



**Regional Committee of United Nations Global Geospatial Information
Management for Asia and the Pacific
(UN-GGIM-AP)**



Established by a United Nations Resolution

Working Group 1

Geodetic Reference Frame

Activity Report

for

The UN-GGIM-AP Plenary Meeting

Kumamoto, Japan

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In the period since the 5th UN-GGIM-AP (2016) meeting in Kuala Lumpur, Malaysia, WG1 activities have included:

- Supporting the establishment of the UN-GGIM Sub-Committee on Geodesy. The following Member Nations from Asia and the Pacific have agreed to be members: Australia, China, Fiji, Islamic Republic of Iran, Japan, Kyrgyzstan, Malaysia, New Zealand, Philippines, and the Republic of Korea. While these 10 countries are the official members, all other Asia Pacific Member States are invited and encouraged to participate in committee activities as associate members.
- Efforts to improve access to the Global Geodetic Reference Frame (GGRF) while also supporting regional geodetic cooperation within the Asia Pacific region. The Asia Pacific Reference Frame (APREF) incorporates Global Navigation Satellite Systems (GNSS) data from a Continuously Operating Reference Station (CORS) network of approximately 620 stations, contributed by 28 countries in the Asia Pacific. Data are routinely processed by four Analysis Centres and made available publicly. An additional GNSS CORS site from Thailand is now contributing data to the APREF GNSS network. Routine analysis for the APREF GNSS network has been updated to align the IGS14 reference frame, which is the International GNSS Service (IGS) realization of International Terrestrial Reference Frame 2014 (ITRF2014). Preparations are also underway to reprocess the APREF data archive using the IGS14 reference frame.
- The ongoing coordination of a regional GNSS campaign – Asia Pacific Regional Geodetic Project (APRGP). The APRGP2016 campaign ran from 18 to 24 September 2016. The data of the APRGP 2016 were collected from eight member countries, including Bangladesh, Hong Kong (China), Japan, Malaysia, Philippines, Singapore, Sri Lanka and Vietnam. The APRGP 2016 analysis report has been finalized and distributed to Member States. The APRGP 2017 Campaign ran from 17 to 23 September 2017.
- The Asia-Pacific Geodetic Capacity Building (APGCB) Project has continued. Specific activity has included:
 - A joint UN-GGIM-AP, FIG and JUPEM forum on Geospatial and GNSS CORS Infrastructure was undertaken 16 – 17 October 2016, Kuala Lumpur – Malaysia. The forum comprised of 6 sessions, and 22 presentations. The forum hosted by JUPEM (Department of Survey and Mapping, Malaysia) had over 150 delegates from 21 countries. Over the 2 days, the forum attracted over 100 participants each day and these attendees actively engaged and contributed to the program. To review and access all presentations listed in the following sessions, please navigate to FIG Asia Pacific Capacity Development Network website for the appropriate links -

http://www.fig.net/organisation/networks/capacity_development/asia_pacific/index.asp

- WG1 has continued to support the Pacific Geospatial and Surveying Council (PGSC) including providing assistance with the development of their strategic plan. The WG1 Chair will attend the upcoming PGSC meeting in Suva, Fiji, in March 2018.
- A joint technical seminar of the UN-GGIM-AP, FIG, IAG, Japan Federation of Surveyors, International Committee for GNSS (IGC), Geospatial Information Authority of Japan (GSI) was conducted. The seminar was held 29-30 July 2017 before the International Association of Geodesy and International Association (IAG) - International Association of Seismology and Physics of the Earth's Interior (IASPEI) 2017 Symposium in Kobe, Japan. The workshop attracted 68 delegates from 19 different countries. There were 21 quality presentations which included 4 presentations from the event sponsors who provided a manufacturers perspective on the issues and challenges relating to geodetic reference frames. The seminar's objective was to provide fundamental geodetic reference frame background, concepts and examine the associated data and analysis techniques, each with a focus on practical implementation and application. Workshop presentations can be downloaded from http://www.fig.net/resources/proceedings/2017/2017_07_refframe_japan.asp.
- A joint workshop of the GSI, FIG and UN-GGIM-AP entitled "Regional Challenges, Benefits and Opportunities of Exchanging Geodetic Data" is planned for Kumamoto City International Centre, Kumamoto Prefecture, Japan, 16 October.

Working Group 1 (WG1) - Work Plan Status

Objective	Goals	Deliverables	Current Status
<p>Manage and support Asia Pacific countries to respond to the General Assembly Resolution on A Global Geodetic Reference Frame (GGRF) for Sustainable Development</p>	<p>To ensure the sustainability and enhancement of the GGRF in the Asia Pacific and provide the framework for all geospatial activity, as a key enabler of spatial data interoperability, disaster mitigation and sustainable development</p> <p>To contribute to a global geodetic reference frame Road Map that will address key elements relating to the development and sustainability of the GGRF that meets the needs of the Asia Pacific</p>	<p>Year 1: An interim report on the current status of the GGRF in the Asia Pacific</p> <p>Year 2: An interim report on progress towards implementation of the UN GA GGRF Resolution in the Asia Pacific</p> <p>Year 3: A final report on progress towards implementation of the UN GA GGRF Resolution. The report will include measures of progress towards implementation of the UN GA GGRF Resolution in the Asia Pacific.</p>	<p>The UN-GGIM Asia Pacific has put forward 10 Member States as members of the newly established UN-GGIM Sub-committee on Geodesy.</p> <p>Chair and vice-chairs of WG1 have been liaising closely with UN-GGIM GGRF Working Group to ensure strong input from the Asia Pacific region.</p> <p>A report on geodetic data sharing has been prepared for discussion at the Kumamoto meeting.</p>

Objective	Goals	Deliverables	Current Status
<p>Manage the Asia Pacific Reference Frame (APREF) project and provide a regional mechanism to incorporate Global Navigation Satellite System (GNSS) data and analysis from CORS stations across the Asia Pacific</p>	<p>Improve access to the GGRF in the Asia Pacific</p> <p>To encourage open sharing of geodetic data in the Asia Pacific</p> <p>To encourage cooperation that addresses infrastructure gaps and duplications towards the development of a more sustainable GGRF, particularly ensuring improved multi-GNSS tracking in the Asia Pacific</p> <p>To support the observation, analysis and development of national GNSS, Satellite Laser Ranging (SLR) and Very Long Baseline Interferometry (VLBI) infrastructure and their interconnection for reference frame improvement and providing an Asia and the Pacific perspective to the global geodetic community</p> <p>To encourage the sharing of real-time geodetic observations to support disaster risk reduction.</p>	<p>Year 1: APREF to continue while encouraging additional participation of member states through data and analysis contributions. A geodetic data portal to provide easy access to data and results. Encourage the development of national to international transformation parameters. Encourage the development of regional standards including the adoption of a common reference epoch. Support the activities of the Asia-Oceania VLBI (AOV) Group.</p> <p>Year 2: on-going – as above. Work together with organisations such as the International Federation of Surveyors (FIG) and the International Association of Geodesy (IAG) to develop common approaches to crustal deformation monitoring and modelling and its application to geodetic control networks in our region</p> <p>Year 3: on-going – as above</p>	<p>The WG has ensured resourcing of the APREF central bureau</p> <p>The WG has ensured an APREF website is maintained. APREF website provides up to date geodetic coordinates and uncertainties for participating stations and member countries. Six CORS stations from Hong Kong (China) and four stations from Taiwan (China) have been contributed to the APREF GNSS network, four of them are approved for use in the IGS network after testing via APREF project. Another new CORS site from Thailand is contributing data to the APREF GNSS network.</p> <p>The WG has generated a densification of velocity field based on the APREF GNSS data set.</p> <p>The APREF routine analysis of the APREF GNSS network has been updated to align the IGS14 reference frame.</p>

Objective	Goals	Deliverables	Current Status
<p>Manage an annual regional GNSS campaign - Asia Pacific Regional Geodetic Project (APRGP)</p>	<p>Improve access to the GGRF in the Asia Pacific, particularly for developing countries</p> <p>To encourage open sharing of geodetic data in the Asia Pacific</p> <p>To encourage the use of geodetic data to enable spatial data interoperability, disaster mitigation and sustainable development in the Asia Pacific</p>	<p>Year 1: APRGP to continue while encouraging additional participation of member states through GNSS data and analysis contributions. An annual analysis report to be prepared. Encourage the development of national to international transformation parameters. Encourage the development of regional standards including the adoption of a common reference epoch.</p> <p>Year 2: on-going – as above</p> <p>Year 3: on-going – as above</p>	<p>The WG has produced a report that details geodetic coordinates and their uncertainty throughout the region and distributed to participating member countries.</p> <p>The WG has coordinated the APRGP 2016 campaign, data assembly and analysis report.</p> <p>The WG has coordinated the 2017 APRGP campaign, which ran from 17 to 23 September 2017.</p>

Objective	Goals	Deliverables	Current Status
<p>Manage the Asia Pacific Regional Height System Unification (APRHSU) project</p>	<p>To facilitate regional height system unification to support spatial data interoperability disaster mitigation and sustainable development in the Asia Pacific</p> <p>To encourage open sharing of geodetic data in the Asia Pacific in accordance with the objectives of the UN General Assembly Resolution on the GGRF</p>	<p>Year 1: develop a geodetic database and dedicated website to facilitate regional height system development. Data to include gravity, levelling and tide gauge observations. Conduct a planning workshop.</p> <p>Year 2: ongoing maintenance of a geodetic database and website. Conduct a capacity building workshop.</p> <p>Year 3: ongoing maintenance of a geodetic database and website. Conduct a planning workshop.</p>	<p>A report on the height systems of the Pacific Islands is in preparation.</p>

Objective	Goals	Deliverables	Current Status
<p>Support geodetic capacity Building in the Asia Pacific through technical workshops and developing partnerships with other organisations including the International Federation of Surveyors (FIG), the International Association of Geodesy (IAG), the United Nations International Committee for GNSS (UN-ICG) and the Pacific Geospatial and Surveying Council (PGSC)</p>	<p>To provide technical assistance for capacity building in Geodesy for developing countries, with the aim of ensuring the development, sustainability and advancement of the global geodetic reference frame</p> <p>To make the global geodetic reference frame more visible and understandable to society</p>	<p>Year 1: conduct a regional geodetic capacity building workshop with a focus on either GNSS data processing, Geoid determination, or the use of open geodetic software</p> <p>Year 2: as above</p> <p>Year 3: as above</p>	<p>WG1 members have partnered with the FIG, IAG and PGSC to develop regional geodetic workshops that support geodetic capacity building.</p> <p>WG1 workshops has been arranged to coincide with other related conferences and meetings.</p> <p>Three international workshops/seminars have been conducted.</p>