

CALL FOR APPLICATIONS: JAXA’s Multi-GNSS Joint Experiment 2011

Application deadline: October 14, 2011 at 24:00 UTC

Table of Contents

1. Introduction.....	2
1.1. Objective of Multi-GNSS Joint Experiment 2011	2
1.2. Background.....	2
1.2.1. Quasi-Zenith Satellite System (QZSS):	2
1.2.2. Multi-GNSS Demonstration Campaign	2
2. Call for Joint Experiment	2
2.1. Expected experiment	2
2.2. Requests for experiment	3
2.3. Experiment periods	3
3. Equipment.....	3
3.1. Receivers	3
3.1.1. Hardware	3
3.1.2. Tracked signals.....	3
3.1.3. Output data	4
3.2. Antennas.....	4
3.3. Software	4
4. Conditions and Criteria for Applications.....	5
4.1. Funding	5
4.2. Criteria for eligibility.....	5
4.3. Ownership of research results.....	5
4.4. Confidentiality obligation	5
4.5. Warranty	5
4.6. Equipment.....	5
4.7. Other conditions	5
5. Selection Process and Schedule	5
6. Inquiries.....	6

Appendix 1: Application Form

1. Introduction

1.1. Objective of Multi-GNSS Joint Experiment 2011

The main objective of Multi-GNSS Joint Experiment 2011 is to promote the utilisation of Multi-GNSS including QZSS in Asia Oceania Region by demonstrating quantitative impacts of Multi-GNSS and exploring new GNSS applications of more available satellite signals and more accurate satellite positioning service.

1.2. Background

1.2.1. Quasi-Zenith Satellite System (QZSS):

- The Quasi-Zenith Satellite System (QZSS) is a regional space-based Positioning, Navigation and Timing (PNT) system that will use a constellation of satellites placed in multiple Inclined Geo-Synchronous Orbits (IGSO).
- Its orbital characteristics were selected in order to provide enhanced GNSS availability as well as improved PNT performance over Japan and the surrounding area. The system is being developed by JAXA in partnership with other Japanese research institutes, following a phased deployment approach.
- The current design is a three satellite constellation. The first satellite, named “Michibiki”, was successfully launched on September 11, 2010. Technical validation and application demonstrations have been conducted since December 2010.
- Further information and detailed specification can be found in the document “Interface Specification for QZSS (IS-QZSS)”, available for download from the following web site.
http://qz-vision.jaxa.jp/USE/is-qzss/index_e.html

1.2.2. Multi-GNSS Demonstration Campaign

- The “Multi-GNSS Demonstration Campaign” has been proposed by JAXA at the United Nations International Committee on GNSS (ICG), and related multilateral meetings such as the Asia Pacific Region Space Agency’s Forum (APRSAF), and the Asia Pacific Economic Committee GNSS Implementation Team (APEC GIT).
- The campaign aims to encourage GNSS signal and service providers and user communities in the Asia Oceania region to develop new applications, and to carry out experiments or demonstrations of “Multi-GNSS” on a best efforts basis in the spirit of international cooperation.
- The campaign has three main components: 1) establishment of the multi-GNSS observation network, 2) development and demonstration of multi-GNSS applications, and 3) a workshop program. Multi-GNSS Asia (MGA) is an open organisation that has been established to assist in managing and promoting the above campaign activities. The following web site contains information about the campaign and MGA, <http://www.multignss.asia>.
- Multi-GNSS Joint Experiment 2011 was approved as an MGA recommended activity at the MGA Steering Committee on September 4, 2011.

2. Call for Joint Experiment

2.1. Expected experiment

JAXA will select up to ten joint experiments. The following Joint Experiment will be expected to be proposed:

- Experiment which will demonstrate the quantitative benefits of improvement of the availability and accuracy of satellite positioning by using Multi-GNSS including QZSS
- Experiment to explore new GNSS applications in various application fields such as Disaster Mitigation, Precise Agriculture, Machine Control, Surveying, ITS, LBS, Mapping,

and other fields by using more available and more accurate satellite positioning service.

2.2. Requests for experiment

Proposed joint experiment should satisfy the following requests:

- Purpose of application should be limited to peaceful research, development, and demonstration of GNSS applications.
- The experiment should include QZSS utilization.

2.3. Experiment periods

The experiments of this call for application are expected to be conducted during 2012. An additional call might be opened depending upon the situation with respect to applications.

3. Equipment

JAXA will provide some equipment, such as receivers, antennas, and software with technical support for joint experiments. Transportation costs of the receiver(s) from Japan to the experiment site shall be borne by JAXA. Transportation costs of the receiver(s) from the implementation site to Japan shall be borne by the participant.

JAXA will keep at least ten receivers and antennas for the joint experiments during 2012, however, according to the application situation, the number of and time period for the receiver usage might be limited.

3.1. Receivers

3.1.1. Hardware

JAXA will lend two types of JAVAD receivers:

	DELTA-G3T	SIGMAS-G3T
Weight	401g	1277g
Input / Output	Serial port (RS232) USB 2.0 device port 10BASE-T/100BASE-TX Ethernet port External Reference Frequency input	
Battery	None	internal Li-Ion batteries
Rate	10Hz	

Further information:

http://javad.com/downloads/javadgnss/sheets/Delta_Datasheet.pdf

http://javad.com/downloads/javadgnss/sheets/SigmaS_Datasheet.pdf

3.1.2. Tracked signals

The receiver can track the following signals:

	Tracking and positioning	Tracking
GPS	L1-C/A, L1P, L2C, L2P(Y), L5	L1C
GLONASS	L1-C/A, L1P, L2-C/A, L2P	
GALILEO	E1, E5a	
QZSS	L1-C/A, L1-SAIF	L1C, L2C, L5

3.1.3. Output data

Participants can use multi-GNSS observation data from the JAVAD receiver by using such data formats as:

	version	QZSS format	receiver
NMEA	2.2, 2.3., 3.0	Prototype version can be output by JAVAD receiver - format will be provided	Real time output
RINEX	2.10, 2.11 2.12(QZSS extension), 3.01	Prototype version can be output by JAVAD receiver - format is available: http://qz-vision.jaxa.jp/USE/is-qzss/RINEXv2_QZSSext_NC.pdf	Obtained from JAVAD raw data using JPS2RIN
RTCM	2.x, 3.0	Prototype version can be output by JAVAD receiver - format will be provided	Real time output
BINEX		Prototype version is available: http://binex.unavco.org/binex_record_7f_x.html	Real time output

3.2. Antennas

Participants can use of the following antenna on loan from JAXA, or they may use their own antenna:

	GrAnt-G3T
Weight	515g
Interface	TNC
Radome	none
Cable	3m (TNC) 5m (TNC) 10m (TNC)

Further info: <http://www.javad.com/jgnss/products/antennas/>

Phase Center Variation (PCV) file for antennas is the icg08.atx file, which can be obtained from;

<ftp://igscb.jpl.nasa.gov/pub/station/general/igs08.atx>

3.3. Software

Participants can use following software for Multi-GNSS observation data:

Name	Description
TriVU/NetView	TriVU is a free application allowing the user to easily control JAVAD GNSS receivers http://javad.com/jgnss/products/software/trivu.html
JPS2RIN	JPS2RIN software is converter from the JAVAD native JPS format files to RINEX 2.xx (including 2.10/2.11/2.12) , RINEX 3.0, and RINEX 3.01 format. Version 2.12 includes QZSS extension format. http://javad.com/jgnss/products/software/jps2rin.html
RTKLIB	RTKLIB is an open source program package for standard and precise positioning with GNSS including QZSS. Real time and post-processing analysis of data observed by JAVAD GNSS receivers is possible using RTKLIB: http://www.rtklib.com/

4. Conditions and Criteria for Applications

4.1. Funding

In principle, JAXA and participants shall be responsible for funding their respective activities under this cooperation.

4.2. Criteria for eligibility

International organisations, governmental organisations, public research institutes, public universities, Japanese private companies and Japanese private universities*, which have interests in Multi-GNSS utilisation in the Asia Oceania region, may submit an application using the form in Appendix 1.

4.3. Ownership of research results

All research results shall be the joint property of JAXA and the participants unless one party reasonably proves that it solely has generated the research results in the course of the research project(s).

4.4. Confidentiality obligation

JAXA and the participants shall keep any information obtained through this cooperation confidential when such information is marked “confidential”, and shall not disclose such information without prior approval of the providing party.

4.5. Warranty

- JAXA does NOT warrant a continuous provision of navigation data of Quasi-Zenith Satellite or any of the succeeding Quasi-Zenith Satellites.
- JAXA does NOT warrant the quality of QZSS navigation data provided through this cooperation before the qualification process stipulated by JAXA is completed.

4.6. Equipment

Participant shall compensate for the damages to equipment provided by JAXA or any loss, except when it arises upon use in accordance with the instructions of JAXA.

4.7. Other conditions

- The participants of the joint experiments should be members in MGA. www.multignss.asia
- The organizations which conduct joint experiments should make reports about their plans and present results of any joint experiment at the Asia Oceania Regional Workshop on GNSS which will be held annually by MGA.
- The data observed by the receivers lent by JAXA should be shared with MGA participants.

5. Selection Process and Schedule

- The deadline for applications is the 14th of October, 2011. Application form should be received by JAXA's POC by email by the deadline 24:00 UTC on 14th October, 2011.
The contact address is:

Mr. Hiroaki Tateshita
Ms. Yaka Wakabayashi
Japan Aerospace Exploration Agency

* non-Japanese private companies and non-Japanese private universities can participate with eligible partners such as government organisations or research institutes

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- After receiving the application forms, submitted proposals of joint experiment will be discussed at the 3rd Asia Oceania Regional Workshop on GNSS, which will be held in Jeju, Korea, 1st – 3rd November, 2011 (www.multignss.asia). As one of the workshop outputs, the MGA Steering Committee will endorse the experiments, if they satisfy the objectives of the Multi-GNSS Demonstration Campaign.
- According to the results of the discussions in the 3rd Asia Oceania Regional Workshop on GNSS, JAXA will finalize the selection process for the proposed experiments. JAXA will inform the applicants and commence preparation for the joint experiments, including preparing agreements. After concluding the agreement between JAXA and participants, the joint experiment can start. Detailed terms and conditions will be defined in the agreement.

6. Inquiries

Please make a contact with our POC with regard to the project and the application if you have any inquiries:

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Ms. Yaka Wakabayashi
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Satellite Applications and Promotion Center
QZSS-AP@jaxa.jp

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