



GGIM:AS

UNITED NATIONS INITIATIVE ON
GLOBAL GEOSPATIAL
INFORMATION MANAGEMENT
FOR ARAB STATES

UN-GGIM: Arab States Geodesy working group (GRF) Progress

4th Plenary meeting of the UN-GGIM Subcommittee on Geodesy

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Saudi Arabia

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Geodetic Reference Frame Working Group (GRF-WG)

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UN-GGIM: Arab States

The Foundation

2014, Aug

☐ UN-GGIM: AS established by the UN-GGIM in the fourth session in New York in August 2014.

☐ Number of countries: 22

☐ Arab States Members:

- Algeria
- Bahrain
- Comoros
- Djibouti
- Egypt
- Iraq
- Jordan
- Kuwait
- Lebanon
- Libya
- Mauritania
- Morocco
- Oman
- Palestine
- Qatar
- Saudi Arabia
- Somalia
- Sudan
- Syria
- Tunisia
- United Arab Emirates
- Yemen



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UN-GGIM-AS: Arab States

Geodetic Reference Frame Working Group (GRF-WG)

2014

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2015

- ❑ **Established in June 2015.**
- ❑ **Number of Member States: 13**
- ❑ **Chair:** Algeria
- ❑ **Co-chair:** Saudi Arabia and Lebanon
- ❑ **Members are :**
 - Algeria
 - Bahrain
 - Egypt
 - Jordan,
 - Kuwait
 - Lebanon
 - Morocco
 - Oman
 - Palestine
 - Qatar
 - Saudi Arabia
 - Tunisia
 - United Arab Emirates

❑ Objectives

- At the National level:
 - Raise the awareness of the importance of geodesy and the GGRF for scientific and societal applications
 - Refer to the UN GA Resolution on the GGRF for all geodetic proposal projects
 - Coordinate between different GNSS/Gravity network owners within each country
- At the Regional level:
 - Develop and maintain modern GNSS Networks following IGS Standards
 - Explore the possible mechanisms for an appropriate structure of an “ARABREF”
 - Develop efficient geodetic reference data sharing (GNSS & Gravity)
 - Modernize national geodetic reference frames and their alignment to the ITRF



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ARABREF: Initiation of the concept

- ❑ **GRF-WG initiated the concept of ARABREF**
- ❑ **ARABREF Key points & recommendations:**
 - Establishment of the ARABREF as the unified geodetic reference frame for Arab States to support GGRF fully consistent with ITRF using its Standards.
 - Enhance the skills of Arabian geodesists, surveyors and researchers in geodesy to manage the ARABREF.
 - Determine the relationship between the existing national reference frames and the ARABREF.
 - Establish continuous, permanent GNSS stations.
 - Realize a Unified Vertical Datum and support to establish a precise Regional Geoid.

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2016



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ARABREF: Setting a Road Map

- ❑ **GRF-WG set a Road Map to implement ARABREF**
 - Approval of the need to establish ARABREF
 - Coordination of MS contribution to ARABREF at the national level
 - Approve the principle, importance and spirit of data sharing
 - Define two phases for building the ARABREF:
 - *Phase 1: GNSS data analysis of ARABREF CORS network*
 - *Phase 2: physical geodesy data analysis of ARABREF vertical network (e.g. Geoid, gravity, leveling, tide gauges)*
 - Proof of concept: Start with Phase I: GNSS data analysis for the ARABREF implementation
 - Provide GNSS data (RINEX and metadata files) of at least 10%, with an appropriate distribution of the CORS network of each country
 - Establish 2-3 Data Centers to store and archive GNSS CORS data and metadata files with access to all ARABREF Members
 - Establish at least 2-3 Analysis Centers for routine daily analysis of the ARABREF CORS network, and should be extended to all Arab Member States

❑ **Ten Members from GRF-WG showed their interest to contribute in ARABREF project.**

❑ **Data centers and Analysis centers with the number of stations nominated from each country, as shown in the following table:**

Country	Number of GNSS CORS	Data Center	Analysis Center
Algeria	10	Yes	Yes
Egypt	4		Yes
Jordan	1		Yes
Lebanon	1		Yes
Morocco	4		Yes
Oman	4		Yes
Qatar	2		Yes
Sudan	2		Yes
Saudi Arabia	10	Yes	Yes
Tunisia	3	Yes	Yes

2014
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2016, Feb
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2016, Nov



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ARABREF: Benefits and Standards

- ❑ **In the 4th Meeting of UN-GGIM: AS in February 2017, GRF-WG demonstrated the benefits of ARABREF**
 - A unified Geodetic Reference Frame for all Arab countries
 - Unification of geodetic/mapping applications within the Arab region, without need for transformation
 - Integration of geospatial data exchanges .
 - Learning together on how to:
 - accurately analyze GNSS data,
 - determine geodetic parameters,
 - use GNSS for scientific applications
 - ARABREF will be connected and consistent with the International Terrestrial Reference Frame (ITRF)
 - The establishment of ARABREF requires the need to share knowledge and expertise and work together for the benefit of all Arab States.

- ❑ **Also the specification required for Data Center and Analysis center was set**

- **Data Center**
 - A cluster of servers where you store and archive GNSS data:
 - GNSS observations (RINEX files) and
 - GNSS metadata: a site log for each GNSS station
 - Needs an IT personnel (maybe one technician)
- **Analysis Center**
 - A computer or a cluster of computers
 - GNSS Precise software (Bernese, GAMIT, etc.)
 - Scientist(s) to analyze GNSS data
 - Able to process GNSS data in a routine mode (daily)

- ❑ **Official letter signed by Chair of UN-GGIM-AS was sent to MS to support their contribution to the implementation of ARABREF.**

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ARABREF: Proposals of Data and Analysis Centers

- ❑ **A Data Sharing Protocol was drafted and shared with all members**
- ❑ **Proposals of Data Center and Analysis Center:**
 - Saudi Arabia demonstrated a proposal for Data center and Analysis Center for the realization of ARABREF using international standards
 - Data Center is designed to store data from the proposed CORS stations as follows:
 - Daily files of GNSS/GPS data at a 30-second sampling rate.
 - Hourly files of GNSS/GPS data at a 1-second sampling rate.
 - Site Log files.
 - Analysis Center is designed for computation, Analysis, filtration then the combination of Daily solutions, and was using the following criteria :
 - GNSS Processing Software: Bernese V.5.2.
 - GNSS Processing technique: Double-Difference (RNx2SNx)
 - Standards and Specifications used to establish and operate its GNSS CORS network were shared with ARABREF members.

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ARABREF: Establish Data and Analysis Centers

□ Data Center and Analysis center were established by Saudi Arabia

- FTP links for each member were shared with ARABREF members.
- Presentation on the proposed structure of GNSS data for each member state
 - [Member State] > [RINEX] > [YEAR] > [Observation DAY]
- Presentation on the Analysis process to be used for the ARABREF realization
 - Data pre-processing > Ambiguity Resolution > Generation of the final Daily solutions
- Presentation on the benefits of the contribution of Arab member states to the activities of UNGGIM SCoG.

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Geodetic Reference Frame Working Group: Alignment with SCoG of UN-GGIM

- ❑ **Adoption and Support Sub-Committee on Geodesy (SCoG) activities by approving:**
 - GGRF Position Paper On Governance
 - Agreement on International Terrestrial Reference System (ITRS) and the International Terrestrial Reference Frame (ITRF)
 - Position Paper on Sustaining the Global Geodetic Reference Frame
 - Concept Paper on Establishing a Global Geodetic Center of Excellence

- ❑ **GRF-WG members “Saudi Arabia and Tunisia” started sharing the GNSS data with the Data Center deployed in Saudi Arabia**

- ❑ **GRF-WG proposed a list of strategic objectives for the period 2020-2022, which is:**
 - Working on the implementation of ARABREF project requirements.
 - Urging member states that have the ability to complete the establishment of Data Centers (DC) and Analysis Centers (AC) for the ARABREF project.
 - Adopting the roadmap for the Global Geodetic Reference Frame (GGRF) and implementing appropriate relevant works in the ARABREF project.
 - Urging member states to actively participate in SCoG.
 - Adopting an agreement for the consistency of national references with the International Terrestrial Reference System (ITRS) and the International Terrestrial Reference Framework (ITRF).
 - Urging Member States to register their national geodetic references in the ISO/TC211 Geodetic Register.

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Alignment with SCoG of UN-GGIM: Workshops and Workplan

- ❑ **GEF-WG organized a number of remote workshops with the coordination of SCoG on the following topics:**
 - Arrangements resulting from (ITRS/ITRF) Agreement and their impact on national geodetic references.
 - The challenges and difficulties faced by Arab countries regarding their geodetic references, with the study and discussion of possible solutions.
 - Means of support that the SCoG can provide to the member states of the Arab Committee.
 - Contributions of Arab countries to enriching the content of documents related to the activities of the SCoG (Position Paper on Sustaining the GGRF and Concept Paper on Establishment a GGCE).

- ❑ **The Future Work plan of GRF-WG has been discussed and adopted**
 - At National Level
 - Taking into account the impact of (ITRS/ITRF) agreement.
 - Raising awareness on the importance of geodesy and the GGRF for scientific and societal applications and working to inventory and identify the components of the national geodetic infrastructure.
 - Using the standards of the Technical Committee 211 ISO/TC, especially by adopting and approving International Specification 1-19161 ISO related to the geodetic reference ITRS, as well as including the components of the national reference in the geodetic registry of ISO/TC 211.

 - At Regional Level
 - Activating the recommendations related to the completion of the unified Arab geodetic reference, especially those related to the sharing and exchange of geodetic data between Arab countries.
 - Working to ensure that Arab countries have an effective role in the process of establishing the Global Geodetic Center of Excellence (GGCE).
 - Working with the content of the aforementioned reference documents issued by the Subcommittee on Geodesy (UN-GGIM SCoG).
 - Encouraging cooperation with Geodetic organizations (IAG, IGS, FIG).
 - Active participation in the ongoing consultations regarding the draft Global Geodetic Reference (GGRF) and the draft establishment of the Global Geodetic Center of Excellence (GGCE).
 - Preparing an annual report on the progress achieved in the aforementioned issues and submitting it to the secretariat of the Arab Committee.

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Urging member states

- Urging member states to on implementation of ARABREF project recommendations and action plan.
- Urging member states that have the ability to complete the establishment of Data Centers (DC) and Analysis Centers (AC) for the ARABREF project.
- Urging member states to actively participate in UNGGIM SCoG.

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Extension of GRF-WG proposed strategic objectives

- Extension of GRF-WG proposed strategic objectives for the period 2020-2022 for one year extra

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The strategic objectives included

- Working on the implementation of ARABREF project requirements.
- Urging member states that have the ability to complete the establishment of Data Centers (DC) and Analysis Centers (AC) for the ARABREF project.
- Adopting the roadmap for the Global Geodetic Reference Frame (GGRF) and implementing appropriate relevant works in the ARABREF project.
- Urging member states to actively participate in UNGGIM SCoG.
- Adopting an agreement for the consistency of national references with the International Terrestrial Reference System (ITRS) and the International Terrestrial Reference Framework (ITRF).
- Urging Member States to register their national geodetic references in the ISO/TC211 Geodetic Register.



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Geodetic Reference Frame Working Group: New Structure

❑ The organizational structure of GRF-WG has been changed as follows

- Chair: Qatar
- Co-chair: Lebanon
- Members are : 8
 - Algeria
 - Egypt
 - Lebanon
 - Morocco
 - Qatar
 - Saudi Arabia
 - The United Arab Emirates
 - Iraq

❑ Objectives:

- **Align efforts to implement A/RES/69/266** – “A global geodetic reference frame for sustainable development’ including that of the Subcommittee on Geodesy, and through engagement with the United Nations Global Geodetic Centre of Excellence (UN-GGCE).
- **Coordinate and collaborate** with UN-GGIM: Arab States members and with international geodetic organizations to **densify national and regional geodetic reference information and contribute to the global geodesy supply chain.**
- **Enhance geodetic capacity** through training and workshops and communicate the importance of geodesy for national, regional, and global societal, environmental, and economic benefits.

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2023	strategic objectives Extension

2024, Feb



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Geodetic Reference Frame Working Group: New Structure

Function:

Provide a forum for dialogue and coordination between members of the UN-GGIM: Arab States, United Nations system, and other relevant stakeholders with a view to –

- Align with efforts to implement General Assembly Resolution 69/266 – ‘A global geodetic reference frame for sustainable development.
- Exchange information and experiences to improve national awareness and investment in geodesy.
- Collaborate with other efforts of regional committees on UN-GGIM on issues of common interest in geodesy and recognize important and relevant partners and stakeholders in successfully planning and implementing an effective geodetic network.
- Explore sharing geodetic data to contribute to the densification of Arab States regional geodetic network as well as the global geodetic reference frame and identify and address issues that inhibit such collaboration and sharing.
- Improve standards as appropriate and coordinate standards requirements.
- Plan, organize and conduct workshops and training activities on geodesy and its importance as part of capacity development.
- Develop and/or use existing communication information to educate others on the importance of geodesy and the geodetic framework for national, regional, and global benefits.

Approved to transfer the ARABREF project from UN-GGIM:AS and register it within the Regional Reference Frame under the International Association of Geodesy (IAG)

Approved the representatives MS of UN-GGIM-AS on the SCoG to be :

- Algeria
- Lebanon
- Oman
- Qatar
- Saudi Arabia
- Iraq

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Thanks for listening

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