XXIIth Meeting of the EUREF Technical Working Group in Brussels, March 20 – 21, 2000

Meeting place: Royal Observatory of Brussels.

Begin: 20.03.2000, 13.00 p.m., end: 21.03.2000, 12.00 a.m.

Agenda

1. Minutes of the Dresden TWG meeting (HORNIK)
2. Campaign validations:
   – Moldova Campaign (GURTNER)
3. MEGRIN activities (GUBLER, IHDE, FARRELL)
4. National reference systems: Definitions, links to ETRS (BOUCHER)
5. New EUREF web site (TORRES)
   – New EUREF logo
   – Web pages design
   – EUREF web address
6. Trademark EUREF? (VERMEER, postponed from last meeting)
7. EUREF Permanent Network
   – Current status (BRUYNINX)
   – Norwegian stations (GURTNER, HARSSON)
   – Hourly data flow (GURTNER, BRUYNINX)
   – Troposphere coordinator (WEBER)
   – Restructuration (BRUYNINX)
8. EUREF contribution to ITRS2000 (WEBER, GURTNER)
9. EUREF guidelines (HARSSON, SIMEK)
10. Recent Galileo GEMINUS meetings (BOUCHER, BRUYNINX)
11. Galileo Issues (BOUCHER)
    – Galileo reference system
    – the EUREF network wrt EGNOS and Galileo tracking stations
    – EUREF as representatives of geodetic and mapping European communities
12. EUREF symposium (HARSSON)
13. ISO 15046 (HARSSON, postponed from last meeting)
14. Common reference system for airports (BOUCHER, DUNKLEY, HARSSON)
15. EUVN (IHDE, SCHLÜTER)
16. UELN 95/98 (IHDE)
17. EVS2000 (AUGATH)
18. IGEX/IGLOS-PP (GURTNER)
19. COST 716 (GPS troposphere) (V. D. MAREL)
20. COST Wegener (TORRES)
21. Varia
    – Swedish ETRS-89 realisation
    –

Participants

JÓZSEF ÁDÁM, Budapest
JOAO AGRIA TORRES, Lisbon (Subcomm. President)
WOLFGANG AUGATH, Dresden
CLAUDE BOUCHER, Paris
CARINE BRUYNINX, Brussels
ALESSANDRO CAPORALI, Padova
PAUL DUNKLEY, Brussels
BERNARD FARRELL, Paris (guest)
WERNER GURTNER, Berne (Chairman)
ERICH GUBLER, Berne-Wabern (delegate of CERCO)
BJORN HARSSON, Honefoss
HELMUT HORNIK, Munich (Subcomm. Secretary)
JOHANNES IHDE, Leipzig (guest)
HANS VAN DER MAREL, Delft
FABIAN ROOSBEEK, Brussels (guest)
WOLFGANG SCHLÜTER, Wettzell
HERMANN SEEGER, Bad Neuenahr – Ahrweiler (guest)
JAROSLAV SIMEK, Prague
MARTIN VERMEER, Helsinki
GEORG WEBER, Frankfurt

Minutes

Remark: The presented papers and viewgraphs are, as far as available, collected in the annex.

Topic 0: The new elected chairman of the EUREF Technical Working Group (TWG), W. GURTNER, opens the 1. meeting in the year 2000 and welcomes the participants, especially as guests H. SEEGER, B. FARREL (MEGRIN). He thanks C. BRUYNINX for the invitation and for hosting this TWG meeting.

The updated agenda is distributed.

Topic 1: The action item list and the minutes of the TWG meeting in Dresden, October 28 – 29, 1999, have been distributed. Some comments and corrections are to be added

C. BRUYNINX mentions that G. Weber is appointed now in the EUREF group as troposphere coordinator.

Concerning the membership int he TWG W. GURTNER comments that in principle guests always are welcome to the sessions, however, in order to keep the group as a small efficient working group, the current policy is to invite only those colleagues who practically contribute to an item to be discussed within the actual agenda, especially the organizers of next symposium.

Topic 2: A report on the Moldova EUREF Campaign 99 has been distributed. The campaign has been carried out within a Swiss-Moldavian Economic Corporation, the processing was done by the AIUB. W. GURTNER gives some comments on the validation of the results. The campaign was carried out from May 25-29, 1999 (24 h/d; 10 deg. elev.; Bernese software version 4.2; orbits: IGS in ITRF96, constrained to ITRF97, epoch May 99) on 5 sites in Moldavia (LEICA SR), and 3 additional ones in Ukraine (Trimble), further one permanent site in Ukraine was occupied to strengthen the network. For installing a new control in Moldavia several additional stations were occupied to densify the network, these sites, however, are not treated here but handled as internal ones.

The daily repeatability in the free network amounts 1 – 5 mm for the North/East component and 3 – 9 mm for the height. The rms values are ranging in the same size. Concerning the fiducial stations, the velocities for Ankara turned out to be obviously not correctly computed in the ITRF97 solution. H. v. d. Marel adds that in the Permanent EUREF Network Ankara shows similar effects. Therefore the adopted velocities and coordinates for Ankara should be carefully checked for further use of this site. In all it is very satisfying that meanwhile the repeatability can clearly help to find incorrect coordinates.

A comparison with older results is not possible because this campaign was the first one in Moldavia while the

Ukrainian coordinates of former campaigns are not accessible up to now. Therefore the official solution will only comprise the Moldavian part. The site forms of the Moldavian stations will hopefully be available in the next time to be put in the site catalogue.

Topic 3: The minutes of the *Spatial Reference Workshop, Marne-la-Vallée, 29-30 November 1999* have been distributed. A most remarkable note is the following:

The Workshop recommends that the European Commission:

European Geodetic Datum

- *Adopts ETRS89 as the geodetic datum for the geo-referenced co-ordinates of its own data;*
- *Promotes the wider use of ETRS89 within all member states.*

A similar recommendation concerns EUVN to be adopted as European height reference as soon as the complete results will be available.

For the realization of these recommendation the transformation parameters between ETRS and the respective national reference systems have to be provided with sufficient accuracy and reliability and be placed in a public domain. For the application on cartography a accuracy on dm-level is sufficient, however, the coordinates should be made available as soon as possible.

Besides the application in cartography the ETRS can be used in meteo survey. In this context EUREF could also provide a valuable validation of other data sets. On this basis ETRS can serve as a practical common system for all European airports. H. SEEGER objects that some countries are not interested in a free access to their coordinates but intend to sell them for money. As a possible solution it is agreed to publish coordinated freely on a 1 m level accuracy and let it to the countries how they make available high precise results.

E. GUBLER recommends to write to directors of all national surveying agencies as well as to encourage the national representatives in the EUREF subcommission to continue these activities and make ETRS known to the public as European reference. These activities should be carried out in close cooperation with ISO and the meteo groups so that the EUREF subcommission does not develop to a pure service organization but keeps its status as a scientific body within the IAG.

P. DUNKLEY adds that EUROCONTROL already collected all relevant data for its own purpose, however, it might rather useful to get these data confirmed by the national agencies. H. SEEGER adds that generally these coordinate lists and transformation parameters can practically only be compiled by people who are practically concerned with these topics, i.e. colleagues engaged within EUREF.

Summarizing the following items are suggested:

- prepare ETRS89 for real use without any possibility of errors and misunderstandings
- prepare for practical need a system of geographical coordinates of positions related to ETRS89
- publish coordinates with easy access on 1 m level free of charge
- for heights cm-accuracy is sufficient for mapping, but make available coordinates very soon!
- define the relations to national coordinate reference systems
- a group (E. GUBLER (national agency L+T, CERCO representative), J. IHDE (ISO), C. Boucher (IERS, ETRS89), P. DUNKLEY (EUROCONTROL), B. FARRELL (MEGRIN), J. A. TORRES (EUREF president, national agency)) should get into contact with the directors of the national agencies and EUREF representatives to encourage these activities
- the TWG should organize a collection of relevant transformation parameters and publish them on a public domain
- convince public that EUREF is the best body to coordinate activities and requests (also meteo survey)

Topic 4: C. Boucher emphasizes again the need to provide for all ETRF 96, ETRF97 (and all others) the EUREF site coordinates and those of permanent stations in a common EUREF data base and define the European system as a subset of the relevant ITRF solution. The data should in case be accessible via internet.

Topic 5: J. A. TORRES)presents the new EUREF logo, a draft of the web pages design and the EUREF web address (http://homepage.oma.be/eurefnew/EurefHome.html). The TWG discusses and accepts the design of the logo. Concerning the web page it is emphasized to give at first an explanation of EUREF in few sentences and then lead the reader to the different sublevels. Links to the IAG and CERCO homepages should show the relation of EUREF to these institutions. It is suggested to keep the main page on a common server, the subpages, however, are to be maintained on special serves. B FARREL offers that MEGRIN could finance the costs (registration, usage) for the next years. J. A. Torres, M. Vermeer and C. Bruyninx are asked to find out the amount of fee to be paid.

Topic 6: M. VERMEER suggests to trademark the term *EUREF* in order to avoid a possible ban to use this term when others would trademark the word for their own purposes. B. HARSSON declares that Norway will pay the costs (about 200 US$), M. VERMEER is asked to prepare the necessary steps.

Topic 7: C. BRUYNINX: reports on the current status of the Permanent EUREF Network.. In 1999 altogether 21 new sites have been installed, some have been excluded due to too large gaps in their data records. An increasing number of stations has changed to deliver their data hourly instead of daily. According to an improved distribution now the most sites are controlled by three analysis centers, so that the reliability of the results is significantly improved.

Representatives of the EUREF subcommission (E. GUBLER, J. A. TORRES, W. GURTNER) have written a letter to B. Engen as Norwegian delegate to urge Norway to install at least one permanent station on its territory and to guarantee the suitable maintenance of this site by. The site was installed and the test phase has started so that hopefully Norway will be part of the Permanent network again.

W. Gurtner reports on the hourly data flow project started about one year ago. Although this attempt was not an official one the experiment worked rather satisfying. The majority of the presently 14 participating sites deliver their data with a delay of only few minutes, some, however, rather late. Organisational problems causing delays are to be solved if the hourly data flow should become standard. Presently the most processing centers use only daily data, so it has to be decided how to proceed in order to avoid useless work as well as enormous data sets which practically have the same contents. The results of hourly and daily data respectively are mostly identical, however, sometimes very interesting effects can be interpreted in the quasi real time data. Considering the improved possibilities the hourly data delivery could become standard in future, in this case, however, all sites have to switch to this system.

It is agreed to discuss this item at the next symposium and – if it is officially decided to continue this program – to nominate a special project leader for this subject.

G. WEBER as new appointed troposphere coordinator gives a short report on the activities on this item which is dealt by the BKG as regional data center. A cooperation with other groups, e.g. IGS and COST716, is agreed. Moreover, it was agreed to storage centrally the meteo data of the European Water Vapour Radiometers on the BKG FTP server.

Concerning the restructuration or the Permanent EUREF Network, C. BRUYNINX mentions that the results are more and more used for different purposes. So it has to be considered whether it would be useful to establish a governing board similar to IGS (5 – 6 people) and establish the group as a e.g. ”management board” in order to justify what this group is doing. The label ”service” in the sense of IAG is reserved for really internationally working groups, although the Permanent EUREF Network in its work is rather similar to ILRS or IGS. C. BOUCHER proposes to keep this item till the IAG has renewed its structure and then discuss again whether the Permanent EUREF Network can become an ”IAG service”. In any case this group should try to become a ”European Service” in order to receive financial support from the European Community as COST also does. J. A. TORRES proposes to announce officially to the public at the next symposium that EUREF offers ”services”, e.g. Permanent EUREF Network and to define exactly which ”service products” can be offered.

Topic 8/9: The BKG computes a combination of nine different EUREF solution as contribution to ITRF2000, the work is planned to be finished till end of March 2000. The complete data set comprises 183 weeks, 95 stations, about 9 Mio observations, 6 Mio parameters and 600 unknowns. A comparison of the station velocities within EUREF and those of the ITRF shows, as already mentioned in topic 2, an obvious error in the results for the site Ankara. In this context, W. GURTNER emphasizes the need for general guidelines how to handle the data, e.g. to define how to distinguish random noise effects from important outliers. C. BRUYNINX adds that the developing possibility of combining different techniques offers the possibility to detect errors and analyze their origine. C. BRUYNINX, G. WEBER and Z. ALTAMIMI are asked to try to define relevant guidelines and present their findings at the next TWG meeting.

As another contribution to the definition of a new ITRF2000, the EUVN97 GPS-campaign with its 217 sites has been submitted to the IERS.

Topic 10/11: C. BOUCHER reports on the recent Galileo GEMINUS meetings. It is decided to start with the definition phase at the end of 2000. The next third meeting on user requirements will take place in May 2000. The different user groups who are interested in this navigation system mostly are professional groups managing navigation (car navigation, road systems, railways, air crafts, sea and maritime navigation). The overall organization of Galileo is managed by GALA.

C. BOUCHER is asked to care about the final report and circulate it in the EUREF group. C. BRUYNINX adds that she definitely asked to be involved in the planning phase in order to define the system architecture in time, so hope that in May we will be informed more on frequency definition which is a most interesting item for EUREF. Moreover C. BOUCHER is asked to contact GALA representatives to hold a one day meeting together with EUREF TWG representatives between mid April and May in Paris or Brussels, moreover he should invite a GALA representative to give a report at the EUREF TWG meeting to present a report on the project.

It can be expected that Galileo will be based on a tracking system defined in ITRF and in this way be correlated to GPS. It would be appreciated if Galileo also would be related to the Permanent EUREF Network. C. BRUYNINX should

contact EGNOS network manager directly to discuss common interests.

Topic 12: B. HARSSON reports on the preparations for the coming EUREF symposium in Tromsø from June 22 – 24, 2000. The participants are urgently asked to registrate not later than mid of May because the capacity of the hotels will be rather limited. A circular letter reminding to registrate will be sent by e-mail. As usual each one representative from economically poor countries will receive financial support, up to now 10 countries have asked for financial help. A post conference tour will take place from June 25 – 27. For further information see http://www.gdiv.statkart.no/EUREF2000/.

Topic 13: B. HARSSON and J. IHDE inform on the activities concerning ISO 15046. The referencing by coordinates or geographic identifiers becomes an increasing tool in geodesy, engineering and navigation. The ISO 15046 should especially help to use definite formulae for the coordinate transformations from one datum to another one. Concerning the height system it was decided to use normal heights for geographical information systems.

Topic 14: The topic *common reference system for airports* was initiated at the last TWG meeting, C. BOUCHER, P. DUNKLEY and P. HARSSON were asked to develop some ideas to this item. A paper by P. HARSSON is distributed. In Norway meanwhile all airports refer their coordinate system to EUREF. P. DUNKLEY mentions the need to use the same geoidal model for all European countries in order to use consistent system, otherwise shifts of meters are possible. W. GURTNER adds that this request can be solved on cm-level on the basis of EUVN, UELN and the European Geoid. As a first step it should be tried to generate pointwise a geoid defined by EUVN. W. AUGATH is asked to compile a description with a formal definition of the European height definitions and to circulate this draft among the TWG before the next meeting.

Topic 15: J. IHDE and W. SCHLÜTER inform on the very encouraging tendency that EUVN is going to become the definite European vertical reference. This goal only can be reached if the EUVN project will be completed in time. The GPS part is already finished, the levelling and tide gauge part, however, turned out to be rather difficult and time consuming. About 60% of the tide gauges information is already available. It is planned to send a colleague to the Permanent Service for the Mean Sea Level in order to collect the missing data. A presentation of a final report at the next EUREF symposium will not be possible, it can be expected to complete the work till 2001.

Topic 16: J. IHDE inform that meanwhile the results for the Romanian part in UELN 95/98 are available. The data proved that the gravity information is obviously not correct because the results are better fitting without gravitational correction. Unfortunately it cannot be expected in the moment to receive better data.

The works for the Baltic countries are very promising. It is hoped to get the still missing data from Russia so that the Baltic Ring can be closed definitely.

Topic 17: W. AUGATH reports that the EVS project made no considerable progress in the last time. The adjustment of a test area (Netherlands, Denmark, Northern Germany) is still in preparation.

Topic 18: W. GURTNER informs on the planned pilot phase of the inclusion of GLONASS into IGS in 2000. As a specific problem the concentration of GLONASS receivers within Europe as well as the low number of working satellites are to be considered.

Topic 19/20: H. V. D. MAREL gives some information on the COST 716 workshop in Matera, March 2000 and the next one in Oslo, July 2000. Some comments on COST WEGENER are given by J. A. TORRES.

Topic 21: E. GUBLER mentions a letter from the national mapping agency of Tunisia in which the interest in the work of EUREF is expressed. An invitation to participate at the next EUREF symposium was sent out. J. A. TORRES declares to participate at a workshop in May in Tunis.

Concerning the compilation of an African Continental Reference, C. BOUCHER mentions the numerous attempts undertaken in the past. As a suitable example the South American SIRGAS is mentioned.

The autumn TWG meeting in 2000 is scheduled for October 9 – 10 in Lisbon.

W. GURTNER informs that Sweden has submitted a recomputation of the Swedish network including exterior sites. Some TWG members (BOUCHER, BRUYNINX, GURTNER, V. D. MAREL) will prove the data and present their findings at the next TWG meeting.

J. Adam distributes a flyer concerning the 2001 IAG Scientific Assembly in Budapest.

C. BOUCHER proposes to put the geophysical interpretation of permanent station results as item on the agenda for the next TWG meeting. A. CAPORALI and A. KENYERES are asked to present their ideas to this topic.

W. SCHLÜTER adds to care also about the inclusion of other techniques than GPS into EUREF, especially the data of those sites where different techniques are applied simultaneously. I tis proposed to invite J. Campbell to Tromsø for a presentation on the European VLBI Project.