49th Meeting of the EUREF Technical Working Group in Budapest, 26. – 27. March 2009

Next events:

- TWG 2009 Symposium Meeting: Florence, 26 May 2009 (whole day)
- Symposium 2009: 27 – 29 May 2009 (30 May: technical excursion), Florence
- TWG 2009 Fall Meeting: Padova, 13 October 2009 (whole day)

Meeting place: FÖMI headquarters, Budapest, district XIV, Bosnyák tér 5 (lat: 47°31'08"N - lon: 19°06'50"E)

Time schedule: Thursday, 26.02.2009, 13.00 - 18.30
Friday, 27.02.2009, 08.30 - 12.30

Agenda

1. Opening (Bruyninx)
2. Minutes of the 48th TWG meeting in Munich (all)
3. EUREF Permanent Network
   a) EPN CB status report (Bruyninx)
   b) EPN real-time Special Project (Söhne)
   c) EPN analysis (Habrich)
      – Update of the hourly combination
      – EPN multiyear solution
   d) EPN reprocessing activities (Völksen)
   e) EPN/ETRS89 maintenance (Kenyeres)
4. Coordinates of EPN stations in national ETRS89 realizations (Brockmann)
5. Preliminary results of the Italian Rete Dinamica Nazionale (RDN) of Istituto Geografico Militare Italiano and its alignment to ETRF2000 (R05) (Maseroli, Caporali)
6. EVRS2007 distribution of data and recommendations for the EC (Ihde)
7. ECGN continuation (Poutanen, Ihde)
8. EUVN_DA final report (Kenyeres)
9. INSPIRE (Torres)
10. TRS89 Working Group (Lidberg, all)
    – Discussion of the draft charter
    – Role of ETRS89 velocities in national densifications
    – Use of ETRS89 by scientific community
11. Organization of EUREF2009 (Maseroli, all)
12. EUREF home page (Hornik, Ihde, Vasconcelos)
13. Proceedings EUREF2007 and EUREF2008 (Hornik, Ihde, Bruyninx)
14. Divers
    a) ICG3 meeting in Pasadena (Ihde)
    b) EUREF campaign data base (Stangl)
    c) GGSP/GRSP (Söhne)
    d) GEOSS Architecture Workshop (Torres)
    e) Database for supporting meteo data exploitation within GNSS analysis (Dousa)
15. Next TWG Meeting (All)
16. Action Items (all)

Participants

ZUHEIR ALTAMIMI, Paris
ELMAR BROCKMANN, Berne
CARINE BRUYNINX, Brussels (Chair)
ALESSANDRO CAPORALI, Padova
JAN DOUSA, Prague
RUI FERNANDES, Covilhã
HEINZ HABRICH, Frankfurt a.M.
HELMUT HORNIK, Munich (Sub-comm. Secretary)
JOHANNES IHDE, Frankfurt a.M. (Sub-comm. Chair)
AMBRUS KENYERES, Budapest
MARTIN LIDBERG, Gävle
RENZO MASEROLI, Florence (guest)
MARKKU POUTANEN, Helsinki
HERMANN SEEGER, Bad Neuenahr-Ahrweiler (hon. member)
WOLFGANG SÖHNE, Frankfurt a.M.
GÜNTER STANGL, Graz
JOAO AGRIA TORRES, Lisbon
CHRISTOF VÖLKSEN, Munich (guest)

apologized: WERNER GURTNER, Berne; JAAKKO MÄKINEN, Helsinki

Minutes

Remark: The presented papers and view graphs are published, as far as available, on the EUREF homepage (*http://www.euref.eu/TWG/EUREF%20TWG%20minutes/49-Budapest2009/TWG-Budapest2009.html*).

1. Opening

In her property as chairwoman of the EUREF Technical Working Group (TWG), C. BRUYNINX opens the meeting and welcomes the participants. She thanks the Földmérési és Távérzékelési Intézet (Institute of Geodesy, Cartography and Remote Sensing – FÖMI) for hosting this TWG meeting. On behalf of the FÖMI, General Director Dr. SZ. MIHALY expresses his pleasure to host the meeting. SZ. MIHALY describes the activities of the FÖMI on all fields of geodesy, remote sensing and GIS. Especially the role of the already longtime operating satellite station Penc is mentioned as this station was engaged in common campaigns of countries in eastern and western Europe as well and thus contributed much to the communication between the formerly separated parts of Europe.

2. Minutes of the 48th TWG meeting in Munich

The minutes of the last TWG Meeting in Munich, 03.-04.11.2008, were distributed among the TWG members. Some few corrections are to be attached. The final text is published in the EUREF homepage <*http://www.euref.eu/TWG/EUREF%20TWG%20minutes/48-Munich2008/twg-08-11-munich-minutes.pdf*>.

3. EUREF Permanent Network

a) EPN CB status report

A written report by C. BRUYNINX is distributed. Altogether 9 new stations (4 – Austria, 1 – Slovakia, 2 – Portugal, 2 – Spain) have been included into the EPN in the recent period. One site in UK has been decommissioned. 5 stations (France, UK, Northern Ireland, Greece, Azores/Portugal) are proposed to be introduced, partly to replace older ones. The number of sites which record GLONASS data simultaneously to GPS data is steadily increasing.

C. BRUYNINX informs on various updates of the EPN CB web site (station coordinates web Page,"Special Project on Real-Time Analysis", on-line site log submission). The TWG members are asked to test the on-line site log submission by access with password and to submit all comments to the EPN CB. Then in April 2009 the website will be opened for the public.

The EPN CB has now a license to access the GEO++ antenna calibrations database. The information will be used to maintain a calibration file containing all the best possible calibrations for the EPN stations.

The abstract for a paper by the EPN Coordination Group has been submitted to the LOC of the coming 2009 IAG Scientific Assembly in Buenos Aires.

b) EPN real-time Special Project

W. SÖHNE shows an overview on new or changed EPN RT data streams since last TWG meeting. As concluded at the last TWG meeting, the draft of the webpage for this project has been improved and circulated by e-mail. The TWG discusses this new presentation and finally asks W. SÖHNE for a further improvement. The new page also should comprise a link to the article "W. SÖHNE, A. STÜRZE, G. WEBER: *Enhancement of EPN real-time data streams*, presented at the TWG Munich Nov. 2008". After one month the update should be completed and then be circulated among the members of the SP-WG as well as the TWG members. After approval the new website has to be installed and announced by EUREF-mail.

The IGS has expressed the request for an official invitation from EUREF to have an official delegate in the project members group in the Real-Time Special Project. C.

BRUYNINX comments that any possible conflicts with the IGS should be avoided and EUREF should not compete with IGS in this point, in fact the EUREF activities are to be clearly listed.

c) EPN analysis

– Update of the hourly combination

– EPN multiyear solution

The essence of a questionnaire distributed among the LACs yields an agreement to continue the combination of hourly and daily EPN solutions for event identification. Non-homogeneous LAC solutions will be accepted in future, too.

H. HABRICH explains the effect of interesting insights when solutions basing on different time periods are analyzed. As example he shows the results of the EPN site Osjek with an event of unusual heavy snowfall within a short time period. While the 4-hours solution yields significant deviations in the results, these effects are rather smoothed in the 24-hours solution.

In the near future a warning/information system for wrong or unclear data records is going to be established. Hourly available messages will indicate in green/yellow/red colour the current state of any respective EPN station.

Considering the presently available facilities (mainly manpower), the permanent hourly analysis for all EPN sites can hardly be managed. Therefore the TWG recommends to install a reliable working "daily alarm" based on the daily rapid solutions to be of prior importance. The experiences should be submitted to the TWG before the next meeting and then be discussed at the meeting in order to set next steps as far as necessary.

d) EPN reprocessing activities

A file prepared by CH. VÖLKSEN on this topic has been distributed by circular. CH. VÖLKSEN explains the various correlations of the coordinates computed with respect to the input data as well as parameters, e.g. reference system realizations, correction models, analysis strategies, orbits and ERPs. Thus inconsistencies in the long coordinates and time series are occurring, especially after changes of the modelling parameters. The plan to reprocess the long time series of numerous EPN stations aims on a consistent processing strategy and thus to receive more reliable results. A first attempt for reprocessing has been carried out by the Potsdam-Dresden-Group for the data sets from 1994 to 2007.

On a call for participation all invited LACs declared to be willing to participate in this project. The majority of the LACs is using the Bernese Software, some, however, make their data processing by other software packages. The comparison of the results basing on identical input data would be of special interest.

The TWG finally decides to define a new EUREF Special Project "EPN Reprocessing". It is agreed that possibly several steps of subsequent solutions will be necessary to yield a satisfying result. CH. VÖLKSEN is asked to form a Working Group with about 10 members (LACs, members of large) to investigate this problem in detail. A call for participation should be sent out inviting everybody who is interested and ready to contribute is invited to participate.

e) EPN/ETRS89 maintenance

As A. KENYERES explains, the EPN Cumulative Solution was started within the CATREF (Combination and Analysis of Terrestrial Reference Frames) Project using the weekly combined EPN solutions. The present method is based on a reference network selection based on a selection of 22 sites which are considered to be highly reliable over long and continuous observation periods. The sites within the EPN Cumulative Solution are categorized relative to the length of observations and their quality into 2 classes, i.e. category A with 1 cm accuracy ETRS89 coordinates and 1 mm/year velocity at any epoch, category B with 1 cm accuracy ETRS89 coordinates at the mean epoch, but without consideration of the velocities. The experience shows that velocities only should be estimated when continuous observation records of at least 2 years are available.

The datum definition for the EPN Cumulative Solution is the same as used for the ITRF2005 densification. For testing and analyzing the results a continuous series of cumulative solutions with updates of each 5 weeks has been computed.

As conclusion A. KENYERES states that the EPN Cumulative Solution is capable to maintain 1 cm accuracy for the ETRS89 coordinates for the EPN sites.

In the discussion it is emphasised that the users should clearly be informed whether the ETRS2005 or EPN solution should be used for national densifications. Despite the fact that the individual countries mainly will proceed considering their respective demands and limitations, they should be advised on the quality of the relevant sites. Although the Earth is a deforming body and thus coordinates are no absolutely fixed values, the actually best possible way based on an agreed frame has to be formulated noting that changes from time to time occur.

The TWG asks A. KENYERES to implement the recommendations of the TWG into his multi-year solution and to prepare a new document concerning in which the guidelines for national EUREF densifications will be formulated. The document will reflect the latest evolution. The document will be compiled by C. BRUYNINX (chair), A. CAPORALI, A. KENYERES , G. STANGL, J. TORRES, M. LIDERG and Z. ALTAMIMI. The draft will be circulated among the TWG in mid April, comments be submitted till mid May, the final text be submitted to the Florence Symposium.

4. Coordinates of EPN stations in national ETRS89 realizations

At present the EPN comprises 218 sites distributed over 38 different countries. E. BROCKMANN states that for some EPN sites relatively large outliers especially in the vertical component (up to 25 cm) occur. In order to use the EPN results in the best possible way and to improve steadily the quality, the individual countries should be asked to show clearly how they process the EPN coordinates for their national systems. The goal of this project which was initiated at the LAC Workshop in Frankfurt, end of 2008, should be

a collection of all EPN sites which are used in the countries for reference frame realization and which therefore have official national ETRF coordinates.

To reach this goal, the motivation for the project has to be clearly explained. J. TORRES mentions that the results would be highly interesting for INSPIRE. Various efforts are undertaken to install a homogeneous reference for Europe. Thus this project could serve a lot to improve the consistency of the coordinates systems.

Finally it is concluded to ask the countries officially by circular letter to prepare their national reports for the coming 2009 EUREF Symposium in Florence especially in this way. E. BROCKMANN will compile a letter to all National Geodetic Survey Agencies to present in their National Report to the Florence Symposium an overview on the use of EPN coordinates in the respective countries. J. IHDE and H. HORNIK will take care to distribute the letter to the relevant addressees.

5. Preliminary results of the Italian Rete Dinamica Nazionale (RDN) of Istituto Geografico Militare Italiano and its alignment to ETRF2000 (R05)

A relevant report on the RDN had been submitted to the last TWG Meeting in Munich, 03.-04.11.2008. After an intensive discussion the authors were asked to prepare a new version following the remarks of the TWG and to present the text to the TWG again. The updated version was distributed before this meeting by circular.

Originally the RDN comprised 100 sites. Station Palermo had been dropped due to insufficient results. Further now only 13 ITRF sites are used for reference, station Hafelekar had been excluded, too. In all the network comprises 45 stations which are part of the previous system IGM95. Under the request of an accuracy of 3 cm, the expected lifetime of the RDN is estimated with about 10 years. For some regions, especially in South Italy, this time period may be even shorter.

After a detailed discussion the TWG accepts the presented RDN solution as class B[1] under the condition that the height component is checked for antenna influence. A. CAPORALI will inform on the findings in an e-mail and submit a final report to the Florence Symposium. Moreover the authors will submit all relevant information on the campaign to G. STANGL to be included into the EUREF Campaigns Data Base.

[1] The classification code for individual stations is the following:
- Standard A: 1 cm accuracy for each component of the three-dimensional position in ETRS89 (1 ó level) for epoch 1989-99.
- Standard B: Same accuracy, but guaranteed only at a specific epoch (when the velocities are insufficiently accurate).
- Standard C: 5 cm accuracy, as in A.

6. EVRS2007 distribution of data and recommendations for the EC

Referring to Resolution no. 3 of the 2008 EUREF Symposium in Brussels[2], J. IHDE reports on the recent development. It was proposed to distribute the results and compile a new set of CRS-EU transformation parameters. All countries should be asked to agree on the data exchange. However, not all countries which participated in the EVRS2007 had sent delegates to the Brussels Symposium and thus could not be contacted in tis matter. After an action by questionnaire finally in October 2008 an agreement could be yielded. The agreement says that the results are to be exchanged among the individual countries, but without any observation data. As only exception Bosnia-Herzegovina did not agree, this reaction, however, may be due to unclear responsibilities. Thus it finally was concluded to exclude this country from the exchange.

J. IHDE emphasizes that this progress marks an important step towards a common high precise vertical system for the European continent. He expresses his hope that the EC will adopt the solution.

7. ECGN continuation

M. POUTANEN introduces on the status of the ECGN (European Combined Geodetic Network). An ECGN Working Group is going to be created, its members should be the operators of all included techniques, the EUREF-TWG and GGOS.

The ECGN is considered as a European contribution to the IAG Project Global Geodetic Observation System (GGOS). At the business meeting of the IGGC (International Gravity and Geoid Commission) at the Gravity and Geoid 2002 Symposium in Thessaloniki the ECGN project as a cross-commission project was approved. The primary concern of the project consists in connecting the height component with the gravity determination while allowing for measuring data that are acquired in the European coastal regions and above adjacent seas.

As objectives of the ECGN as an integrated European Reference System for Spatial Reference and Gravity are to be noted

- maintenance of a long term stability of the terrestrial reference system with an accuracy of 10'-9 for Europe especially in the height component,

[2] Resolution no. 3:

The IAG Reference Frame Sub-commission for Europe (EUREF)
- recognising the requirement of the European Commission for harmonisation of the vertical reference system for geo-information
- noting the availability of a new realisation of the European Vertical Reference System (EVRS) in agreement with the EVRS2007 conventions
- recommends to adopt this new realisation of the EVRS under the name EVRF2007 and to exchange the results between all participating countries and
- proposes to the European Commission that this solution is adopted as the vertical reference for pan-European geo-information.

– in-situ combination of geometric positioning (GPS) with physical height and other Earth gravity parameters in 1 cm accuracy level,
– modelling of influences of time-dependent parameters of the solid Earth, of the Earth gravity field, the atmosphere, the oceans and the hydrosphere for different applications of positioning.

Further the ECGN should contribute to
– the European gravity field modelling,
– the modelling of gravity field components to validate the satellite gravity missions CHAMP, GRACE and GOCE,
– present a platform for further geo-components (GMES, GEOSS. GGOS).

As input data the records of techniques such as VLBI, SLR, GNSS, DORIS, levelling, tides gauges, gravimeters (absolute, superconducting, spring) are mentioned.

In the following M. POUTANEN describes shortly the present development and organisational status of the mentioned techniques.

Initially about 70 stations were selected to form the ECGN, later the number was reduced to about 50 as the other ones turned out to be not suitable.

Finally M. POUTANEN lists various recommendations, time schedules and topics to be discussed
– renewal of the Working Group,
– update objectives, tasks, guidelines,
– redefine/update the ECGN station criteria,
– inventory of current ECGN-related activities,
– update the 1st call,
– (meta)data portal,
– organizational aspects, status of EC,
– funding,
– how to keep on the activity and where to get resources.

In the discussion it is stated that since the start of the ECGN not much progress was achieved although the need for the development of the ECGN is agreed. Therefore the work is to be urgently re-activated. Z. ALTAMIMI adds that in the GGOS similar problems arise. Although the IAG Services generally achieve much progress, the common use of the various data is not yet developed as desired. J. IHDE complains that the co-location of the different data sets on stations equipped with multi-techniques is still not sufficiently solved.

8. EUVN_DA final report

A. KENYERES gives a summarizing report on the progress of the EUVN_DA. The numerical results have been submitted to M. SACHER to be used for the computation of the EVRS2007. Further the data have been sent to H. DENKER in Hannover to contribute to the European Geoid computation which is expected to be completed in the near future.

The final solution of the EUVN_DA is still in preparation as some input data are not yet available. It is concluded that a final report is to be completed anyway as far as possible in early May to be presented to Florence Symposium.

9. INSPIRE

J. A. TORRES reports that about 300 comments have been submitted as answer on the distributed version 2. As far as possible the comments will be considered for the implementation of version 3 which is planned for release in April 2009. J. A. TORRES emphasizes that the goals of INSPIRE are strongly related with those of EUREF concerning the infrastructure for spatial information in Europe. Therefore some members of the EUREF TWG were asked for comments on the definition of an European coordinate system. The ETRS89 is adopted by the EC as European reference system, however, this systems does not fit sufficiently for regions outside of the stable part on Europe and with large terrain movements as well as countries with overseas possessions.

J. A. TORRES invites all TWG members for their comments to these topics. An updated report will be submitted to the next TWG meeting.

10. ETRS89 Working Group

A draft paper by M. LIDBERG has been distributed by e-mail. The ETRS89 has been introduced mainly to serve user needs to harmonize geo-referencing applications throughout Europe. The successive realizations of ETRS89, derived from different ITRF's have caused occasionally coordinate shifts.

As objectives for the ETRS89 Working Group M. LIDBERG mentions
– the clarification of the definition of ETRS89 and its target groups (documentation on ETRS89; how it has been used in the past and how it should be used in the future, handling of intra plate velocities in terms of ETRS89, use of ETRS89 in the scientific community),
– approaches for the long-term maintenance of the ETRS89 with special attention to the potential benefit from EPN.

A working plan should clearly show the
– development of the ETRS89 up to now,
– the conceptual use of ETRS89 at present and in future,
– future maintenance of ETRS89.

It is emphasized to consider among all topics especially the user requirements. After a detailed discussion the TWG concludes to
– enforce the discussion of the draft charter,
– investigate the role of ETRS89 velocities in national densifications,
– define the use of ETRS89 by scientific community.

The presented charter should be fixed now, details for the layout be submitted within one week and then be distributed.

The future ETRS89 Working Group should be chaired by M. LIDBERG and be enlarged by the TWG members Z. ALTAMIMI, E. BROCKMANN , C. BRUYNINX, A. CAPORALI, J. DOUSA, R. FERNANDES, J. IHDE and J. TORRES. Further

L. BIAGGI, C. BOUCHER, P. HÄKLI and J. LEGRAND will be invited to participate. M. LIDBERG will contact all proposed members for agreement, a meeting will at least take place the day before the Florence TWG meeting, A. CAPORALI will be contacted for arrangements.

11. Organization of EUREF2009

A. CAPORALI explains the plans how to arrange the 2009 EUREF Symposium in Florence. Special attention should be paid on the present *Year of Astronomy* and *400 Years Galileo Galilei*.

The Scientific Sessions will be as follows:

1 – Activities of the TWG (chair: J. IHDE, C. BRUYNINX)

2 – New developments in GNSS (EPN, other networks, real time, GLONASS/Galileo) (chair: H. HABRICH)

3 – Modelling the Earth with GNSS (tropo-, ionosphere, deformations) (chair: J. DOUSA)

4 – Mitigation of GNSS error sources (calibration issues, re-processing, new models) (chair: E. BROCKMANN)

5 – Height, gravity, geoid, GGOS (chair: M. POUTANEN)

6 – Improvements and densifications of the ETRS89 (chair: J. TORRES)

7 – National Reports (chair: J. KRYNSKI)

The Opening Session will be chaired by A. CAPORALI, for the Closing Session another Italian colleague will be nominated.

J. IHDE and C. BRUYNINX will formulate the objectives of the Symposium in general and send the text to the LOC asap to be put into the website. The chairpersons will compile short chapters as objectives for each session till March 4 and send the texts to H. HORNIK to be collected and then be sent to J. IHDE and C. BRUYNINX for approval and be submitted to the LOC for the website as well.

A deadlines are defined

– abstract submission: mid April,

– registration: May 10.

As already done for the 2008 Symposium,. C. CALVERT offers again a *best students poster award.*

12. EUREF home page

J. IHDE presents a draft for the update of the EUREF home page. He emphasizes that links to other websites form an important part. These links will not be changed. Therefore the main task to update the existing website is to make it more attractive and clear for the users especially those who are not familiar with EUREF.

G. STANGL remarks that the term "documentation" is not clear enough and could have different meanings, so it should be changed to "guidelines". Further it is objected that the terms "projects" and "initiatives" cannot be clearly distinguished. C. VÖLKSEN proposes to install an explicit "search function" to help the user to find the needed information. Moreover a button "news" as well as a possibility to subscribe for the mailing list should be installed.

The TWG asks H. HORNIK and J. IHDE to formulate a new draft especially concerning part "projects/initiatives" and to be distributed among the TWG till end of March.

13. Proceedings EUREF2007 and EUREF2008

The deadline for the submission of contributions of the 2008 EUREF Symposium in Brussel for publication in the BGG is finished. Parallel to the BGG publication of some selected papers all available contributions will be published in the traditional BKG series. The collecting of contributions should be finished and the editing be started as soon as possible.

14. Divers

a) ICG3 meeting in Pasadena

J. IHDE gives a summarizing review on the 3rd Meeting of the International Committee on Global Navigation Satellite Systems (ICG) in Pasadena, 08-12.12.2008. The ICG is working on voluntary basis under the umbrella of the UN. The goal is to enforce the cooperation between the nations and institutions operating navigation and other space systems, further to promote the use of GNSS especially in developing countries. EUREF is integrated in the ICG as an associate member.

It is mentioned that the ICG represents mainly a group to support organisational and political aspects of navigation and GNSS. The IAG is a scientifically orientated institution and thus not engaged in the ICG. The UN, however, make efforts to integrate the relevant IAG Sub-commissions into the ICG and consider them as associate members.

b) EUREF campaign data base

G. STANGL reports that unfortunately no information could be received up to now from H. V. D. MAREL as former organiser of the data base. The present status refers to 19 98/99, so G. STANGL will start to collect information from other sources by himself.

It is proposed to compile a relevant website, the link to the EUREF homepage is then to be installed by M. VASCONCELOS. The TWG asks G. STANGL to prepare a draft website to be distributed among TWG for comments one month before the Florence Symposium, the result then should be presented to Symposium.

c) GGSP/GRSP

W. SÖHNE gives a short report about the progress of European's GNSS Galileo. The Galileo procurement for the Full Operational Capability (FOC) infrastructure started in July 2008. A short list of eleven contenders for the six working areas was announced in September. For the Ground Mission Segment (GMS), Thales Alenia Space (France) and Logica (United Kingdom) were selected. Both GMS aspirants asked the consortium of the Galileo Geodetic Service Provider (GGSP) prototype (with BKG and IGN) to give a proposal as Galileo Reference Service Provider (GRSP) external entity. The decision by EC and ESA about the six working areas is expected to come in May or June 2009.

d) GEOSS Architecture Workshop

J. TORRES presents his report on the IAG perspective on Coordinate Reference Systems for GEOSS (Global Earth Observation System of Systems) given at the XXV GEOSS Workshop *Perspectives on GEOSS Architecture: Principles and Implementation* from 03-04.12.2008 in Valencia. The *Architecture Task AR-07-03* has the purpose to ensure the availability of accurate, homogeneous, long-term, stable, global geodetic reference frames as a mandatory framework and the metrological basis for Earth observation. Steps are to be identified to proceed towards ensuring such reference frames for Earth observation and the observing systems contributing to GEOSS. The work to be performed covers user requirement coordination and georeferencing.

In the following J. TORRES characterizes the issues of the IAG, space geodetic observing systems (VLBI, ILRS, IGS, DORIS, altimetry etc.), the geodetic reference systems and frames (ITRS, ITRF) and their relationship with other systems (WGS84 etc.), GRS for geo-spatial referencing and regional initiatives. As conclusion it is stated that

- the present geo-referencing systems are realized through an observing system based on geodetic space techniques,
- there is a strong international effort and cooperation for the maintenance of the global and regional geodetic reference frames,
- the description of geodetic reference systems is the aim of the ISO 19111 Geographic Information – Spatial referencing by coordinates,
- WGS84, ETRS89, PZ90, GTRF are all connected to (compatible with) a Unique System, i.e. the ITRS.

The TWG proposes that J. TORRES should present this report again at the coming EUREF Symposium 2009.

e) Database for supporting meteo data exploitation within GNSS analysis

J. DOUSA remembers the modification of the Bernese Software in 2005 by which the analysis of the data was considerably improved and significantly better results can be yielded. He emphasizes that the advancement of the project needs the feedback of all participating groups as well as a sophisticated use of the data base. J. DOUSA expresses his confidence to develop suitable procedures to be applied in particular for EUREF. By support of the MOU with EUMET, EUREF has an excellent position to use the relevant meteo data.

In the discussion it is emphasized to develop the methodology commonly with those of the real time activities of W. SÖHNE. Concluding this topic the TWG asks J. DOUSA and W. SÖHNE to present a common proposal on the use of meteo data and provide it as input for the EPN. A relevant report should be presented to the next TWG Meeting.

15. Next TWG Meeting

The next TWG meeting will be held as usual the day before the EUREF Symposium, i.e. on Tuesday, May 26, 2009, in Florence.

M. LIDBERG invites the TWG to hold its 2009 Fall Meeting in Sweden. In order to minimize time consuming travelling the meeting should be possibly in Stockholm[3].

16. Action Items

C. BRUYNINX and H. HORNIK will complete the action items and distribute them among the TWG by circular in the next days.

[3] Meanwhile A. CAPORALI proposed to have the meeting in Padua just before the Galileo symposium to which probably several members of the TWG will go. The meeting will take place in on Tuesday, Oct. 13, 2009, full day.