

XXVth Meeting of the EUREF Technical Working Group in Munich, February 15 - 16, 2001

Meeting place: Bavarian Academy of Sciences, Munich

Begin: 15.02.2001, 14.00 p.m., end: 16.02. 12.30 p.m.

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Participants

JÓZSEF ÁDÁM, Budapest
 WOLFGANG AUGATH, Dresden
 CARINE BRUYNINX, Brussels
 ALESSANDRO CAPORALI, Padova
 HERMANN DREWES, Munich (guest)
 WERNER GURTNER, Berne (Chairman)
 ERICH GUBLER, Berne-Wabern (delegate of CERCO)
 BJØRN HARSSON, Honefoss
 HELMUT HORNIK, Munich (Subcomm. Secretary)

JOHANNES IHDE, Leipzig (guest)
 AMBRUS KENYERES, Budapest
 MARIAN MARJANOVIC, Zagreb (guest)
 LJERKA RASIC, Zagreb (guest)
 HERMANN SEEGER, Bad Neuenahr - Ahrweiler (guest)
 JAROSLAV SIMEK, Prague
 GÜNTER STANGL, Graz (guest)
 JOAO AGRIA TORRES, Lisbon (Subcomm. President)
 GEORG WEBER, Frankfurt (guest)

Minutes

Remark: The presented papers and view graphs can be received, as far as available, on request from the EUREF secretary.

Topic 0: The TWG chairman, W. GURTNER, opens the XXVth meeting of the EUREF TWG and thanks the German Geodetic Commission at the Bavarian Academy of Sciences for hosting this meeting. On behalf of the Deutsches Geodätisches Forschungsinstitut (DGFI), the director of this institute, H. DREWES, welcomes the TWG in Munich. He points out the importance of EUREF for geodesy in general and expresses his best wishes for a successful meeting.

The agenda was distributed among the TWG members by mail and is adopted by the auditorium.

Z. Basic, C. BOUCHER, H. v. D. Marel and W. SCHLÜTER have apologized for being unable to attend the meeting.

1. Protocol of the XXIVth TWG Meeting in Lisbon

The *minutes of the last TWG meeting in Lisbon*, October 9 - 10, 2000, have been distributed. Some details are to be corrected.

2. Campaign validations

Croatia

M. MARIANOVIC remembers the different campaigns to connect Croatia with EUREF, some of which included also neighbouring countries¹. He explains in detail the

¹ cf. the concerning reports in the previous EUREF proceedings: VOL. 8, 106-113: Y. ALTINER, W. SCHLÜTER, H. SEEGER: *Results of the Balkan'98 GPS Campaigns in Albania, Bosnia and Herzegovina, and Yugoslavia*; vol. 7/I, 79-88: Y. ALTINER, K. COLIC, B. GOJCETA, H. HABRICH, B. LIPEJ, P. NEUMAIER, M. MARJANOVIC, Z. MEDIC, D. MIŠKOVIC, B. PRIBICEVIC, L. RASIC, H. SEEGER, A. SELIŠKAR, D. TAVCAR: *Results of a Re-Computation of the EUREF GPS Campaigns in Croatia and Slovenia*; vol. 6, 108-123: Y. ALTINER, T. BASIC, K. COLIC, B. GOJCETA, M. MARIANOVIC, Z. MEDIC, L. RASIC, H. SEEGER: *Results of the CROREF'96 GPS Campaign*; vol. 4, 51-57: Y. ALTINER, K. COLIC, B.

items of the CROREF-96 campaign, the most important ones which covered in all 86 sites. The 1994 campaign also was accepted officially as parts of EUREF². In order to define the best possible reference for Croatia it was decided to use a combination of all existing campaigns.

The investigations showed differences between different solutions which cannot only explained by the use of different fiducial points, ITRF's etc. It was found out that in the combined solutions the transformations of the individual campaigns were not exactly correct in some cases, it is hoped to present a final corrected solution to the next symposium in Dubrovnik. It also has to be decided whether the results for neighbouring areas such as Slovenia being included in this solution should be confirmed.

3. Support for a EUREF GPS campaign in Russia

Remembering the discussion at the last TWG meeting in Lisbon, E. GUBLER reports on the new efforts to help Russia to join EUREF. Parts of Russia as well as Belorussia have already been covered by EUREF campaigns, e.g. within the EUVN. It is stated that campaigns as in the last years organized by the BKG (former IfAG) in many European countries are no more possible, so Russia must do this work mainly by itself. Help, however, could be given by some financial support by EuroGeographics by inviting colleagues to stay for some time in the BKG to process and analyze the data. It is proposed to invite V. Kaftan to present in Dubrovnik a detailed report to the TWG and then to decide the practical further steps. It is emphasized to make clear that support only is granted if the general rules for the acceptance of EUREF campaigns are considered, especially the coordinates of a selected number of sites must be made available to the public.

GOJCETA, B. LIPEJ, M. MARJANOVIC, LJ. RASIC, H. SEEGER: *Results of the EUREF 1994 Croatia and Slovenia GPS Campaign*.

² Resolution No. 1, Helsinki, 1995: EUREF-CRO/SLO94 ... improvement and extension to EUREF-89.

4.EVRS

Definition paper

A detailed paper compiled by J. IHDE and W. AUGATH has been distributed. The report includes a review on the activities in the last 10 years, the objects of the definition and realization of the EVRS as well as some comments. It is emphasized that these items are indeed a very interesting topic which could be discussed and treated further on, nevertheless, the project has urgently to be structured and finalized for practical reasons within the next time. Basing on the results all European countries are enabled to compute their national height systems within the European height system.

It is decided to change the presented report somewhat and to publish it completely in the Tromsø proceedings³ and to refer in a short summarizing report in Dubrovnik explicitly on this publication.

NATO Workshop (Simek)

J. Simek reports shortly on the NATO workshop in Prague, November 2000, *the way forward to come to an Improved World Height System*. The resolutions of the workshop explicitly mention the support of EUREF as well as gravity measurements and systems for geodetic purposes.

5.UELN, EUVN

EUVN: J. IHDE mentions that the GPS and levelling Parts of the EUVN have been completed. Concerning the tide gauge part the situation is rather complicated. Originally a considerable number of sites was proposed, due to organizational problems, however, this number had been reduced to 20 being really available in order to guarantee the completion of the work in time. It is decided to invite G. WÖPPELMANN to Leipzig to prepare a report for the Dubrovnik symposium. The final report will comprise a detailed description of all sites and will be published by the BKG. A summarizing report is planned to be published in the EUREF proceedings.

UELN

Bulgaria has announced to deliver its data, but requests financial support to continue the work. EuroGeographics could possibly give some support for travelling expenses and stay of a scientist in Leipzig. The BKG will contact the Bulgarian colleagues to clear up definitely the problems and then decide how to proceed.

6. "Transformation Group"

Status of the data/parameter availability

J. IHDE reports on the results of the *Cartographic*

³cf. EUREF proceedings: VOL. 9, 99-115: J. IHDE, W. AUGATH: *The Vertical Reference System for Europe; European Vertical Reference System (EVRS)*; J. MÄKINEN: *A Note on the Treatment of the Permanent Tidal Effect in the European Vertical Reference System (EVRS)*; M. EKMAN: *On the Permanent Tide in the European Vertical Reference System*; R. RUMMEL, B. HECK: *Some Critical Remarks on the Definition and Realization of the EVRS*.

Projection Workshop, Marne-la-Vallée, Dec. 14-15, 2000. The workshop accepts the European Vertical Datum as the official one for Europe and recommends to prepare a list of transformation parameters between the respective national systems and ETRS89 as well as the corresponding algorithms and publish it on a public domain. Up to now only a few countries answered the previous questionnaire, therefore a new letter should urge all missing countries to join now this important project. Moreover, it is proposed that EUREF should also be engaged in the unification of the many different, although mostly more or less similar map projections within Europe. A common goal could be to store all coordinates as ellipsoidal coordinates and adopt the UTM projection for maps in a scale larger than 1:50.000 and Lambert projection for scales smaller than 1:50.000, respectively. The BKG would be ready to install a concerning homepage in collaboration with EUREF and EuroGeographics. The EUREF President is asked to write an official letter to the BKG asking for this support⁴. The *Parts Relationship between ITRS, ETRS89 and WGS84* should be declared as official EUREF documents and be published in the EUREF homepage. This item has to be put on the agenda for Dubrovnik again and an example as internet demonstration has to be prepared.

H. SEEGER emphasizes in this context that the European Union as well as the individual countries need much practical advice in this matter, otherwise the other groups may take over this work and EUREF lose its influence on this field.

E. GUBLER emphasizes the various and long time efforts of J. IHDE and the BKG in this matter and expresses on behalf of CERCO and EuroGeographics the thanks for engagement.

7. EUREF Permanent Network

Network

C. BRUYNINX gives a report on the last development of the EPN (<http://www.epncb.oma.be/>) since the last TWG meeting, remembering the guidelines for EUREF stations and the adopted minimum distance of sites. Some new stations have joined the network. Meanwhile about 50% of all permanent sites submit hourly data. Up to now the time series yield no time corrections, so the relevant investigations by A. KENYERES will probably enable a considerable quality improvement. It can be hoped that careful analysis of the correlations between azimuth and elevation angle as well as receiver dependant influences, jumps in time series and synchronisation problems will enable to correct the results for still inherent systematic errors.

A workshop of the Local Analysis Centers will take place in Warsaw from May 31 till June 1.

Data Flow

⁴Meanwhile the BKG has declared to carry out this work, the corresponding homepage will be <http://www.crs.ifag.de>.

G. STANGL mentions the various EUREF mails concerning this topic. In the next time he will distribute a EUREF mail informing on the procedure of the data flow in the case that the BKG server for EUREF fails and the ASI/Matera should take over the work. A short note of intention has to be prepared to install a second European IGS data center parallel to the IGN, e.g. the BKG or ASI. It is emphasized that the present situation is not satisfying, i.e. no really identical data set is available for the case that a main center is unable to operate. Moreover the data flow should automatically be led to the acting center if the first one fails because in such cases the center often is not able to inform the local data centers on its problems. C. BRUYNINX and G. WEBER are asked to prepare a contribution to be discussed in Dubrovnik so that the IGS can be informed how to react in cases of failures. Moreover, ideas are to be collected how to improve the access to the hourly data (at present not satisfying). C. BRUYNINX is asked to discuss this topic at the next IGS meeting and to inform the TWG.

Analysis (Weber/Habrich)

Starting from beginning of EUREF, GPS campaigns were carried out to define a reference for EUROPE. This systems is more and more going to be replaced by the EPN. The EPN originally collected daily data files, meanwhile hourly data are replacing these and it can be expected that in future quasi real time coordinates will be available. The technical realization of this project, however, means an enormous challenge for programming, organization, communication, computing and, last but not least, costs. G. WEBER mentions that this topic is essential also for the application of GPS for tropospheric research.

C. BRUYNINX and G. WEBER are asked to prepare and distribute a call for participation for a working group to compute a EUREF troposphere solution.

8. Open issues regarding the EUREF Web site (<http://www.euref-iag.org/>)

General

J. TORRES mentions that meanwhile the link to the European Vertical System is installed, the link to the ETRS89, however, is still missing. C. BOUCHER and Z. ALTAMIMI should be asked again to complete the EUREF homepage in this matter. Moreover the links to other systems e.g. SIRGAS and NMA's should be enlarged as well as the TWG part and the transformation group. W. GURTNER urgently emphasizes that all TWG members permanently should check the main homepage as well as the subpages in order to guarantee a really up-to-date presentation of EUREF.

Documentations, guidelines, links

This part will also be completed in the next time, including minutes and a photo gallery of meetings, a permanently updated member list etc.

Vertical network (Ihde)

J. Ihde informs that this subpage is practically ready, the EVRS part will be installed in the next future, too.

9. EUREF Trademark / Name and logo protection

B. G. HARSSON gives a short report on his efforts for trademarking EUREF, a more detailed report will be presented at the Dubrovnik symposium.

10. Guidelines

J. Simek informs that a raw concept has been worked out but still has to be completed. B. Harsson and J. Simek will distribute a proposal among the TWG till end of March to be rediscussed in Dubrovnik. The public should be informed on the updated guidelines for EPN, guidelines for campaigns, IGS products, frames. A reference to the paper *Relationship between ITRS, ETRS89 and WGS84*, presented at the workshop for the European Community, December 14-15, 2000, should also be given. It is emphasized that these guidelines are to provide for the public all information and are to be updated as far as necessary.

11. Galileo Meeting

E. Gubler gives some remarks on the development of Galileo. G. Weber mentions that the GLONASS system has been developed now and altogether 14 satellites are operating. The Russian agency is obviously eager to keep this system alive, so GLONASS should also be considered besides the other systems as a usable tool for positioning and navigation. J. TORRES remarks that a certain competition between the presently available and developing systems arises, partly leaving the impression that the future Galileo may not be an equivalent tool.

12. Time series analysis

A. KENYERES explains the application of permanent network time series as special task for geokinematical use as an interesting and worthwhile by-product of EUREF. Moreover, the careful analysis of jumps and gaps in time series can improve the quality of the EPN at all. The irregularities may be induced by physical as well as environmental influences, so it should be investigated in detail what is really going on when an antenna is registering GPS signals.

In August 2000 a call for participation has been issued and EPN data subsets within 6 selected subnetworks, i.e. Nordic, BENELUX region, Iberian Peninsula, Italy and surrounding, Turkey, eastern Middle Europe have been made available. A. KENYERES thank C. BRUYNINX for her great engagement in organizing this project. As expected, relevant conclusions need long time series, otherwise the statements would be only speculative. Special care has to be taken for the correction of coordinates for station velocities on the relevant (sub)plate according to NUVEL model and local/regional tectonic motions respectively.

G. STANGL mentions that in the practical work sometimes data records or even sites are deleted due to non fitting results, but these eventually could be used after applying the needed corrections. hereby it is urgently necessary to use really the same guidelines and

analysis procedures for the definition of outliers. On the other hand, however, different software also can show distortions in the data. W. Gurtner says that in future also the local analysis centers are to be engaged more than now in these investigations and therefore are to be advised in detail how to proceed.

The work is still going on, but a detailed report will be presented to the coming Dubrovnik symposium.

13. EUREF Symposium Dubrovnik

L. Rasic reports on the preparations for the coming EUREF symposium in Dubrovnik, 16-19 May, 2001. The homepage <http://www.dgu.tel.hr/dgu/euref/euref2001-information.htm> informs on all details of the symposium. W. GURTNER, H. HORNİK and J. TORRES will prepare within one month a list of session names (and their goals) and proposals for chairpersons. This information will be put into the web as well as e EUREF mail. H. HORNİK will issue a EUREF mail reminding the deadlines and urging to book flights and hotel rooms.

Concerning the technical items it is recommended to prepare the reports carefully taking in account that the internet connection via the beamer may be difficult.

As usual in the last years, economical weak countries have been invited to send each one delegate who will be financially supported for travel expenses and stay.

14. IAG Scientific Assembly in Budapest

On occasion of this assembly a detailed report on the development of EUREF will be presented. Oral contributions are planned, including a general review (J. TORRES), UELN, EUVN, EVS (J. IHDE), EPN organisational/analysis etc. (C. BRUYNIX, A. KENYERES, G. WEBER), EUREF data base, maintenance and monitoring (H. V. D. MAREL). An extra report on campaigns is not seen to be necessary.

15. Future financing and publication of the EUREF proceedings

H. HORNİK explains the present situation concerning the more and more difficult problem of financing the printing of the EUREF proceedings. The TWG discusses in detail the (dis)advantages to put the proceedings only on the web or to publish a printed book as usual. It is stated that especially proceedings are worthwhile to be printed because many readers use to read such publications in situations when an internet access is hardly available. On the other hand the publication on the web has other advantages without any doubt. A voting among the TWG results in continuing the printed proceedings and additionally the publication on the web and possibly also on CD.

Up to now the Bayerische Kommission für die Internationale Erdmessung (BEK) has generously financed 8 volumes of EUREF proceedings. Financial restrictions, however, force to restrict severely the number of pages per volume. The Bundesamt für Kartographie und Geodäsie (BKG) has suggest a possibility to take over the EUREF proceedings within

its own series *Mitteilungen des Bundesamts für Kartographie und Geodäsie*. The EUREF subcommission has to write an official letter asking to state this offer⁵.

This change will be announced at the Dubrovnik symposium, moreover thanks should be expressed to the BEK and the BKG as well as Germany in general for all support for EUREF.

16. Varia

ESEAS

W. GURTNER informs on a call for participation by the European Sea Level Service to find people to work in this project, funds infrastructure etc. In a letter by H.-P. PLAG the EUREF Subcommission has officially asked to participate. B. HARSSON is asked to keep the contacts to ESEAS and offer the participation of EUREF as far as necessary and useful. The item will be put again on the agenda of the next TWG session in Dubrovnik.

IAG Symposium on Vertical Reference Systems, Cartagena, Colombia (Drewes)

H. DREWES reports on the coming IAG Symposium on Vertical Reference Systems, Cartagena, Colombia, February 20-23, 2001. The DGFI is engaged in various projects for South America such as SIRGAS (Sistema de Referencia Geocéntrico para América del Sur), the installation of permanent GPS sites for IGS and the cooperation for organizing the mentioned IAG Symposium. Nearly all American countries will send delegates to this event, about 90 presentations were given. The main topics were 1. status of height systems, 2. height determination techniques (together with FIG), 3. height reference systems, 4. unification of systems (main topic), 5. mean sea level, tide gauge variations. The efforts for the next future will mainly refer the installation of a quasi geoid for South America as basis for a unified height reference.

EUREF will contribute to the symposium by a poster by J. IHDE and W. AUGATH to explain EUREF, H. DREWES will present the poster.

H. DREWES further mentions the recent change in the IERS in which now German agencies are responsible for various tasks, The BKG is acting as central bureau, the DGFI works as one of the analysis centers for ITRF.

EUREF symposium 2002

J. TORRES invites the EUREF Subcommission to hold its next symposium on the Portugese Azores Islands in late May or June 2002. The TWG thanks for the invitation. the proposal will be offered to the plenary of the coming EUREF symposium.

EUREF TWG fall meeting 2001

A. CAPORALI offers to organize the TWG fall meeting 2001 in Padova. The TWG thankfully accepts the

⁵Meanwhile the BKG has generously declared to finance the printing of the EUREF proceedings for the next five years.

invitation, the meeting will take place on October 1-2,
noon to noon.