XXXIth Meeting of the EUREF Technical Working Group in Paris, March 6 – 7, 2003

Meeting place: Institut Géographique National, Salle Hurault, Saint-Mandé/Paris
Begin: 06.03.2003, 13.30; end: 07.03.2003, 12.00

Agenda

1. Minutes of the XXXth TWG Meeting in Delft
2. Campaign validations
   - Re-computation of the Slovenian EUREF campaigns 1994-1996
   - EUREF-SK 2001 Computation and Realisation of the Terrestrial Kinematic Reference Frame for Slovakia (Klobušiak)
   - Hungarian re-observation 2002
   - Austria 2002
   - Updated guidelines
3. ETRS89-Certification of Non-EUREF Permanent Stations
4. Status EPN
   - Network
   - Data flow, guidelines for hourly data file concatenation
   - Analysis
5. Status Troposphere Project (Short communication)
6. Status Realtime Project (Short communication)
7. Status ECGN
8. Status EUVN densification , Circular
9. ESEAS and ESEAS-RI, status with respect to tide gauge and GPS co-location
10. Near Real Time Products and Services of GOP
11. An alternative approach to the realization of the EVRS
12. EUREF Symposium 2003 Toledo
13. Maintenance of National Networks: Inquiry of Ireland
14. Support of GPSVel
15. Working document for INSPIRE
16. Protection of the EUREF name (Short communication)
17. IUGG Sapporo: EUREF Report
18. Varia
    - SCIGAL
    - Next TWG meeting
    - Next EUREF symposium

Participants

ZUHEIR ALTAMIMI, Paris (perm. guest)
SANDI BERK, Ljubljana (guest)
CLAUDE BOUCHER, Paris (06.03.)
CARINE BRUYNINX, Brussels
ALESSANDRO CAPORALI, Padova
JAN DOUSA, Prague (guest)
DUSAN FERIANC, Bratislava (guest)
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
MATEJ KLOBUŠIAK, Bratislava (guest)
HANS VAN DER MAREL, Delft
HANS-PETER PLAG, Honefoss (guest)
JAROSLAV SIMEK, Prague
HERMANN SEEGER, Bad Neuenahr – Ahrweiler (perm. guest)
GÜNTER STANGL, Graz (perm. guest)
JOAO AGRIA TORRES, Lisbon (Subcomm. President)
GEORG WEBER, Frankfurt

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 XXXIth meeting of the EUREF TWG in St. Mandé/Paris and thanks ZUHEIR ALTAMIMI as representative of the French IGN for all the invitation and arranging the meeting. W. GURTNER welcomes especially 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 XXXth TWG Meeting in Delft

The minutes of the *TWG Meeting in Delft, November 7 – 8, 2002*, are accepted after some small corrections. The text will be put into the EUREF homepage (http://www.euref-iag.org/).

2. Campaign validations

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

A detailed report S. BERK, B. STOPAN, D. RADOVAN: *The Recomputation of EUREF GPS-Campaigns in Slovenia, Status Report 7.1.2003* has been distributed by circular. Basing on this report S. BERK describes the work done. The observation and analysis of the three campaigns in 1994 (15 sites), 1995 (57 sites), 1996 (17 sites) was carried out in close cooperation with the BKG. The computations were carried out similarly to those for Croatia which were presented and adopted in 2001. In the discussion it is emphasized that the combination of data from different observation periods has to be done very carefully taking into account the point velocities for the respective time and ITRF.

The TWG accepts the results as improvement and extension to EUREF-89 on class B standard (about 1 cm at the epoch of observation). The coordinates including the station descriptions are to be submitted to the EUREF Data Center (H. V. D. MAREL). The station coordinates in the data bank derived from older campaigns should be replaced by the new ones. The report should be presented to the plenary of the Toledo 2003 Symposium including a clear description of the point velocities for fiducial and Slovenian sites as well as the models used.

– EUREF-SK 2001 Computation and Realisation of the Terrestrial Kinematic Reference Frame for Slovakia

M. KLOBUŠIAK presents the report to this item, the text was distributed by circular. The Slovak kinematic terrestrial reference frame 2001 (SKTRF 2001) represents the part of ETRS and serves as national reference positioning standard. It is created from connecting the solution of Slovak Geodynamic Reference Network (SGRN) to the ITRFyy and then to the ETRFyy. The SGRN comprises the Permanent Observation Stations (SPOS) as well as the SGRN Epoch Observation Stations (SEOS). Several sites are repeatedly observed by various techniques as space techniques, levelling and gravimetry. The results of a series of campaigns from different time periods are collected in the SGRN.

The TWG accepts the data set as improvement and extension to EUREF-89 on class B standard at epoch ITRF 1997.0. The coordinates including the station descriptions are to be submitted to the EUREF Data Center. The station coordinates in the data bank derived from older campaigns should be replaced by the new ones. The report should be presented to the plenary of the Toledo Symposium including a clear description of the point velocities for fiducial and Slovakian sites as well as the models used. The report should be revised and presented to the plenary of the Toledo 2003 Symposium.

– Hungarian re-observation 2002

A draft report KENYERES A., BORZA T., VIRÁG G.: *The HUNREF2002 Campaign: Re-establishment of the EUREF Network in Hungary* was distributed by circular. The first

connection of Hungary was installed by the EUREF-CS/H 91 campaign which was a pioneer work at this time. Meanwhile the new techniques promise better results. Comparisons with the EUREF BUL'92 campaign show coordinate differences up to 10 cm. For station Penc the ETRS89 coordinates differ to IGS by some cm. Hereby it is mentioned that the contradictions in the BKG and NOAA solutions of the GPS campaign 1994 in Romania in which also some Hungarian stations were involved are not yet clear. So it was concluded to re-install the national EUREF reference network. The original 5-site network has been supplemented with two EUVN sites and two EPN sites. Two old sites were withdrawn.

The TWG accepts the data set as improvement and extension to EUREF-89 on class B. The coordinates including the station descriptions are to be submitted to the EUREF Data Center. The results should be presented to the plenary of the Toledo 2003 Symposium. The new report should visibly show the considerable improvements in the station coordinates.

– Austria 2002

At the last TWG Meeting in Delft, November 7 – 8, 2002, a report STANGL, G., WEBER, R., HÖGGERL, N., FRAGNER, E.: *ETRF-Austria 2002 – EUREF-Campaign for the introduction of ETRS89 in Austria* (*http://www.euref-iag.org/book2002/twg%20_%20Delft/EUREF%20Austria%202002.pdf*) was presented. The solution was accepted as part of EUREF on class B level. The report should be presented to the plenary at the next symposium 2003 in Toledo. G. STANGL informs on some minor changes e.g. in the antenna heights, especially at station Hutbiegel. The new station coordinates and all other relevant information should be sent to the EUREF Data Center.

– Updated guidelines

Z. ALTAMIMI states that the plan to publish and update the guidelines for EUREF is still not yet completed. Especially clear guidelines for EUREF campaigns and the correct method to introduce station velocities as well as to combine different campaigns are missing. Another aspect refers the use EUREF products on national level. It has also to be considered that existing guidelines may be replaced and the older should be eliminated. Furthermore not all published guidelines are followed sufficiently. The EPN board should formulate respective guidelines in order to enable the observation of long consistent and reliable data records. For the next meeting an action "European velocity field" should be initiated by the "time series group" chaired by A. KENYERES as well as Z. ALTAMIMI and C. BOUCHER. A relevant proposal should be circulated before the next meeting. The activities of ESA on this field could serve as example.

3. ETRS89-Certification of Non-EUREF Permanent Stations

A. CAPORALI distributes a paper to this topic. The principal question is whether permanent GPS stations, e.g. operated by private companies, which are not yet accepted as EPN sites should be included in the list of EPN stations as far as no sufficient number of accepted stations within a special region or country is available. Another reason to consider such stations would be to give the EUREF certificate to stations which are used for other applications but should be kept on a guaranteed quality level. It is emphasized that this aspect could contribute to the completion of an overall coverage of EPN stations. However, is has to be considered that the quality of an EPN station is not only the proved long term of its observation records, but also the guaranteed free access to the site as well as the data, its stability and the maintenance of the facilities. Nevertheless, if a permanent station fulfils these requests, a positive validation could help to adopt the respective site as EPN station. Therefore the operators of such stations should contact via the NMAs the TWG or the EPN board to initiate an inclusion into the EPN. J. TORRES is asked to formulate guidelines to this aspect. The guidelines should be put into the web as well as all other guidelines.

4. Status EPN

– Network

C. BRUYNINX reports on the acceptance and inclusion of 5 new sites in UK, Hungary, Greenland, Denmark and Poland into the EPN network. More detailed information can be found in the EPN homepage (http://www.epncb.oma.be/).

– Data flow, guidelines for hourly data file concatenation

A collection of guidelines compiled by G. STANGL was distributed by circular. The TWG members are asked to put in useful additions. The item will be discussed at the next TWG meeting again.

– Analysis

H. HABRICH informs on the changes since the last symposium in 2002. Bratislava is operating now as new analysis center and the weekly reports include detailed information on the status of the EPN sites. The next Analysis Center Workshop will be held in September 2003 in Graz, this event will be announced in the web. The new EPN guidelines and details on the new server structure in the BKG are available in the web as well.

5. Status Troposphere Project (Short communication)

G. WEBER informs on the continuation of this project in the BKG under the responsibility of W. SÖHNE. Meanwhile 12 EPN Analysis Centers provide information for the project.

6. Status Realtime Project (Short communication)

G. WEBER distributes a paper *Networked Transport of RTCM via Internet Protocol / N trip, Version 1.0 / Design – Protocol – Software*. Part I describes the *Networked Transport of RTCM via Internet Protocol*, part II gives an *example for implementation*. G. WEBER emphasizes that the users are rather interested in a tool which guarantees high quality on the one hand and will be maintained consistent for a certain time on the other hand. A call for participation together with the GNSS community is prepared. The major part of the software will be available in June 2003. The

customers of this application are mainly expected from the mobile phone industry.

It should be reflected to introduce the EPN sites into this project, then the whole project could be placed under the umbrella of EUREF. Moreover it is pointed out that this application of near real time access to a reference frame serves as a good example for a new necessary technology which will become more important in the next future. In order to develop a usable technology the basic principles have to be worked out very carefully.

7. Status ECGN

J. IHDE distributes a paper *European Combined Geodetic Network (ECGN) – 1st Call for Participation*. He repeats the recent development of the project which is mainly related to the vertical component involving gravity and tide gauge data. Since the last TWG meeting a working group was initiated, a call for participation sent out by J. TORRES as Subcommission President and W. GURTNER as TWG Chairman. C. Boucher states that several initiatives are going on in this matter, so this project is an adequate task for EUREF to keep in contact with other groups and to play an important role in geodetic research.

Its is concluded to distribute the paper on the ECGN project to all concerning groups (gravity, EuroGeographics, universities etc.) serving as basis for the further development and call for participation.

8. Status EUVN densification, Circular

A. KENYERES remembers the decision of the last TWG meeting in Delft to send out a call for participation signed by the EUREF President and A. KENYERES. In the circular especially the urgent need for high precise connections between the UELN nodal points and GPS/EUVN points has to be emphasized. Moreover a clear and realistic time table for the project has to be formulated and submitted to the countries. At the Toledo symposium (June 2003) some input information should already be available and be presented. It is emphasized that, in order to come to a completion in a suitable time, this project must not cover the whole EUVN but especially focus on those areas where large discrepancies have occurred. It is hoped to complete the data collection till end of 2003 and the whole project till 2006. Everybody is naturally welcome to participate, but it should not be waited too long if some group does not react. The name of the new project is fixed to *EUVN Densification Action (EUVN_DA)*.

9. ESEAS and ESEAS-RI, status with respect to tide gauge and GPS co-location

H.-P. PLAG informs on the *European Sea Level Service / … Research Infrastructure Project* (*ESEAS / ESEAS-RI*) projects. The project was started in July 2001. The total funding amounts 2.3 mio EURO. The aim is to provide precise and coherent information on the sea level at the European coastlines to build up a long time scale model on sea level variations going back to old data, too. The objectives have both technological and scientific character. Meanwhile about 50 authorities within 22 countries, operating 11000 sites are involved. The input data naturally turn out to be very inhomogeneous, so much work has to be done to bring all data to a comparable level. In the discussion it is pointed out that the analysis of old data may be very interesting, but the data may not be sufficiently reliable to fulfil the requests of a high precise system of sea level heights and their variations. Moreover it is emphasized to urge the already existing groups and their initiatives to cooperate in this field and not to create still more committees.

More detailed information on ESEAS(-RI) can be found in the web (http://www.eseas.org/).

10. Near Real Time Products and Services of GOP

J. DOUSA distributes a paper on this topic. The GOP (Geodetic Observatory Pecný) Analysis Center run together with the Dept. of Advanced Geodesy of the Czech Technical University in Prague is active since 1997. In May 2002 the GOP was adopted as EUREF Data Center (ftp://pecny.asu.cas.cz/LDC/). The GOP is intensively engaged in providing products and information from NRT (hourly) GPS data and the support of post-processing products. Other products refer zenith time delay information and GPS ultra-rapid orbits. The data of more that 100 GPS sites (national, EUREF, GLONASS, IGS, COST-716) are processed. Much emphasis is put on the development of efficient data mirroring procedures.

11. An alternative approach to the realization of the EVRS

A paper by J. SIMEK and J. KOSTELECKÝ on this topic is distributed. J. SIMEK outlines the recent development of the EVRS project since the 2000 Tromsø symposium. The EVRS is realized by geopotential numbers and normal heights of nodal points within the UELN related to the *Normaal Amsterdams Peil (NAP)*. As alternative method a free adjustment of the UELN in relation to the geopotential numbers computed for all available tide gauge stations in the EUVN97 is proposed. The needed numbers could be derived from a geopotential model as functions of the geocentric coordinates taken from the EUVN97. As no tide gauge is given preference, this method, consistent with physical aspects of Earth, would possibly provide more realistic results and could give a better insight to the error propagation. It further could contribute to world height system. An investigation using the described method was already carried out for sea level differences between the east and west coast of Canada. J. SIMEK proposes to carry out this experimental work in cooperation with the BKG.

It is decided to put this item on the agenda for the next TWG meeting as well as EUREF symposium 2003 in Toledo. J. SIMEK is asked to work out a detailed proposal to be distributed before the meeting.

12. EUREF Symposium 2003 Toledo

J. GONZALEZ-MATESANZ distributes a detailed plan for the coming EUREF Symposium in Toledo from June 4 – 7. The TWG discusses the various items and thanks J. GONZALEZ-MATESANZ on behalf of the Spanish hosts for all the careful and efficient preparation. The LOC is asked to try to organize a minibus transport Madrid airport – Toledo. To enable this

facility the participants have to announce their arrival/ departure times to the LOC. At the symposium power point presentations will be available. Considering earlier experiences, all speakers are asked to use no own PCs but to put their presentations by CD onto one common PC made available by the LOC. For that the colleagues are to be informed by a circular.

Concerning the financial support for participants from economical weak countries, E. GUBLER points out that according to the strict rules of EuroGeographics support can only be granted to those participants whose home countries are full members of this organisations. Others have to be supported by other funds e.g. the participation fees.

13. Maintenance of National Networks: Inquiry of Ireland

J. TORRES mentions a letter from Ireland relating the maintenance of zero/first order networks and how to react if stations are damaged or destroyed at all. It is stated that the principal task of EUREF is to initiate the installation of such points and the collection and qualification of data. However, it has to be considered that especially the maintenance of networks of prior order is an important task to keep the quality of a high precise reference network. So, although the countries are responsible for the maintenance, EUREF should encourage the NMAs to take care of this item. By this maintenance the countries could also be encouraged to install permanent stations.

J. TORRES is asked to answer the Irish colleagues in this matter. In general this item should be out in the agenda for the next or fall meeting of the TWG. A relevant questionnaire should be worked out. Furthermore the maintenance of national networks should be an item for the national reports presented at the symposia.

14. Support of GPSVel

C. BRUYNINX distributes a paper and informs on GPSVel. GPSVel is a working group of UNAVCO, started in April 1999 (http://www.unavco.org/community/workinggroups_projects/crustal_motion/dxdt/gpsvel/gpsvel.html). The task is to synthesize data from various studies to produce a combined, consistent, high quality global GPS velocity field expanding upon the effort to catalogue GPS Site Motions. Such a high quality, self-consistent solution for station kinematics will be useful as a tectonic tool, giving motions in a rigorous global kinematic frame. The project is carried out in close cooperation with the IGS and IERS. The EPN already submits data of weekly solutions, later possibly more data will be delivered.

H. V. D. MAREL is asked to select from the data base relevant campaigns which could be used for this project. C. BRUYNINX is asked to inform L. BASTOS and G. BLEWITT as chairpersons of GPSVel that EUREF would be interested in this project and also ask the NMAs to contribute. The concerning NMAs (especially SLO, SK, H) should be encouraged to make available their detailed data.

15. Working document for INSPIRE

A paper *INSPIRE: Infrastructure for Spatial Information in Europe – Pre-announcement of an Internet Consultation on a forthcoming EU legal initiative on spatial information for Community Policy-making and implementation* is distributed. E. GUBLER gives a summary of the ExG Geodesy meeting before this TWG meeting (morning of March 6). He emphasizes the importance of EUREF for various aspects in geodesy/cartography. Especially the generally accepted validation of data by EUREF is an interesting connection between EUREF and INSPIRE. Another item could be the publication of generally needed transformation formulae with clear descriptions in the internet.

E. GUBLER will circulate a revised version of the presented working document. Basing on the acceptance of ETRS89 as reference frame for Europe the manufacturers of GPS receivers should be urged to install a direct access to ETRS89 in their receivers.

The next meeting of the ExG Geodesy will be held on June 2, 2003, the day before the next TWG meting in Toledo.

16. Protection of the EUREF name (Short communication)

B. HARSSON informs that 27 European which are gathered in the Madrid convention have been contacted., 2 countries officially adopted the application, 4 rejected (Denmark, Germany, Spain, Ukraine). The others did not react up to now. A non-reaction till the deadline May 4, 2003, implies automatically a consent. B. HARSSON is asked to inform the public at the Toledo Symposium on this item.

17. IUGG Sapporo: EUREF Report

The abstract of the report on the EUREF activities has been circulated by W. GURTNER and J. TORRES. As authors all TWG members are listed. The abstract is accepted, all TWG members are asked to contribute to the final text.

18. Varia

– SCIGAL

C. BRUYNINX informs on the continuation of the SCIGAL (Earth Science Applications using GALILEO) project. AT present only few activities are going on. H.-P. PLAG mentions in this context that precise and reliable reference frames represent the backbone of many projects, so EUREF can contribute to many tasks.

– Next TWG meeting

J. IHDE invites the TWG to hold the TWG fall meeting 2003 in Frankfurt a.M. H. HORNIK is asked to circulate as soon as possible a questionnaire to decide on the adequate date.

– Next symposium 2004

J. TORRES informs that two countries have signalized to invite the Subcommission for its 2004 symposium, further already for 2005 an invitation has been presented. It is concluded to decide on this item at the coming symposium.