

## XXXIII<sup>th</sup> Meeting of the EUREF Technical Working Group in Frankfurt a.M., November 10 – 11, 2003

Meeting place: Bundesamt für Kartographie und Geodäsie (BKG), Villa Mumm, Großer Sitzungssaal  
Begin: 10.11.2003, 14.00 am; end: 11.11.2003, 12.00 am.

### Agenda

1. Minutes of the 32nd TWG Meeting in Toledo
2. EUREF and IAG New structure
3. EUREF Terms of Reference and member countries
4. Armenian stations in EUREF
5. European IGGOS and the 6th Framework Programme
6. IERS Workshop on co-locations
7. EPN status
  - Network
  - Update of EPN guidelines
8. EPN Local Analysis Center Workshop Graz
9. EUREF-IP Special Project
10. EUREF-Troposphere Project
11. European Velocity Field
12. Status of the Time Series Project
13. Status EUVN densification
14. Status of the ECGN
15. EUPOS Project
16. Work Schedule of the ExG Geodesy of EuroGeographics
17. Short report of EuroGrid workshop
18. Varia
  - Cooperation EUREF & European Geoid Project
  - COST716
  - ESEAS
  - EUREF webpage
  - Next TWG meeting

### Participants

ZUHEIR ALTAMIMI, Paris (Chairman)  
ELMAR BROCKMANN, Berne  
CARINE BRUYNINX, Brussels  
ALESSANDRO CAPORALI, Padova  
DENISE DETTMER, Frankfurt (guest) (10.11.)  
WERNER GURTNER, Berne  
HEINZ HABRICH, Frankfurt (perm. guest)  
BJØRN HARSSON, Honefoss  
HELMUT HORNIK, Munich (Subcomm. Secretary)  
JOHANNES IHDE, Frankfurt  
AMBRUS KENYERES, Budapest

JAAKKO MÄKINEN, Helsinki  
HANS VAN DER MAREL, Delft  
BERND RICHTER, Frankfurt (guest) (10.11.)  
HERMANN SEEGER, Bad Neuenahr – Ahrweiler (perm. guest)  
JAROSLAV SIMEK, Prague  
WOLFGANG SÖHNE, Frankfurt (guest)  
GÜNTER STANGL, Graz (perm. guest)  
JOAO AGRIA TORRES, Lisbon (Subcomm. President)  
GEORG WEBER, Frankfurt (10.11.)

## Minutes

Remark: The presented papers and view graphs can be received, as far as available, on request from the EUREF secretary. Furthermore, some texts are published on the EUREF homepage ([http://www.euref-iag.net/html/twg\\_meetings\\_documentation.html](http://www.euref-iag.net/html/twg_meetings_documentation.html)).

The new elected TWG chairman, ZUHEIR ALTAMIMI, opens the XXXIII<sup>th</sup> meeting of the EUREF TWG in Frankfurt a.M. He thanks JOHANNES IHDE as representative of the Bundesamt für Kartographie und Geodäsie (BKG) for the invitation and arranging the meeting in the BKG. Z. ALTAMIMI welcomes especially the new TWG members, ELMAR BROCKMANN and JAAKKO MÄKINEN, as well as the guests who were invited to give reports on special topics.

The agenda was distributed among the TWG members by mail and is adopted by the plenary after some small additions.

### 1. Minutes of the 32nd TWG Meeting in Toledo

The minutes of the XXXII<sup>th</sup> TWG Meeting Toledo, June 3, 2003, are accepted after some small corrections. The text can be found in the EUREF homepage (<http://www.euref-iag.net/TWG/EUREF%20TWG%20minutes/TWG%202003%20Toledo%20minutes.pdf>).

### 2. EUREF and IAG New structure

Z. ALTAMIMI explains the new structure of the IAG as concluded at the last IUGG General Assembly in Sapporo, 2003<sup>1</sup>. The IAG now comprises 4 commissions, one of which is Commission I – Reference Frames (President H. DREWES), subdivided into subcommissions such as Subcommission 1.3 – Regional Reference Frames (President Z. ALTAMIMI). EUREF is part SC 1.3.a of this subcommission. Others parts are South/Central America, North America, Africa, Asia-Pacific, Antarctica, Interaction of Celestial and Terrestrial Reference Frames. Moreover, an Inter-Commission Project IC-P1.2 – Vertical Reference Frames (joint with Commission II), chaired by J. IHDE has been installed.

Z. ALTAMIMI emphasizes that the SC 1.3.d AREF – Africa urgently needs the support of the other groups which are already well experienced in installing and maintaining continental reference frames. The African continent is still more or less a white spot on the geodetic world map with only very few reliably working observatories for any kind of geo-research.

The Subcommissions 1.2 – Global Reference Frames and 1.3 – Regional Reference Frames interact in a common working group for the worldwide promulgation and use of the ITRF for any kind of application.

### 3. EUREF Terms of Reference and member countries

The activities of the EUREF Subcommission refer items such as EPN, UELN, EUVN\_DA, EVTRS2000, velocity field, ETRS89, ITRF, IGGOS, GALILEO, public activities (symposia, WWW, publications). The general terms of reference concerning IAG Commission I – Reference Frames are compiled in <http://www.gfy.ku.dk/~iag/HB2004/part2/2x13-IAG-com1.pdf>.

J. TORRES remembers the request of the IAG to define officially the member states of EUREF. At present the IAG has 29 full members in Europe and 4 associate ones without voting rights. Some few states are not member of the IAG at all, but participate in EUREF.

On the other hand, EUREF is also intensively connected with EuroGeographics. This European wide acting organization comprises active, associate and pending members. The member lists of IAG and EuroGeographics within Europe are nearly, however, not exactly identical. Some very few states (Belarus, FYROM/Macedonia, Ukraine) belong neither to IAG nor to EuroGeographics, but participate in EUREF. Naturally the work of EUREF refers Europe at all and no state should be excluded, however, the participating countries should also be obliged to contribute as far as possible to the common organizational tasks. An other point of view is the fact, that an active cooperation contributes more to a common goal than a mere official membership in a group. Similarly states which are not geographically located in Europe (e.g. Armenia, Israel, Morocco) are interesting for the goal of EUREF and thus included in EUREF e.g. by EPN stations. Therefore the question of memberships has still to be discussed.

Z. ALTAMIMI reports that especially in Ukraine considerable activities in space geodesy are going on. In all, 4 SLR sites, 1 for VLBI and 8 permanent GPS stations are available, some sites could usefully be employed for co-location. However, the systems have to be upgraded and modernized and some help by other countries is needed.

Z. ALTAMIMI emphasizes that the terms of reference for the EUREF Subcommission have to be completed and submitted to the President of Commission I, H. DREWES. J. TORRES is asked to prepare together with B. HARSSON and H. HORNIK a draft and circulate it for discussion.

### 4. Armenian stations in EUREF

W. GURTNER remembers a letter by L. JIVALL, Sweden, about a number of stations in Armenia which possibly could be evaluated and included in EUREF. It was suggested to present a observation campaign basing on the usual procedure in EUREF. Up to now that was not done. Z. ALTAMIMI is asked to contact the Swedish colleague and encourage her to continue the earlier efforts.

<sup>1</sup> Detailed information on the new structure of the IAG can be found in the net with <http://www.iag-aig.org/> or <http://www.gfy.ku.dk/~iag/HB2004/newsun.htm>.

## 5. European IGGOS and the 6th Framework Programme

Z. ALTAMIMI remembers a recent meeting in Munich<sup>2</sup> on this topic at which several colleagues engaged in EUREF participated. For the present period, C. REIGBER is chairman of new IAG-Project IGGOS (Integrated Geodetic and Geodynamic Observing System). At the meeting especially the interactions with other groups e.g. oceanographers were discussed, a proposal was worked out. As conclusion it was stated that IGGOS can only be successfully managed in cooperation with all disciplines working in this field. A letter signed by C. REIGBER, B. RICHTER and H.-P. PLAG was formulated and sent to the EU Technical Commission expressing the interest and need for cooperation as well as data.

W. GURTNER approves this statement and adds that the requirements for IGGOS are so large that the geodetic community (or others) never can do it alone, so a close cooperation with other groups working on the field of georesearch is indispensable, otherwise it would make no sense to invest time and money. The IAG services will participate in IGGOS, therefore the EUREF Subcommission, which fulfills partly the structure of a service, should do so, too. B. RICHTER adds that up to now there is no adequate core group within Europe, so such a group should be formed and EUREF could take over an important role in the organization.

J. TORRES is asked to organize the further steps for the participation of EUREF in the IGGOS Project.

## 6. IERS Workshop on co-locations

Z. ALTAMIMI reports on the IERS Workshop on Site Colocations in Matera, October 23 - 24, 2003 ([http://www.iers.org/workshop\\_2003\\_matera/programme.html](http://www.iers.org/workshop_2003_matera/programme.html)). The meeting was subdivided into 5 sessions: co-location sites and their importance for the ITRF, site surveys, analysis and SINEX, reporting and archiving, planning for 2004. To each session a number of recommendations were formulated. At present the quality of the station coordinates derived from the various space techniques ranges in the order of a few millimetres in the horizontal and about 1 cm in the vertical component. However, systematic influences of the individual techniques may induce a limiting factor for the accuracy. A possible method to improve the reliability for a unique, high-precision terrestrial reference frame is the use of colocations, i.e. stations in which different techniques are used and compared. Precise local ties are the perfect link to enable a rigorously combination of all space observing techniques by their common parameters. Up to now unfortunately only 4 stations involved in the IERS are using at least 4 techniques (SLR, VLBI, DORIS, GPS). The local ties should be determined reliably with an accuracy of at least 1 mm, these measurements have to be repeated regularly and be part of the preprocessing with the same importance as space geodetic solutions. For the practical

realization of this important tool the relevant records should be also put into the IERS data base.

## 7. EPN status

### Network / Update of EPN guidelines

C. BRUYNINX distributes an overview on this item. She expresses her complacency on the fact that now in Great Britain three EPN sites are available.

Another paper contains the updated guidelines for permanently observing GPS stations which should become EPN sites. The new guidelines now describe clearly the procedure and necessary conditions which are to be fulfilled. A EUREF mail has been sent out informing on this item. C. BRUYNINX points out that, besides the useful geographic sites distribution, a really long term commitment is absolutely necessary. An observation period over some months only cannot contribute basically to the EPN, such attempts only cause work and confusion and should better be avoided. In general a serious commitment for 5 years should be aimed as such a period normally can be guaranteed.

## 8. EPN Local Analysis Center Workshop Graz

H. HABRICH informs on the 4th EPN LAC Workshop, 18-19.9.2003, Graz (minutes cf. [http://www.epncb.oma.be/\\_newsmails/workshops/EPNLACWS\\_2003/minutes.html](http://www.epncb.oma.be/_newsmails/workshops/EPNLACWS_2003/minutes.html)). 28 colleagues from 13 nations took part, 14 of altogether 16 LACs were represented. The objectives of the workshop were: review of the last 2 years work by reports of all contributors, discussion about the participation in current and future projects, improvement of processing strategy and options, examination of current and future direction of the EPN. A number of recommendations was formulated (see the internet address). The question whether to compute further on daily and weekly solutions is discussed intensively. Normally weekly solutions should be sufficient, daily solutions, however, allow a better insight for distortions and data jumps and could serve as valuable data for the time series group.

## 9. EUREF-IP Special Project

D. DETTMERUNG informs on the recent development of real time GPS issues<sup>3</sup>, a short paper is distributed. Meanwhile in Europe up to 1500 users are using the tool, 11 sites provide data in realtime. At present only 10 EPN stations deliver their data to the EUREF-IP service whereas e.g. in the IGS a large number of stations is already involved. The EPN sites represent highest quality, so it would be useful to include more sites into this project and thus make EUREF more known in the community of users. Omnistar which operates about 100 sites has asked for permission to be linked to the EPN and use the data. G. WEBER emphasizes that a general strategy for this topic has to be developed soon considering the free resp. restricted use of EPN data by the public, including commercial users. It has to be

<sup>2</sup> Another meeting took place in Potsdam in January 14, 2004. The European IGGOS is called now "EPIGGOS".

<sup>3</sup> For more detailed information cf. e.g. [http://www.epncb.oma.be/euref\\_IP](http://www.epncb.oma.be/euref_IP), [http://igs.ifag.de/index\\_ntrip.htm](http://igs.ifag.de/index_ntrip.htm), [http://igs.ifag.de/ntrip\\_down.htm](http://igs.ifag.de/ntrip_down.htm).

reflected whether some NMAs could not allow such a use, on the other hand it is basically concluded that EPN data should be freely accessible.

G. WEBER is asked to present this item again to the next TWG meeting.

### 10. EUREF-Troposphere Project

W. SÖHNE presents a short paper on this item. 16 Local Analysing Centers contribute to the project by delivering troposphere parameters in 2 hours intervals. Some interesting test computations were presented at the recent LAC Workshop in Graz (cf. topic 8). A comparison with the results produced by the IGS was fitting rather well.

### 11. European Velocity Field

Referring on his presentation in Toledo, Z. ALTAMIMI mentions some new items to this topic. For an efficient data handling, the CATREF (Combination and Analysis of Terrestrial Reference Frames) software has been installed at the EPN CB. A weekly solution for the station velocities referred to the ETRS89 is done in the EPN. The thorough analysis shows about 100 discontinuities which have to be analyzed in detail. For a better insight it is proposed to use also other accurate non-EPN permanent stations for comparison. The British Ordnance Survey has announced to contribute on a regular basis with about 30 stations, some of which are included in the EPN already.

C BRUYNINX suggests to compare the results with those of the Time Series Group chaired by A. KENYERES. Moreover the findings should be published regularly in the web to urge the station masters for investigating possible station discontinuities which could pretend terrain/plate movements but in reality are due to local influences. This regular contact is rather important to guarantee an utmost accuracy of the EPN coordinates.

### 12. Status of the Time Series Project

A. KENYERES gives a short report on the progress. Z. Altamimi points out that different quality estimation strategies exist and should be evaluated. A. KENYERES, C. BRUYNINX and H. HABRICH will prepare a proposal (e.g. format, strategy) to be presented at the next TWG meeting.

### 13. Status EUVN densification

A. KENYERES reports on the first part of the project, i.e. the data collection. All data will be stored in the EUVN data center in Leipzig. Although up to now the amount of new available data is rather small, it is hoped to finish the data collection till December 2003. To accelerate the procedure the call for data will be renewed. For France, Z. ALTAMIMI will contact B. GARAYT to deliver the available data. The Fennoscandian countries have been rather active and therefore could give a valuable contribution to the progress of the work. An updated detailed report will be presented at the next TWG meeting.

### 14. Status of the ECGN

In a short review J. IHDE summarizes the development of the European Combined Geodetic Network (ECGN) in the recent two years. According to the new IAG structure, the ECGN is now assigned to Subcommission 1.3 as well as Commission Project 2.1. On April 1, 2003 a call for participation was sent out to about 150 addresses of NMAs, universities, institutes and individuals. From September 2-3, 2003 the 1st ECGN Working Group Meeting took place in Frankfurt. At the meeting the guidelines and the necessary steps to proceed in the project were discussed (see also <http://www.ifag.de/ecgn/titel4.htm>). As mandatory criteria for ECGN stations the inclusion in the EPN as well as other permanent observations such as absolute gravity, UELN or tide gauge was expressed. Local ties (see also topic 6) are to be measured with utmost accuracy and reliability.

About 90 stations in 19 countries were proposed, finally about 50 (37 are part of the EPN) of them were selected to be part of the ECGN. Some countries asked for financial support to take part in the campaign, however, at present the funds are too limited to give any support. A sample letter concerning the requirements for the stations is distributed. To some sites the label "core station" is given, these should have already long data records and be equipped with permanent GPS, (absolute) gravity measurements, and, as far as they are located at a coast, tide gauge observations and TIGA (GPS Tide Gauge Benchmark Monitoring).

In the next 2 months the data base should be installed and filled up with data. A next call for participation including descriptions of items such as methodology and analysis will be distributed at the end of 2003, the start of the project is planned for begin of 2004. J. IHDE expresses his hope to especially involve the countries of Eastern Europe into this project and thus into a common European cooperation. In the same, the work should be carried out by all participating groups together.

Concerning the UELN adjustment, J. IHDE states that after a rather long period of data collection this project is going now to be finally completed. The Bulgarian data now are included into the data base. Russia, after long attempts and negotiations, did not yet definitely decide to deliver the data, but there is still some hope. Greece and Turkey still remain a problem as the data are restricted.

### 15. EUPOS Project

J. SIMEK distributes a paper on this new European initiative EUPOS (European Position Determination System) (see also <http://www.eupos.org/eupos-menu.html>). The initiative comprises mainly the East European countries, at present 15 states take part. Russia announced to participate with numerous sites, some of which located in Asia (extending till the Russian island in the Pacific). The system should be similar to the German SAPOS (Satellitenpositionierungsdienst der deutschen Landesvermessung) and be based on ETRS89 and differential DGPS positioning as well as the future Galileo system. EUPOS will provide DGNSS information on several levels of accuracy for the positioning of geodetic control points and for land, air and marine navi-

gation. In order to accelerate the work, the already existing infrastructure should be used.

Z. ALTAMIMI points out that under these instructions it would be a waste of time and personnel to install a new system, but a combination of EUPOS with the already existing and well defined infrastructure of EUREF would be obvious. W. GURTNER agrees with this statement and asks J. SIMEK and A. KENYERES as members of the TWG and colleagues being involved in EUPOS to expressly point out within the EUPOS community that besides of these great intentions the work should be really based on a realistic level which could be given by EUREF. The chance to receive funds from the EU are rather low at the moment as the budgets are decreasing and new projects are hardly accepted.

### 16. Work Schedule of the ExG Geodesy of Euro-Geographics

As new chairman of the ExG-G (EuroGeographics Expert Group for Geodesy) J. IHDE distributes a draft working plan for the group. In the morning before the TWG meeting a meeting was held and the future strategy discussed. As main topics the definition of the terms of reference similar to those for EUREF to identify the goals of the work and to define bylaws and relationship between the ExG-G and EUREF on both sides are to be stated. Considering the discussion on geodetic infrastructure and GIS in the EU, the working plan should be adjusted to these requirements. As numerous items of the ExG-G are close to EUREF, this well functioning group could easily serve as platform. A next meeting will be held in December 2003 in Paris.

The future work should especially consider the information for non geodesists working in GIS, navigation, cartography etc. about geodetic control station information (EPN, GPS campaigns, development of exchange of station coordinates, quality concept for control stations). The relation of CRS and GIS has to be pointed out to express the need of a geodesy as basis for the development of a functioning GIS. Another item is the supply of clearly described transformation procedures between the ETRS89 and local/regional/national coordinates systems. Moreover the importance of the gravity field and its realisation by a geoid has to be made clear.

It is pointed out that much knowledge is stored in EUREF, so especially the EUREF homepage should be updated and linked to EuroGeographics to help to improve the lack of information.

### 17. Short report of EuroReference Grid workshop

J. IHDE informs shortly on the last workshop. As mentioned in the topic before, the general knowledge on the fundamentals is rather low in the user community. So also in this context EUREF could give much help to improve the information about reference systems, standard procedures for transformations, projections etc. It is pointed out that the

ETRS89 is recommended to serve as reference all over Europe, so EUREF should try to stimulate its use.

## 18. Varia

### a) Cooperation EUREF & European Geoid Project

Due to the changes of the IAG structure, the former Geoid Commission does not exist any longer. A. KENYERES informs on the new organization comparable to the EUREF Subcommission. The group in which more or less the same people as before are gathered will continue most of the projects. It is intended to install also subgroups e.g. for the European Geoid. The work for the European Geoid is coordinated at present by H. DENKER, Hannover.

### b) COST716

H. V. D. MAREL distributes a summarizing paper on COST-716 – NRT GPS Integrated Water Vapour Network. The initiative, started in September 1998 and terminated till January 2004, aims at the exploitation of ground-based GPS for climate and numerical weather prediction application for Europe. A final workshop will be held in De Bilt/Netherlands from December 1-3, 2003. Detailed information can be found in <http://www.oso.chalmers.se/~kge/cost716.html> or <http://www.knmi.nl/samenw/cost716/>.

### c) ESEAS

ESEAS (European Sea Level Service)<sup>4</sup> has expressed the desire to have a permanent observer from the EUREF Subcommission in its governing board. H. HABRICH who already had contact with ESEAS is asked to clear up the tasks which an observer should fulfill, then it should be decided whether an observer is to be nominated.

### d) EUREF webpage

J. TORRES informs that the old address of the EUREF webpage has not been made safe sufficiently and now others are using the original domain. For making the EUREF homepage accessible again a new intermediate address at the Portuguese Geographic Institute has been installed by the webmaster J. CARDOSO. Although some bureaucratic procedures have still to be fulfilled, it is hoped to re-install the old address in the next future<sup>5</sup>.

### e) Next TWG meeting

A. KENYERES invites the TWG to hold the next meeting in Budapest. The TWG members thank for the invitation, the meeting is fixed for Monday, March 22 – Tuesday, March 23, 2004. As usual the meeting will start at noon and end at noon, too. The EUREF Secretary will inform all TWG members on this next meeting.

<sup>4</sup> See also <http://www.eseas.org/index.html>

<sup>5</sup> The original address could unfortunately not be reinstalled again. Therefore a new address was created, the EUREF homepage is accessible now by <http://www.euref-iag.net/>.