

XXXIIth Meeting of the EUREF Technical Working Group in Toledo, June 3, 2003

Meeting place: Hotel María Cristina, conference room

Begin: 03.06.2003, 9.00 am; end: 03.06.2003, 18.00

Agenda

1. Minutes of the 31st TWG Meeting in Paris
2. Nominations for a new TWG chairman
3. Campaign validations
 - Re-computation of the Slovenian EUREF campaigns 1994-1996: Confirmation
4. Status EPN
 - Network
 - Data flow
 - Analysis
5. Status Troposphere Project
6. Status Realtime Project
7. Status European Combined Geodetic Network
8. Status EUVN densification action (EUVN_DA)
9. Time Series
10. Validation of the EGNOS/GALILEO troposphere model using EUREF's tropospheric product
11. European Velocity Field
12. ETRS89-Certification of non-EUREF Permanent Stations: Guidelines
13. An alternative approach to the realization of the EVRS
14. Future Height Systems in the Nordic Countries
15. EUREF and CERGOP-2
16. ESEAS: Permanent observer
17. Activities of the “EuroGeographics Expert Group Geodesy” (ExG-G)
18. Protection of the EUREF name
19. EUREF Symposium 2003
20. Election of a new TWG chairman
21. New TWG members
22. (Re-)Nomination of J. Torres for EUREF president
23. Varia
 - GPSVel: Open issues
 - Next TWG meeting
 - SCIGAL

Participants

JOZSEF ADAM, Budapest
 ZUHEIR ALTAMIMI, Paris (perm. guest)
 WOLFGANG AUGATH, Dresden
 CARINE BRUYNINX, Brussels
 JAVIER GONZÁLEZ-MATESANZ, Madrid (guest)
 ERICH GUBLER, Berne-Wabern (delegate of Euro-Geographics)
 WERNER GURTNER, Berne (Chairman)
 HEINZ HABRICH, Frankfurt (perm. guest)
 BJØRN HARSSON, Honefoss
 HELMUT HORNIK, Munich (Subcomm. Secretary)
 JOHANNES IHDE, Frankfurt (perm. guest)

AMBRUS KENYERES, Budapest
 JAAKKO MÄKINEN, Helsinki
 HANS VAN DER MAREL, Delft
 JAROSLAV SIMEK, Prague
 HERMANN SEEGER, Bad Neuenahr – Ahrweiler (perm. guest)
 GÜNTER STANGL, Graz (perm. guest)
 JOAO AGRIA TORRES, Lisbon (Subcomm. President)
 GEORG WEBER, Frankfurt
 PETER PESEC (guest)

apologized: ALESSANDRO CAPORALI, PADOVA

Minutes

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

The TWG chairman, W. GURTNER, opens the XXXIIth meeting of the EUREF TWG in Toledo and thanks JAVIER GONZÁLEZ-MATESANZ as representative of the Spanish Instituto Geográfico Nacional for the invitation and arranging the meeting. W. GURTNER welcomes especially the guests J. MÄKINEN and P. PESEC 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 XXXIth TWG Meeting in Paris

The minutes of the *TWG Meeting Paris, March 6–7, 2003*, are accepted after some small corrections. The text will be put into the EUREF homepage (<http://www.euref-iag.org/>).

2. Nominations for a new TWG chairman

The TWG chairman, W. GURTNER, announces his desire to retire from this function. A nomination committee (GUBLER, HORNIK, TORRES) is formed to collect proposals. The proposals are to be presented to the plenary of the following symposium for the election of a new chairman.

3. Campaign validations

– Re-computation of the Slovenian EUREF campaigns 1994-1996: Confirmation

A detailed report on the EUREF-Slovenia-94/95/96 solution had already been presented and discussed at the last TWG meeting in Paris. The results had been accepted as improvement and extension to EUREF-89 on class B standard (about 1 cm at the epoch of observation). The solution will be presented to the plenary of the symposium to be confirmed in a resolution. Some items in the text which have

not been formulated sufficiently clear still should be improved. H. V. D. MAREL is asked to re-read the text to be published in the proceedings and to improve some sentences to make the contents clearer and avoid all misunderstandings.

4. Status EPN

– Network

C. BRUYNINX presents her report on the EUREF Permanent Network (EPN). Using the EPN example it is shown how the quality of a principally perfect time series is degraded by the loss of signals below an angle of 15°.

Concerning the adoption of new EPN sites it is stated that new stations are accepted if they fulfill the guidelines and are located more than 300 km far off from the next neighbouring sites. However, stations located in a shorter distance may be accepted if they deliver hourly data or contribute to a special project (e.g. tide gauges, EUREF-IP, ECGN, GPS and GLONASS together, time laboratories). C. BRUYNINX proposes that the TWG should approve these aspects as new EPN guideline to stimulate the multi-disciplinary character of the EPN. In the discussion it is emphasized that a restriction for the number of EPN stations is necessary, however, any station can be accepted if it gives a considerable benefit for EUREF. In any case the long term maintenance on a high accuracy level has to be guaranteed for each station which is included in the EPN.

– Data flow

G. STANGL gives a short report on the data flow and data processing.

– Analysis

H. HABRICH shows various statistics on the EPN solutions. At present about 6 sites show doubtful results which need to be investigated especially for possible receiver and antenna variations. In order to improve the results detailed tests for all used receiver types and varied options to fix

antenna centers were performed. The findings fit with the investigations of M. ROTHACHER and will be discussed at the next LOC workshop in Graz in autumn 2003.

Another investigation on coordinates related to the ITRF99 and ITRF2000 respectively shows differences up to 5 cm. Therefore all users should be informed about this fact when deriving coordinates. H. V. D. MAREL remarks that for normal applications such as cadastre, coordinates principally should refer to the ETRS89 and must not always be changed when a new ITRF is installed. B. HARSSON adds that meanwhile in Norway newly observed coordinates differ up to 15 cm to the respective ETRS89 values, but generally are reduced by suitable formulae because nobody would accept the ETRS anymore if it would urge a permanent change of coordinates. E. GUBLER mentions that a similar procedure is used in Switzerland. W. GURTNER remarks that originally the ETRS89 covered only the rigid plate part of Europe and the internal motions were considered to be neglected. Meanwhile EUREF has considerably spread over this area and it also has become clear that internal motions exist although these are significantly smaller than plate motions. Moreover it has to be reflected whether a frame should move with the relevant rigid plate or be related to a global system. Z. ALTAMIMI offers to produce a suitable text for the EUREF homepage. Moreover a special report on this item should be prepared for the next meeting.

5. Status Troposphere Project

G. WEBER distributes a short written report. Since GPS week 1203 the EPN weekly combined troposphere solution is included in the IGS troposphere combination. About 40 sites are included in the IGS as well as in EUREF.

6. Status Realtime Project

W. GURTNER remembers resolution no. 3 of the symposium in Ponta Delgada¹ in which the need for European-wide improved real-time positioning and navigation as well as the capability of the EPN to provide reliable and standardised real-time data is stated noted and the TWG is asked to contribute to a differential GNSS infra-structure. Various

¹ Resolution No. 3

The IAG Subcommission for Europe (EUREF)

noting

- the growing need for European-wide improved real-time positioning and navigation
- the recent developments in the interconnection of mobile communication and the Internet

considering that the EUREF Permanent Network (EPN) infrastructure is capable of providing reliable and standardised real-time data

following current efforts within the International Association of Geodesy (IAG) towards real-time data dissemination

asks

- the EUREF Technical Working Group to set up and maintain a differential GNSS infra-structure based on selected EPN stations through the Internet
- the member countries to support this new activity by the necessary upgrade of the respective EPN stations.

activities have been undertaken and first responses by member countries who agree to their registration for providing to this project arrived. At present 11 stations are involved in the project and deliver their data.

G. WEBER mentions that in the German GREF 25 real time stations exist, in the SAPOS one site is operating now. In all about 90 data streams in Europe are already existing. It is mentioned that the functioning of this structure depends on the internet, i.e. the data streams are blocked if a disturbance in the internet occurs.

H. V. D. MAREL emphasizes the increasing importance of the real time data delivery which is also a challenge and chance for EUREF. The IGS has also installed a working group to deal this subject. G. WEBER points out the necessity to work on a common standard, so the permanent contact to private producers as well as possible users has urgently be searched.

7. Status European Combined Geodetic Network (ECGN)

J. JHDE distributes an overview listing the responses on the 1st call for participation from March 2003 when the ECGN group was formed (http://www.bkg.bund.de/ecgn/pdf/ECGN_first_call_190303.pdf). In all, about 170 agencies or persons, representing all interesting special fields (horizontal networks, levelling, gravity, tide gauges, meteorology) have been contacted. It is emphasized that within the ECGN not a totally new network should be installed but mostly already existing data be used. Hereby an utmost accuracy for local ties and eccentricities is demanded. The proposed stations must not necessarily be part of the EPN if they prove to deliver useful and accurate data. J. JHDE emphasizes again that the project has to be pushed forward strictly, otherwise no progress can be reached within an adequate time and the participating agencies would lose their interest. He mentions the excellent proposal by Switzerland which could be used as example for other countries.

The first official meeting of the ECGN Working Group will take place in September 2003. For October/November the dispatch of a second circular is foreseen.

8. Status EUVN densification action (EUVN_DA)

A. KENYERES explains that various working plans have been developed how to coordinate absolute gravity measurements with the goals of EUREF. J. JHDE mentions the numerous activities in the field of absolute gravity and states that in principle sufficient much data would be available, however need to be coordinated and distributed. The EUVN densification action was started in April 03, the data collection is planned to be finished till end of 2003. New field work (GPS, levelling) should be completed till early 2006 and then till mid 2006 the data base be made available. A. KENYERES states that the activities will be concentrated to those countries which are really willing to participate. Up to now about 12 countries have declared to contribute to the project. The data analysis will mainly be done in the BKG, A. KENYERES expresses his thanks for this great help.

He mentions that one of the results of the EUVN densification should be an improvement in accuracy and reliability of the geoid. J. IHDE adds that in the EUVN obviously some weak regions exist, further the agreement between GPS and levelling data is not always as good as expected. So the EUVN-DA could give important insights and help to clarify up to now unsolved problems.

9. Time Series

Concerning his activities on this topic A. KENYERES explains a map of station velocities derived from time series. The vector field fits obviously good with the NNR Nuvell1a model if one considers that the EUREF values are related to the Eurasian Plate. The vector field clearly shows the edges of the European Plate. This central plate shows a small clockwise rotation, the vectors within the plate are relatively homogeneous. In contrary to central Europe, the station vectors in the south and in the area of Island are rather large and inhomogeneous. An investigation of the vector components shows that the estimation of the height proves to be more stable than the horizontal motions. A comparison of the height components with those derived from VLBI observations as well as other GPS solutions shows partial offsets which are not yet clarified and should be investigated in detail. A relatively good fitting is got by comparing the results with those of the Fennoscandian uplift.

10. Validation of the EGNOS/GALILEO troposphere model using EUREF's tropospheric product

H. V. D. MAREL gives some comments on a study for ESA using troposphere products derived from the EPN. The actual rms values in the EGNOS range within 4 - 6 cm. H. V. D. MAREL emphasizes the importance of this experiment for improving the contact of EUREF to other groups and promote the familiarity of EUREF.

11. European Velocity Field

As objectives Z. ALTAMIMI explains:

- long term maintenance of the ETRS89 (kinematic realization, 3D-PGR modelling, carefully study of local deformation and seasonal variations)
- establish a dense velocity field covering the continent
- a grid or/and formula allowing high accuracy positioning in the ETRS89
- an on going project: continuous improvement and network extension/densification

As input data are to be considered GPS time series mainly resulting from the EPN but also from other permanent networks or campaigns, further other data such as VLBI, SLR or DORIS. Special care has to be given to discontinuities in the data or seasonal variations. The combination strategy is based on

- solutions should be free from any constraints
- minimum constraints solely for frame definition
- selection of well maintained reference stations for datum definition

- raw combination to identify outliers and jumps
- rejection of outliers and efficient handling of discontinuities
- refined combination expressed in the ETRS89.

12. ETRS89-Certification of non-EUREF Permanent Stations: Guidelines

J. TORRES explains that due to the density threshold stipulated by EUREF the certification by EUREF for GPS permanent stations cannot be given to a series of GPS sites although these stations in principle fulfill all the other requirements. In order to encourage agencies and institutions for the installation and maintenance of permanent stations, such stations should be evaluated for their results according to the same criteria as are used for EPN stations and receive a certification to be on the level of EPN. For this purpose a certification group has to be installed. As benefit for EUREF a increased degree of familiarity could result and the EUREF standards would be generally used.

The TWG asks J. TORRES to start an adequate action with a small group and develop further ideas for practical application.

13. An alternative approach to the realization of the EVRS

At the last TWG meeting a proposal by J. SIMEK and J. KOSTELECKY had been presented and discussed. In the meantime the ideas were developed further on in cooperation with J. MÄKINEN from the Nordic Geodetic Commission. J. Ihde mentions that this proposal was discussed in the EUVN group. It is in agreement with the EVRS and could be developed for a global system.

The height specialists (especially J. IHDE, J. MÄKINEN, J. SIMEK) are asked to reflect on the development of further ideas and how to proceed practically. Their findings should be presented at the next TWG meeting.

14. Future Height Systems in the Nordic Countries

On behalf of the WG for Height Determination of the Nordic Geodetic Commission, J. MÄKINEN distributes a paper *Future height systems in the Nordic countries, their relation to the EVRS2000 and to INSPIRE GIS standards*. The EVRF2000 in Scandinavia is based on data from epoch 1960.0. Due to the considerable postglacial rebound and a new data set which will be available in the near future, a new EVRS2000.0 should be realized. Comparisons between GPS and levelling show in some cases disagreements, but sometimes the comparisons between two different GPS campaigns show even larger discrepancies. The careful investigation of these items should help to install an improved height system in Scandinavia as well as advance the UELN/EVRS. Moreover, the running levelling campaigns in the Baltic countries will hopefully also give a benefit to the whole system in Northern Europe.

J. IHDE remarks the obviously weak connection between Scandinavia and the neighbouring parts of Europe without any redundancies. So the availability of more data could

significantly help to analyze the problems and stimulate a new realization of an EVRF200x.

The TWG endorses a close cooperation between the Scandinavian colleagues and the TWG working groups UELN/EVRS. All relevant data should be sent to the BKG data center.

15. EUREF and CERGOP-2

P. PESEC explains shortly the objectives of CERGOP (Central European Regional Geodynamic Project) and CEGRN (Central European GPS Geodynamic Reference Network) and their relations to EUREF. At present 13 European countries participate in the project. The four analysis centers process the data according to EUREF guidelines, all data are collected in the data center Graz. As the overall site quality of CEGRN permanent stations is on EUREF standard, the data could be used as a densification of EUREF.

16. ESEAS: Permanent observer

The TWG discusses whether to send we permanent observer to ESEAS (European Sea Level Service). At the beginning B. HARSSON, later H. HABRICH participated in the ESEAS meetings as informal EUREF representatives. It is concluded to postpone this item for the next TWG meeting.

17. Activities of the “EuroGeographics Expert Group Geodesy” (ExG-G)

E. GUBLER reports on the meeting of the ExG-G the day before. He regrets that at the moment the collaboration with other groups is not as good as it should be. In his opinion the present activities and plans in EuroGeographics partially could be too optimistic. In any case, the understanding of the tasks and requests of the various groups should be improved.

E. GUBLER declares that he has got other duties which force him to retire as chairman of the ExG-G. It is proposed to nominate J. JHDE as new chairman. J. JHDE asks for time to think about and see how things develop in the near future. W. GURTNER emphasizes that EUREF should proceed on its way as up to now as it has proved to be successful. Any useful contacts to other groups should be extended and the applications of the EUREF products be offered to the geodetic community.

18. Protection of the EUREF name

B. HARSSON repeats shortly the history of his initiative to protect the name “EUREF”. After the initial protection by Norway, a notification was sent to the WIPO (World Intellectual Property Organization), Geneva, in October 2001. In May 2003 the deadline for oppositions ended. In all 25 European countries accepted or did not object. 2 countries (Germany, Spain) refused, 2 others (Ukraine, Denmark) accepted partly, Sweden informed to need still more to check the protection. The international registration number for the protection of EUREF is 764 743. The protection is valid till 2011, then the procedure has to be started again.

19. EUREF Symposium 2003

J. TORRES presents a plan of the schedule of the sessions and contributions of the EUREF Symposium 2003 which will be held in the following days. J. GONZÁLEZ-MATESANZ informs that about 110 participants are registered.

20. Election of a new TWG chairman

As already announced at the last TWG meeting (Paris, March 2003) W. GURTNER desires to retire from his function as chairman of the EUREF TWG and stay in the TWG as an ordinary member. J. TORRES informs that he received a nomination for Z. ALTAMIMI as successor. The TWG approves the nomination. The nomination has to be presented to the plenary of the EUREF Symposium and the proposal be confirmed. On behalf of the EUREF Sub-commission J. TORRES thanks W. GURTNER for his successful and engaged work over 4 years.

21. New TWG members

W. GURTNER informs that W. AUGATH will retire in the near future. E. GUBLER and J. ADAM have got new duties and desire to confer their membership in the TWG to other colleagues. A small nomination group is formed to collect proposals to be presented to the plenary of the EUREF Symposium for election.

22. (Re-)Nomination of J. Torres for EUREF president

Z. ALTAMIMI informs shortly on the planned reorganisation of the IAG. The existing sections and commissions will be dissolved and new commissions but no sections will be formed. The present Commission X within Section I will be transferred into the new Commission I – Reference Frames in which EUREF should be installed as a Sub-commission. Therefore a new president of the new EUREF Sub-commission has to be elected. It is proposed to ask J. TORRES to continue his present presidency. J. TORRES declares to accept this task under the condition that the plenary confirms the proposal. W. GURTNER and Z. ALTAMIMI are asked to inform the IAG on the election. Z. ALTAMIMI thanks J. TORRES for his engagement and efficient activities for EUREF since his election for EUREF President in 1998 and expresses his best wishes for a further successful work.

23. Varia

– GPSVel: Open issues

C. BRUYNINX informs that some campaigns are running. H. V. D. MAREL is asked to report more details to the next TWG meeting.

– Next TWG meeting

As already concluded, J. JHDE will organize the next TWG meeting in the BKG in Frankfurt from December 1 - 2, 2003 (later changed to November 10 - 11).

– **SCIGAL**

As discussed before, C. BRUYNINX has organized the publication of an article J. TORRES, C. BRUYNINX, H. V. D. MAREL: *EUREF launches SCIGAL: Earth Science Applications using GALILEO* in the journal “The Parliament Magazine”. Copies of the article are distributed. All colleagues are asked to contribute for raising some funds for the costs.

Closing the session at 18.00, the TWG chairman thanks all colleagues for their engagement and assistance during his time as chairman during the last 4 years. He expresses the best wishes for his successor for a fruitful work further on.