

EUREF – Reference Frame Sub-Commission for Europe of IAG

Draft

Terms of Reference

PREAMBLE

Recognizing the potential of space-based geodetic techniques, in particular the Global Navigation Satellite Systems (GNSS), for the establishment and maintenance of global and continental geodetic reference frames, and the need for a modern and precise continental reference frame in Europe, the IAG (*International Association of Geodesy*) established the EUREF Sub-Commission at the IUGG (*International Union of Geodesy and Geophysics*) General Assembly held in Vancouver, 1987, under the umbrella of Commission X - Global and Regional Geodetic Networks of Section 1 – Positioning. EUREF continues the work of the former RETrig and REUN Sub-Commissions created by the IAG in the middle of the XXth century, responsible for the maintenance of the European Datum (ED), based on terrestrial techniques, and for the adjustment of the European levelling networks, respectively.

The framework to be established and maintained by EUREF should be the geodetic infrastructure for multinational projects requiring precise geo-referencing (*e.g.* three-dimensional and time dependent positioning, geodynamics, precise navigation, geo-information). Moreover, EUREF should cooperate closely with EuroGeographics (the merger of the previous CERCO and MEGRIN), the organisation of the European NMCA (*National Mapping and Cadastre Agencies*).

As a result of the implementation of the new IAG structure at the IUGG General Assembly held in Sapporo, 2003, EUREF was integrated in Sub-Commission 1.3, Regional Reference Frames, under Commission 1 – Reference Frames, with the designation *Sub-Commission 1.3a, Reference Frame Sub-Commission for Europe*.

MISSION

EUREF has been developing activities related to the establishment and maintenance of ETRS89 (*European Terrestrial Reference System*) and EVRS (*European Vertical Reference System*). ETRS89 provides geocentric, three-dimensional positions with millimeter accuracy, in a unique homogeneous reference system for the whole Europe, while EVRS does the same for the height component. These systems are the basis for geo-referencing applications in Europe, and have been recommended for adoption by the European Union, Eurocontrol and EuroGeographics. ETRS89 is ideally suited, and commonly used, as the backbone for modern mapping and Earth Science applications in Europe.

A key instrument in maintaining ETRS89 is the EUREF Permanent Network (EPN), covering the European continent with numerous well-distributed sites. The stations that form the EPN track continuously with high accuracy the GPS and GLONASS satellites, operating under well-defined standards and guidelines that guarantee the efficiency of the EPN and the long-term quality of its products. In addition, the EPN constitutes the European contribution to, and densification of, the International GNSS Service (IGS), and contributes also to the realization of the International Terrestrial Reference System (ITRS), to the monitoring of tectonic deformations in Europe, to long-term climate monitoring and to the development of the standards and the operational means to disseminate GNSS data over the Internet. Within the activities of the International GNSS Committee (ICG) of the United Nations Office of Outer Space Affairs and of the MGEX project of the IGS, several stations of the EPN are engaged with the tracking of additional experimental constellations Galileo (European Union), BeiDou (China), QZSS (Japan), in preparation of a full exploitation of all the opportunities available for the accomplishment of the mission.

GOALS AND OBJECTIVES

The long-term objective of EUREF is the definition, realization and maintenance of the ETRS89 and EVRS, in close cooperation with the pertinent IAG components (Services, Commissions, and Inter-Commission projects) as well as EuroGeographics. EUREF must provide the best possible unique and homogeneous reference system and respective realization, to be used Europe-wide in all scientific and practical activities related to precise geo-referencing and navigation, Earth Sciences research and multidisciplinary applications. For that, EUREF will make use of the most accurate and reliable terrestrial and space-borne techniques available, and develop the necessary scientific background and methodology for the combination of heterogeneous measurements[A1].

The activities to be carried out to accomplish these objectives must result in a set of high quality products and services. For this, EUREF must focus on a continuous innovation and on the changing user needs, as well as on the maintenance of an active network of people and organizations, development of knowledge and its dissemination.

Besides IAG components and EuroGeographics, EUREF activities are developed in cooperation with all the individuals and organizations interested in its work, devoted to its objectives, and willing to cooperate on an open, collegial and voluntary basis, based on the ethical principles that rule the international scientific cooperation.

Based on the previous work and on the established long-term objectives, EUREF activities and tasks are the following:

- Develop the EUREF Permanent Network (EPN) in close cooperation with IGS, for the maintenance of the European Reference Frame, as a contribution to the ITRF and as infrastructure to support other relevant projects, namely the European initiatives related to GALILEO;
- Improve the Unified European Levelling Network (UELN) by extending it to all European countries and in the perspective of a geokinematic computation[A2];
- Implement the necessary projects for the long-term maintenance of the ETRS89 (European Terrestrial Reference System) and the EVRS2000 (European Vertical Reference System), as well as for the improvement of the coherence between both systems, in close cooperation with other IAG components;
- Contribute to the IAG Project GGOS (Global Geodetic Observing System) using the installed infrastructures managed by the EUREF country members;
- Promote the adoption of the reference systems defined by EUREF (ETRS89 and EVRS2000) in the European countries and European-wide organizations involved in geo-referencing activities;
- Organize annual symposia addressing activities carried out at national and European-wide level related with the global work and objectives of EUREF, and tutorials on the most recent developments
- Establish a Technical Working Group (TWG) for preparing and coordinating technical and scientific activities.

EUREF ENTITIES

EUREF entities are the

- Plenary
- Steering Committee[A3]
- Technical Working Group (TWG).

TECHNICAL COMPONENTS

The technical components are organized in and by the Technical Working Group (TWG):

- EPN Central Bureau
- Analysis Centers (GNSS, Height)
- Data Centers (GNSS, Height)
- Operational Centers, Tracking Stations
- Special Projects
- Working Groups
- Pilot Projects.

ORGANISATIONAL STRUCTRE

• Membership

The members of the EUREF Sub-Commission are all the European countries contributing to its mission and objectives, taking into consideration that a full continental commitment is needed for the establishment and maintenance of the European Reference Systems. As a component of the IAG, EUREF follows also the IUGG membership rules.

Consequently, there are two categories of members:

A, European countries affiliated in IUGG;

B, all other European countries.

The countries of category A have the right to nominate 2 official representatives in the EUREF Sub-commission, preferably one from a research organization and the other from the institution responsible for the national geodetic reference frames.

The EUREF Chair and Secretary and the members of the TWG (*Technical Working Group*) are selected from category A member countries.

- **Plenary**

All the persons who attend a EUREF Symposium constitute the **Plenary**.^[A4]

The EUREF Symposium is an open forum, and may be attended by any person interested in the work of the Sub-commission.

The Plenary ratifies the TWG proposal for EUREF Chair, elects TWG members, decides on the constitution of Working Groups for the implementation of special projects, on the proposals presented by the TWG, on the adoption of scientific and technical methodologies and, in general, on the relevant issues for the maintenance and development of EUREF work.^[A5]

The decisions of the Plenary are reflected in the resolutions, approved by the majority of its attendees.^[A6]

All the Plenary attendees have the right to vote. Exceptionally, in case that a resolution is considered to affect the IAG statutes and by-laws or in other special cases, the EUREF Chair may decide that the vote be restricted to the category A members, following IAG statutes and by-laws on this subject. This decision must be always preceded by a consultancy with the TWG Chair.^[A7]

- **Technical Working Group (TWG)**

The **TWG (Technical Working Group)** is responsible, in general, for the control of EUREF activities and policy, and has the following specific tasks:

- to coordinate and develop the EPN (EUREF Permanent Network);
- to evaluate and classify results of GNSS campaigns presented to the TWG for acceptance as EUREF densification or extension;
- to organise and coordinate European-wide geodetic observation campaigns for the improvement of the European Reference Frame;
- to coordinate the actions for the realisation of a European Height System and the integration of the geospatial and vertical components of the European Reference Frame, in agreement with the INSPIRE directive of the EC;
- to identify the relevant actions for the continuation and development of EUREF, with respect to innovation and the changing user needs;
- to set up the working groups to run the projects defined by the plenary;
- to prepare the recommendations for the EUREF plenary.

The TWG meets at least twice a year, and preferably 3 times a year.

The TWG is constituted by members elected by the plenary, *ex-officio* members, honorary members and members in charge of specific tasks. The positions are filled for terms of 4 years which are renewable once. For TWG members in charge of special tasks an additional term can be granted by the TWG.

The number of members elected by the plenary is defined by the TWG Chair and must be in agreement with the tasks committed to the TWG. The recommended term is 4 years.

The *ex-officio* members are the EUREF Chair and Secretary.

Members in charge of specific tasks, in a limited number, also compose the TWG. The TWG Chair appoints these members. The term is established according to the tasks committed.

The TWG Chair may invite persons to attend the meetings, to assist in the discussion of specific subjects or to present relevant items for EUREF. These persons have no voting rights.

Former EUREF Chairpersons, Secretaries and TWG Chairpersons can receive the status of Honorary Members.

The **WG (Working Group)** are established within the TWG and approved in a Plenary's resolution. The TWG Chair proposes the leadership of the WG. The Chair of a WG must be a member of the TWG.

- **Steering Committee (SC)**

Members of the SC are the EUREF representatives, the President of the Sub-Commission 1.3, Regional Reference Frames (and, in addition the EUREF product coordinator[A8]). The SC is chaired by the EUREF Chair. The main tasks are the overall coordination and management of general EUREF activities.

REPRESENTATIVES

- **Chair**

The **Chair** represents EUREF officially. The main tasks are the overall coordination and management, the coordination and presidency of the annual Symposia, the creation of the conditions for the achievement of EUREF objectives and other duties defined by the TWG.

The Chair of EUREF is appointed by the President of IAG Commission 1, under TWG proposal, which must be ratified by the Plenary. The term is 4 years, in a maximum of 2 terms.[A9]

- **Secretary**

The **Secretary** is in charge of the preparation and organization of the Symposia and TWG meetings in cooperation with the respective local organizing committees, as well as the issuing of the symposia proceedings and the minutes of the TWG meetings. Other tasks are to disseminate the information, to maintain a list of members and contacts, to provide the relevant information to the web portal and to assist the chair.

The Secretary of EUREF is appointed by the EUREF Chair. The term is 4 years, and may be renewed.

- **TWG Chair**

The **TWG Chair** coordinates the TWG activities and represents the interests of the TWG to the EUREF community and to IAG Commission 1. The **TWG Chair**, elected among and by its members. The term is 4 years, in a maximum of 2 terms.

- **EPN Central Bureau Director**

The **Director** is in charge of the preparation and organization of the EPN.

The term is 4 years, and may be renewed.

ELECTIONS

For election purposes and where appropriate, nominating committees must be formed, similarly to IAG procedures on this subject.[A10]

REVISION

The Terms of Reference may be reviewed whenever considered necessary, under proposal of the EUREF Chair or the Technical Working Group, or by at least 1/3 of the Plenary attendees. The proposal must be approved by the Plenary, requiring at least 2/3 of the votes.

- **Coordinators**
 - **EPN CB Director**
 - **WG Chairs**
 - **Analysis Coordinator**
 - **Product Coordinator**
 - **Data flow Coordinator**
 - **Network Coordinator**

		SC member	TWG member	TWG ex-officio member
	EUREF Chair	x		X
	Secretary	x		X
	TWG Chair	x	x	
	EPN CB Director	x	x	
	President of Sub-Commission 1.3	x		X
	Analysis Coordinator		x	
	Product Coordinator		x	
	Data flow Coordinator		x	
	Network Coordinator		x	
	RT Coordinator		x	
	Tropo Coordinator		x	
	Network representatives		x	
	Member at large		x	
	Member at large		x	