL) model update to FES2004;
- Estimation of horizontal troposphere gradient parameters;
- Use of low-elevation data (down to 3 degrees) is permitted.;
- Inclusion of GLONASS observations is permitted.

Then H. HABRICH explains the activities since the last TWG meeting concerning the **EPN long-term solution for ITRF2005 densification.**:

- definition of discontinuities (solution numbers) and outliers primarily according to ITRF2005;
- realization of reference frame through ITRF2005;
- long computing time of MCC solution (> 3 h) avoided by intermediate combined free network solution;
- all outstanding residual and singularities in multi-year solution removed.

For the next TWG meeting H. HABRICH will provide an evaluation between using the ITRF2005 or the IGS05 as reference solution respectively for EPN weekly combined solutions.

The last item of the **near real time analysis** was discussed in detail at the last TWG meeting, too. At present the daily combination is in test phase, daily SINEX files the data from WUT and BKG are available. NKG announced the submission with the current week. as next step more LACs will be asked to deliver daily SINEX files with short latency.

## 22. EPN time series analysis after ITRF2000

A. KENYERES states that the introduction of the ITRF2005 implies an overall improvement for the reliability. Inconsistencies are expected due to the reference frame alignment (crd&vel; NUVEL) as well as the change from relative to absolute phase center variations (time series discontinuities at week 1400).

## 23. EUVN\_DA: preparation for closing

A. KENYERES explains the website of the EVRS, a map of the presently available levelling data in Europe to be used for the EVRS is shown. There exists an agreement to connect the British main island with the continent by a new channel connection.

J. IHDE explains that the data policy is not yet clear, in several cases the access to levelling data is still restricted. It is agreed that A. KENYERES prepares a relevant report for the coming 2007 EUREF Symposium in order to discuss this problem with the plenary.

## 24. Status of EVRS2007, ECGN

J. IHDE informs on the present status. Up to now not all countries responded to the questionnaire. According to the time schedule a decision about the EVRS level, tide system

and sets of parameters should be found at the EUREF Symposium 2007. In the following the full parameter determination with EGG07 and IVRS realization is planned for Sept. 2007 and the concluding distribution of results to the participating countries for the end of 2007.

#### **25. Next TWG meeting**

The next TWG meeting will take place as usual the day before the EUREF Symposium, i.e. on June 5, 2007, in London. Further H. HORNIK will send out an e-mail to collect suggestions for the 2007 fall meeting.

#### **26. Varia, summary and action items**

J. SIMEK gives a brief report on an EUPOS Meeting in Nov. 2006. He explains that EUREF should undertake more efforts to inform the public and in particular the EUPOS community on the activities in real time positioning. The TWG asks J. SIMEK as EUREF-delegate in EUPOS to

explain there the activities of EUREF and make clear that there is no competition between EUREF and EUPOS, but both organizations should aim at a cooperation for the benefit of both.

Concerning the request of EUPOS to the TWG for guidelines for reference frame fixing, EUREF will assist EUPOS in fixing national blocks to get a homogeneous ETRS89 based frame.

Concluding the action items collected by H. HORNIK are projected. The file will be distributed among the TWG by e-mail circular immediately after the meeting.

Closing the meeting, the TWG chairman Z. ALTAMIMI expresses the heartfelt thanks of the TWG to the IPG, especially to H. KOL and M. VASCONCELOS, for the excellent organization and hospitality.