

# EUREF and the Next IAG Structure

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## 1. Introduction

EUREF was constituted at the IUGG (International Union of Geodesy and Geophysics) General Assembly held in Vancouver, 1987, as a Sub-Commission of IAG's (International Association of Geodesy) Commission X - Global and Regional Geodetic Networks, under Section 1 – Positioning, with the purpose to establish and maintain the European Reference Frame.

During the IAG General Assembly held in Budapest (September 2001) the new Statutes and By-laws were approved. In practice, a new structure for IAG was defined, to be effective after the IUGG (International Union of Geodesy and Geophysics) General Assembly that will take place at Sapporo, Japan, in June-July 2003.

Following this decision, the EUREF Sub-Commission started to discuss internally its role within the new IAG structure, in order to contribute in a positive way to the work of the *IAG Committee for the Realization of the New IAG Structure*. This was also a good motivation to bring all the wide community interested in the work of this Sub-Commission to the discussion about its future, concerning not only the redefinition of its objectives in the mean term but also the main requirements for its work, under the scientific and practical points of view.

This report presents a short description of the new IAG structure, a review of the main actions developed by EUREF in the suit of this subject and a summary of the discussions and the resultant conclusions.

## 2. The new IAG structure

The new IAG structure is the result of the approval of its new Statutes and By-laws during the General Assembly held in Budapest in September 2001. The new structure comprises:

- Commissions
- Services
- IAG projects
- Inter-Commission Committees

The Commissions and Services listed in the By-laws are the following:

### Commissions

- 1: Reference Frames
- 2: Gravity Field
- 3: Earth Rotation and Geodynamics
- 4: Positioning and Application

### Services

- International GPS Service;
- International VLBI Service
- International Laser Ranging Service
- International Gravimetric Bureau
- International Geoid Service
- International Center for Earth Tides
- International Earth Rotation Service
- Permanent Service for Mean Sea Level
- Time Section of the International Bureau of Weights and Measures

Besides the Commissions and Services defined in the By-laws, the following components are being proposed:

- Inter-Commission Committee on Theory
- Inter-Commission Committee on Geodetic Standards
- Project IGGOS (International Global Geodetic Observing System)

In the meanwhile, the 'IAG Committee for the Realization of the New IAG Structure' was created; one of its tasks is the mapping of the existing structure into the new one. The most relevant documents are related with a meeting of this Committee held at Nice, April 26, 2002, attended by GERD BOEDECKER, ALAN DODSON, RUTH NEILAN, C. K. SHUM, FERNANDO SANJO, KLAUS-PETER SCHWARZ, CHRISTIAN TSCHERNING, CLARK WILSON, PEILINAG XU and ERWIN GROTEN, and with written contributions from E. GROTEN (Geodetic Standards), M. SIDERIS (Commission 2: Gravity Field), P. XU (ICC on Theory), CH. TSCHERNING (Outreach Branch), C. BOUCHER and H. DREWES (Considerations concerning Commission 1)

All the documents (new Statutes, By-laws and reports of the previous mentioned Committee) are available at the IAG web site, in the address <http://www.gfy.ku.dk/~iag/newstructure/newstructure.htm>.

Concerning EUREF, the considerations about the future Commission 1: *Reference Frames* are the most important. The following general statements (among others) for Commission 1 were made (D. K. SHUM, A. DODSON):

- *Duplication of Work of the Services shall be avoided.*
- *As the name implies, the Commission shall focus on reference frame issues and offer a home to important regional IAG entities like EUREF, etc.*

The proposal emergent from discussions in Nice before, at, and after the meeting, (C.K. SHUM, G. BEUTLER, C.

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BOUCHER, H. DREWES, A. DODSON) for the organization of Commission 1 is the following:

#### Sub-Commissions (SC):

- SC1.1: Coordination of Space Techniques
- SC1.2: Global Reference Frame
- SC1.3: Regional Reference Frames
- SC1.4: Satellite Dynamics

#### Commission 1 Projects (CP):

- CP1.1: Altimetry
- CP1.2: GNSS
- CP1.3: DORIS

The purpose of Sub-Commission SC1.3 *Regional Reference Frames*, the one that is directly related with EUREF, is defined in the following way:

*Shall offer a home for service-like regional reference frame activities and address common aspects of these units. In order to avoid sub-sub-commissions (and similar nonsense), it is proposed to formally establish*

- SC1.3a: EUREF, SC1.3b: SIRGAS, SC1.3c: NAREF,
- SC1.3d: AFREF, SC1.3e: APSG, SC1.3f: SCAR (Antarctic)

*with the understanding that these sub-commissions also form the steering committee of SC3 addressing common aspects, and organizing combined workshops, sessions at workshops, etc.*

### 3. EUREF actions

At the EUREF Technical Working Group (TWG) meeting held in Padova (November 2001), the first one immediately after the IAG General Assembly in Budapest, a working group composed by Z. ALTAMIMI, W. GURTNER, H. HORNIK, J. IHDE and J. TORRES was formed, with the objective to follow the work of the before mentioned IAG Committee and prepare the relevant proposals, so that EUREF may continue to play its important role in the international geodetic community.

A brain-storming document was produced and discussed at the TWG held in Berne (March 2002). In this document the results in these almost 15 years were summarised as follows:

- a) *the European Terrestrial Reference System (ETRS89) was defined and is being adopted by several countries (NMA) and organisations (EuroControl, European Community) in Europe as the official system for geo-referencing;*
- b) *the EUREF Permanent Network (EPN) is the main support for the frame establishment and maintenance. It covers all Europe and is developing special projects with implications inside and outside the geodetic community. Its organisation is efficient; it's well recognised and is a basis for new research and developments;*
- c) *the GPS campaigns constitute another way of realizing the frame. The EUREF GPS network covers almost*

*Europe, with the exception of very few countries, and is being densified;*

- d) *the Unified European Levelling Network (UELN) also covers almost Europe, and contains also some densification; its computation (including a kinematic approach) is in progress;*
- e) *the link between the ETRS89 and the vertical component has been established via the European Vertical GPS Reference Network (EUVN); the project is almost finished;*
- f) *the European Vertical Reference System (EVRS), including a European Vertical Datum and related parameters as realisation (EVRF2000), for practical use as a static system, has been defined.*

*Now-a-days, there are several products and services available mainly through the Internet. A web page has been created, containing all the information about the EUREF activities and linking to the several sites that provide products and services, including:*

- a) *description of ETRS89, ETRFyy and procedures for computations in ETRS89;*
- b) *description of national coordinate reference systems (CRS) in Europe, following the ISO standards, as well as the transformation parameters between CRS and ETRS89 at 2 m accuracy level;*
- c) *database of GPS campaigns;*
- d) *data of the EPN tracking stations, weekly estimates and time series of the coordinates (and covariance information), troposphere parameters and information on GPS status;*
- e) *data of the levelling networks;*
- f) *coordinates and the variance-covariance information of the EUVN97 GPS network;*
- g) *relations between the European national height systems and EVRF2000.*

For the analysis of the future of EUREF (objectives, requirements, practical developments, organisation) and its position inside the IAG structure, the following statements and questions were formulated in the same document:

*The statements:*

- a) *EUREF may be regarded as a geodetic infra-structure in Europe, serving scientific and practical purposes;*
- b) *the relationships with IERS, IGS and EuroGeographics (and others) have mutual benefits;*
- c) *the results of the work are products and services, for which there is an increasing demand;*
- d) *the expectation from the outside concerning the EUREF activities is also increasing.*

*The questions:*

- a) *Is the initial objective still pertinent? Are there more requirements?*
- b) *Must the external relationships be different?*
- c) *Are the users satisfied? Is there a need to change the organisation?*

- d) *Is the communication branch acceptable?*  
 e) *What are the future possibilities for EUREF?"*

Concerning the integration in the IAG structure, several possibilities were presented in the brain-storming document:

- a) *keep EUREF as a Sub-Commission, integrated in the future Commission I, eventually reformulating the objectives and the requirements; this is more or less the present situation;*  
 b) *keep EUREF as a Sub-Commission, integrated in the future Commission I, but with a more formal link to a Service (the European branch of IGS?) with its own responsibility to provide products and services;*  
 c) *keep EUREF as a Sub-Commission, integrated in the future Commission I, and also as a formal branch of EuroGeographics for the delivery of products and services; this means that the involvement of EuroGeographics should be greater than a single Working Group;*  
 d) *create a new IAG Service for Europe. In this case, the proposal must be made before the next IUGG General Assembly, because the creation of a Service and respective tasks is a decision of the Council;*  
 e) *the combination of b) and c);*  
 f) *other?*

#### 4. A summary of the discussions

The discussion about the role of EUREF continued at the TWG meeting held in Ponta Delgada (June 2002), taking into account the 'IAG Committee for the Realization of the New IAG Structure' documents and another report on the subject, 'Contribution for the implementation of the new IAG structure', by CLAUDE BOUCHER, where it's written "... the importance of the IGGOS project and the role of its planning committee to define all actions to make it a success. Strong links with Commission 1 are definitively needed.

Furthermore, it is worthwhile to mention the recent discussions among European geodesists to answer the forthcoming calls issued by the European Commission about Integrated

Projects and Networks of Excellence. This should support the involvement of the European geodetic organizations into such projects as IGGOS or into IAG services."

All the possibilities above mentioned were discussed, concerning not only the objectives and requirements, but also the appropriate place for EUREF within the new IAG structure.

The general conclusions coming from the discussion may be summarized as follows:

- the EUREF community is very active and an excellent network of people that must be maintained;
- EUREF can go on as a sub-commission with strong liaisons to other structures (especially services);
- the initial requirements should be open in the direction of an integrated frame (linking to gravity, tide gauges, etc., where the data is needed for EUREF activities).

Finally, a proposal for a resolution on this subject, stating the agreement with the proposal of the IAG Committee, was presented and accepted by the EUREF Plenary during the Symposium held at Ponta Delgada (June 2002).

#### 5. Conclusion

The decision taken by the IAG to reorganize its structure has consequences for EUREF. This moment was found appropriate to discuss internally not only the place of this Sub-Commission within the new structure but also to make an analysis of the work developed so far and redefine, if necessary, its goals and requirements for the future, under the scientific and practical points of view.

The members had an active participation in the discussions, and a resolution was taken to support the conclusions of the 'IAG Committee for the Realization of the New IAG Structure', taking into account the existing geodetic infrastructure in Europe developed by EUREF, the maintenance of the network of people associated with the projects and the possibility that this Sub-Commission has to continue to develop its work within the new IAG Commission 1: *Reference Frames*.