

XXIVth Meeting of the EUREF Technical Working Group in Lisbon, October 9 – 10, 2000

Meeting place: Instituto Portugues de Cartografia e Cadastro (IPCC)

Begin: 9.10.2000, 14.00 p.m., end: 10.10. 12.30 p.m.

Agenda

1. Protocol of the 23rd TWG in Tromsø, June 21, 2000
2. Campaign validations
 - Croatian campaigns (Basic)
 - EUREF-SWEREF-99: Final site selection (v.d.Marel)
3. The definition of the European Vertical Reference System (Ihde)
4. Status of UELN, EUVN, EVS (Ihde)
5. Report of the "Transformation Group" (Gubler, Ihde, Boucher, Torres)
6. Permanent Network
 - Report of the Network Coordinator (Bruyninx)
 - Data Flow in the EUREF Permanent Network
 - EUREF Data Center (Weber)
 - Maximum density of the EUREF Permanent Network (Bruyninx)
7. EUREF Analysis Coordinator
8. EUREF WEB site
 - General (Torres)
 - Permanent Network (Bruyninx)
 - Campaigns (v.d.Marel)
 - Symposia etc (Torres)
 - Documentations, guidelines, links (Bruyninx, Hornik)
 - Vertical network (Ihde)
9. EUREF Trademark (Harsson)
10. Guidelines (Simek, Harsson)
11. VENE and MAD1: Analysis of Coordinates and Time Series (Caporali)
12. EGNOS/EUREF meeting (Paris, September 4, 2000) (Gurtner)
13. EUREF Symposium in Dubrovnik (Basic, Rasic)
14. Varia

Participants

JÓZSEF ÁDÁM, Budapest

ZELJKO BACIC, ZAGREB (guest)

CARINE BRUYNINX, Brussels

ALESSANDRO CAPORALI, Padova

WERNER GURTNER, Berne (Chairman)

ERICH GUBLER, Berne-Wabern (delegate of CERCO)

BJØRN HARSSON, Honefoss

HELMUT HORNIK, Munich (Subcomm. Secretary)

JOHANNES IHDE, Leipzig (guest)

HANS VAN DER MAREL, Delft

LJERKA RASIC (guest)

JAROSLAV SIMEK, Prague

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: On behalf of the Instituto Portugues de Cartografia e Cadastro (IPCC), the Subcommission President, J. AGRIA TORRES, welcomes the EUREF TWG members to this session in Lisbon. He especially remarks that this meeting is the very first one in the new building of the institute. The TWG chairman, W. GURTNER, thanks for the heartily welcome and expresses his hope for a fruitful future work concerning the institute as well as the EUREF subcommission.

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

C. BOUCHER, A. KENYERES, W. SCHLÜTER and H. SEEGER have apologized for being unable to attend the meeting.

Topic 1: The *minutes of the last TWG meeting in Tromsø*, June 21, 2000, have been distributed. Some details are to be corrected.

Topic 2: Concerning the *Croatian campaigns*, W. GURTNER reminds the discussion on the discrepancies of several centimeters between the different solutions in which Croatia had participated. The problem, also referring Slovenia, was already discussed among the Croatian colleagues and those from the BKG (former IfAG), moreover H. SEEGER wrote a detailed comment on the development of the different campaigns and the possible sources for errors or misunderstandings. G. WEBER states that the present situation does not allow to accept the solutions as class B level. Therefore it is proposed again to bring together all concerned colleagues and to ask the BKG to compute a new solution.

Z. BACIC explains that the various solutions (CROSLO94, CROREF96, combined solution) were computed as careful as possible, however, the discrepancies up to 5 cm request an analysis before a definite coordinate set can be accepted as the final one. The discrepancies show an obvious systematic influence besides possible eccentricity errors.

As proposed, a new solution will be computed and presented to the next TWG session to be discussed and then presented as final solution to the 2001 EUREF symposium in Dubrovnik.

For the *final site selection of the EUREF-SWeref-99*, H. V. D. MAREL and L. JIVALL have checked the data set presented to the Tromsø Symposium to be proposed as part of EUREF. The original solution was accepted on class B level, the number of coordinates, however, was considered as too large, furthermore it was criticized that the fundamental station Onsala was not included due to problems with the antenna height in this solution. Meanwhile a set of 21 sites has been selected to represent the final EUREF solution. Furthermore a small secondary network was observed to connect Onsala with the *SWeref-99*. The coordinates are changed up to some neglectible few mm. The documentation is in preparation and will be presented soon. W. GURTNER mentions his contentment with the new solution in which the general EUREF guidelines have been followed very well.

E. GUBLER mentions a letter by V. KAFTAN announcing that *Russia* would be ready to participate actively in EUREF with a *GPS campaign*, however, the Russian national agencies are not able to finance such a campaign. It is remarked that several years earlier the IfAG/BKG has organized and given financial support to various campaigns, this possibility presently is no more available. The TWG states that Russia should be able to plan, organize and observe an adequate campaign by itself while practical help for the analysis and evaluation of the results could be given possibly by the BKG or CERCO by sending one Russian colleague to the BKG to undertake this work there with the help of experienced collaborators there. This method has been practised successfully in the past with a series of other countries.

It is proposed that the BKG should make an adequate offer to Russia and then the plan be discussed in detail.

Topic 3: On occasion of the last EUREF symposium in Tromsø, J. JHDE distributed a draft of a paper concerning *the definition of the European Vertical Reference System*. An updated version is presented now to the TWG. Specifications for the height system to be used for the definition of the EUVN were given by MAKINEN/EKMAN and AUGATH/GROTEN. Basing on IAG recommendations, J. MAKINEN also made proposals for the tide gauges solution. It is concluded that the European Height System should be defined in agreement with the Tidal Group of the IAG.

It is stated that in the UELN no information coming from tide gauges is included, so this system is only referring to its old reference points (marker Amsterdam) but no new tidal observations. Therefore this system is no adequate tool for the application in geokinematics or geodynamics.

W. GURTNER reminds three items to be observed, i.e. the EVRS as system, the realisation of the datum and finally the frame which could be preferably represented by the creation of a EVRF2000. Concluding the discussion, the working group is asked to formulate a clear definition considering the realization and consequences and present their findings to the next

TWG.

J. SIMEK is asked to attend the NATO BfP Workshop *Towards a World Height System* (Prague, 7-8. Nov. 2000) and report to the TWG on the results referring the EVRS.

Topic 4: J. IHDE reports that the solutions for the *UENL* and height part of the *EUVN* are completed now. Fortunately also the Baltic states could be included into the *EUVN*. The suspected N-S-inclination can not be derived, but it has to be considered that such small effects cannot be separated reliably from the noise in the GPS results.

The publication of the *EUVN* levelling part is in preparation.

The tide gauge of the *EUVN* is not yet finished; up to now the data for only 20 tide gauges among altogether 70 selected sites is available. It should be discussed again whether this solution may be computed basing on a reduced data set in the next future instead of waiting too long for new data.

Concerning the progress of the *EVS* project, the data of 4 epochs are collected for block Netherlands, 3 for Denmark, each 2 for Germany and Switzerland while for all other blocks only one epoch of levelling data is available. In general it can be stated that the relevant observation epochs often cannot clearly be defined or distinguished from each other. Relevelling campaigns are practically not possible. Therefore a combination of levelling data with those from permanent GPS sites seems the only useful way to come to a result.

Topic 5: E. GUBLER reports that the *Transformation Group* is collecting relevant information from respective National Mapping Agencies. He underlines the important contributions by P. DUNKLEY and especially J. JHDE and his team in this matter. Moreover E. GUBLER announces that in 2001 *MEGRIN* and *CERCO* will merge to *EuroGeographics* – see also <http://www.eurogeographics.org/>. This institution also will give a limited financial support (10.000 €) for campaigns, symposia and travelling.

J. IHDE asks whether it might be useful to include into the EUREF homepage a list of transformations parameters for the individual countries participating in EUREF. In this context it also should be discussed to install a transformation service considering the fact that some users are not able to apply the parameters in the correct way. J. TORRES emphasizes this idea as one of the entire tasks of EUREF for the public. P. DUNKLEY and Z. BACIC add that besides the list of transformations parameters a clear description of the formulae and computations routines for the transformation process distinguishing the requirements for highest or lower accuracy have to be published, otherwise this information might cause misunderstandings. Moreover the users should be advised to contact in any case the respective National Mapping Agency to confirm the actuality of the values. G. WEBER expresses his doubts whether this information should be free for anybody or profit groups should be charged. B. HARSSON means that the use on an accuracy level of 1 – 2 m level is

generally accepted by most of the countries, in any case passwords may help to avoid misuse. E. GUBLER mentions that exactly this idea has also been formulated by MEGRIN. Therefore MEGRIN should be contacted to create a common home page on high quality level and avoid two similar homepages. J. IHDE explains that presently the relevant information is available from 10 countries among 37 in all.

W. GURTNER summarizes that the installation of such a service by EUREF would be useful, a clear indication of the source of all information has to be indicated. The maintenance and careful update will be an important task, besides this users have to be required to check all data for actuality. In all this would give EUREF the chance to become a European quality control institution.

Topic 6: C. BRUYNINX as Network Coordinator reports on the progress of the *EUREF Permanent Network (EPN)*. As new station in the EPN, Ohrid/FYROM-Macedonia started to operate. each 3 new sites are proposed in England and Denmark, 6 in Norway, hereby 4 of them have already been EPN sites, but were previously excluded from the network. The EPN coordination group presented contributions to the workshops of the IGS in Oslo and WEGENER in Cadiz, others are planned for next year.

For the *EUREF Data Center* G. WEBER points out the BKG webpage (<http://igs.ifag.de/EUREF.htm#EUREF>). Presently the BKG processes the data of about 150 sites, 100 of them are IGS and EUREF stations, so an enormous amount of data has to be organized. Although the computations run automatically, the work needs much personnel efforts. The limit of delay for the data to be considered as hourly data flow is fixed to 30 minutes now. In general the data arrive 10 minutes after the full hour. About 25% of the data arrives too late or is missing at all. It is hoped to improve and automatize the data flow to increase the efficiency still more. As a possibility the direct access to the GPS receivers by avoiding the local data centers is planned, this way, however, needs even more careful data checks in order to avoid the use of lower quality or erroneous results. A data check after the delivery of data implies the danger of neglecting necessary corrections.

Relating the tendency to switch over from the daily to the hourly data delivery, it is mentioned that exceptions should be possible. For example if within a large area only a site with daily data is available, this site should not be excluded to avoid a large data gap.

W. GURTNER proposes that G. STANGL should have a careful look especially to those sites which do not deliver data regularly and try to help them to improve their registrations, analysis and data transmission. In many cases the effort is rather low, the benefit, however, considerable, especially in cases where the relevant site is the single one within a large area and no other data can replace the gaps. Therefore the instructions for the delivery of data should be a prior part of the guidelines for permanent sites.

Similar to the restriction of the number of official EUREF sites per country, meanwhile the same problem

arises to define a *maximum density of sites being part of the EUREF Permanent Network*. As example C.

BRUYNINX mentions the two Italian sites Bolzano and Trento which are located within a distance of less than 50 km. A. CAPORALI mentions that in some cases the running of some nearby permanent sites may be useful to gain reliable and high accurate data for special purposes such as geokinematics. J. TORRES adds that it carefully has to be checked whether some new internal site may produce better data than an already accepted official old one.

W. GURTNER replies that the original task of EUREF is the establishment and maintenance of a primary network, but not the investigation of local effects. Naturally the determination of local/regional movements e.g. on plate boundaries is necessary to guarantee the high quality of this primary network, but in general such tasks should be done by other groups. This statements does not oppose the use of identical sites within different projects and to link the results, it even is welcome for finally proving the network quality. So it will be necessary to formulate clear guidelines for the EPN describing the minimum density of official EPN sites allowing exceptions in special cases. Besides this other groups or individual countries naturally are free to run their own regional permanent networks. For all such investigations it is recommended to base them on the EPN guidelines to enable the accurate and correct link to the EPN which can provide the frame and large scale.

Corresponding to the minimum distance of sites W. GURTNER emphasizes the necessity to take care also for a maximum distance of about 300 km to guarantee a suitable reference network for all Europe, so that everybody can determine coordinates with a certain accuracy.

The group around the data flow manager is asked to discuss these topics in detail and formulate an exact proposal.

Topic 7: G. WEBER informs that M. BECKER from the BKG has changed to the University of the Federal Armed Forces in Munich (FAF) and his tasks are taken over now by H. HABRICH. This change is approved by the TWG and will then be announced by a EUREF mail (cf. EUREF Electronic Mail, 09-Nov-2000, Message Number 0668).

Topic 8: J. TORRES informs on the *EUREF web site*. The TWG concludes:

- The EUREF secretary is asked to care about the permanent update of the list of meetings (symposia; TWG sessions), members of the Subcommittee, titles and contents of proceedings etc.
- In future an adequately placed hint on the EUREF homepage concerning EUREF proceedings volumes has to be placed.
- An updated version of the EUREF brochure (submitted to the last IUGG General Assembly 1999) for the Scientific IAG General Assembly 2001 in Budapest should be published. All TWG members are asked to contribute to this new brochure.

- The EUREF homepage should contain useful links to institutions related to the work of EUREF (IAG; within EUREF: EPN, EVRS, EUVN, EUREF mail; similar groups e.g. IGS, SIRGAS; other institutions e.g. CERCO, EUROCONTROL, BKG, other national data centers). Further the homepage should explain in few words the structure of IAG and the position of EUREF within IAG.
- The logo of the IGS in the EUREF homepage has to be corrected.
- All colleagues are asked to check permanently the homepage and inform on additions, proposals etc. For this add a line at the bottom with addresses to which comments/proposals for corrections/updates should be directed.

Topic 9: B. HARSSON informs that the costs for *trademarking the term EUREF* for 10 years amount 200 EURO per country resp. 5000 for all Europe. B. HARSSON is asked to send the list of the relevant institutions for trademarking in the European countries to the EUREF secretary to be distributed among all member countries of EUREF. Norway would be ready to organize the trademarking for other countries, too.

Topic 10: J. SIMEK reminds his report on EUREF guidelines given at the TWG meeting in Tromsø. In all the guidelines naturally have been updated several times so that a reordering and publication of the update via internet is obviously necessary. This new update should be directed not only to the EUREF community but to all concerned people and institutions regarding the fact that any network densifications are carried out now on national or sub-national level and not always directly observed by the EUREF subcommission. It has to be made known to the public that the guidelines are non-static but permanently updated corresponding to the state of art. The guidelines group is asked to prepare a draft and circulate it among the TWG members to check and comment the contents.

It has to be considered that the homepage does not comprise too much information which might confuse the users. Only the newest state of art for guidelines etc. is to be published. The background and history – as far as necessary – may eventually be explained in appendices.

An abstract concerning the planned publication of guidelines should immediately be put on the homepage in order to inform the users that a complete list of guidelines will be published in the next time. Moreover the guidelines are to be published in the next EUREF proceedings (and also in future issues as far as changes are made).

Topic 11: A. CAPORALI reports on his detailed investigations of the data files of the permanent stations Venice (VENE) and Madrid (MADI). The results derived by the different analysis centers show deviations on cm level which obviously are not only random errors but systematic influences. It is emphasized that the analysis centers partly use not the same procedures, nevertheless the results should not differ so far. In the case of large differences the data are

to be checked in detail to find out the systematic influences. Considering this fact, the use of different software may be regarded as useful and necessary.

A. KENYERES and his group are asked to organize a general check of all sites especially those where the results are processed by various analysis centers to find out the causes for systematic errors (jumps on cm level, opposite signs for components etc.).

Topic 12: W. GURTNER reports on the EGNOS/EUREF meeting (Paris, September 4, 2000) on which the future systems such as GPS, GLONASS, Galileo and others were discussed. The EUREF work was presented by contributions of C. BRUYNINX and C. BOUCHER. It is discussed whether to offer the analysis of the new systems or include tracking stations into the EPN.

Topic 13: Z. BACIC informs on the preparations for the next EUREF symposium in Dubrovnik from 16-19 May, 2001. All colleagues are urgently asked to reserve their flights as well as hotel rooms in time due to the limited capacities. Detailed information is available on the homepage <http://www.dgu.tel.hr/dgu/euref/euref2001-information.htm>.

Topic 14: The next meeting of the EUREF TWG will take place in Munich from Thursday noon, February 15 to Friday noon, February 16, 2001. A. CAPORALI invites the TWG to hold its 2001 fall meeting in Padova.

P. DUNKLEY says: "Following the successful completion of the civil aviation implementation of a common geodetic reference system and frame across Europe, I would like to thank on behalf of EUROCONTROL, the EUREF subcommission for Europe and its Technical Working Group along with the participation of the National Agencies, for their invaluable contributions and technical support. The success of the WGS 84 (ETRS89 - ITRF_{xx}/ETRF_{xx}) Implementation Programme owes a lot to the work undertaken by EUREF and the European network that it has created and managed.

The completion of the project on schedule and within budget means that my 5 year appointment as Project Manager comes to an end and it is appropriate that I resign as a member of the EUREF TWG at the end of the year. On a personal basis, I would like to thank all the members for the very enjoyable participation in the TWG, the great support and interesting discussions, where a lot has been learnt."

As chairman of the EUREF TWG, W. GURTNER thanks P. DUNKLEY on behalf of EUREF for his good cooperation and expresses his best wishes for the future.

C. BRUYNINX gives a short report on the *Tenth General Assembly of the Wegener Project WEGENER 2000*, Cadiz, September 18-22, 2000. Another short report is given by J. SIMEK on the FIG Seminar in Malta, September 18-21, 2000. Finally H. V. D. MAREL reports on the COST Action 716: Exploitation of Ground Based GPS for Climate and Numerical Weather Prediction Applications. G. WEBER is asked to report on EUREF at the Annual European US Civil GPS Service Interface Committee (CGSIC), Monaco, November 30 to December 1, 2000.