

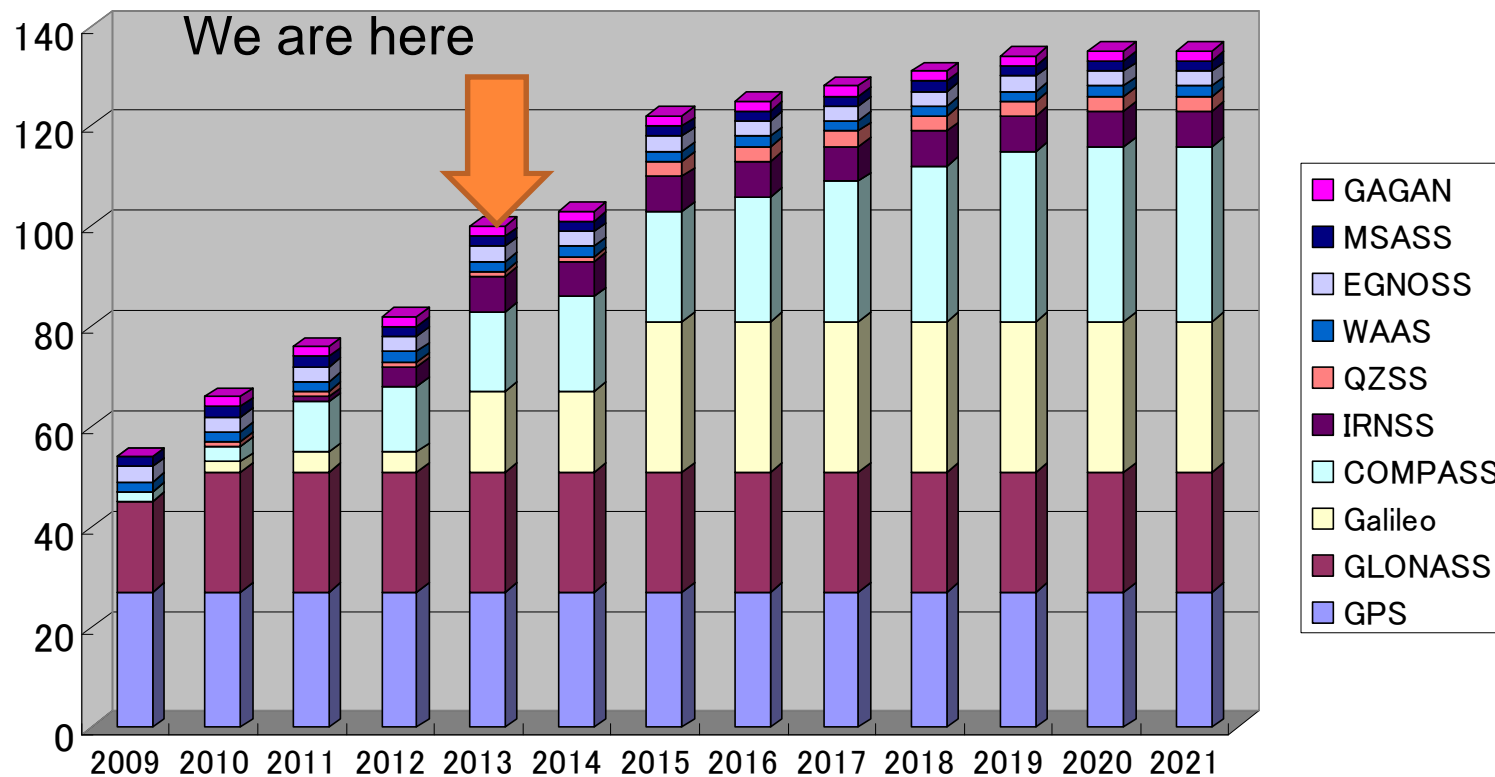
# STATUS OF MULTI-GNSS ASIA

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MGA Secretariat

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# 1. BACKGROUND - MULTI GNSS ERA-

The number of SVs in multi GNSS systems

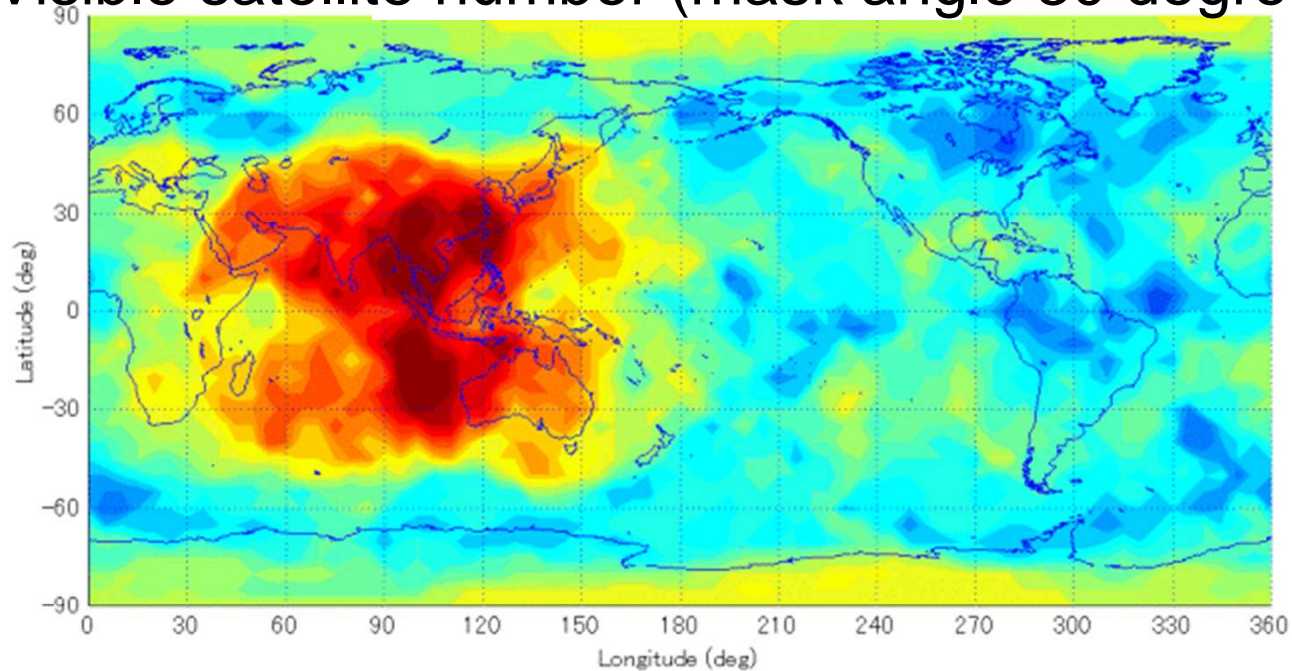




# 1. BACKGROUND

ASIA OCEANIA IS SHOWCASE OF NEW GNSS ERA

Visible satellite number (mask angle 30 degrees)



**2020:**

**GPS(27)+Glonass(24)+Galileo(30)+COMPASS(35)+IRNSS(7)+QZSS(3)+SBAS(7)**



# ASIA OCEANIA MULTI-GNSS DEMONSTRATION CAMPAIGN



- Campaign consists of three main activities:

## Establishment of Multi-GNSS Monitoring Network

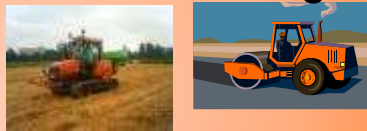


## Application Demonstration

### Disaster Mitigation



### Precise Positioning



### ITS



### LBS



Other, ionospheric observation etc

## Regional Workshop

3<sup>rd</sup> Workshop, Nov. 2011 @ Jeju, Korea:



2<sup>nd</sup> Workshop, Nov. 2010 @ Melbourne, Australia



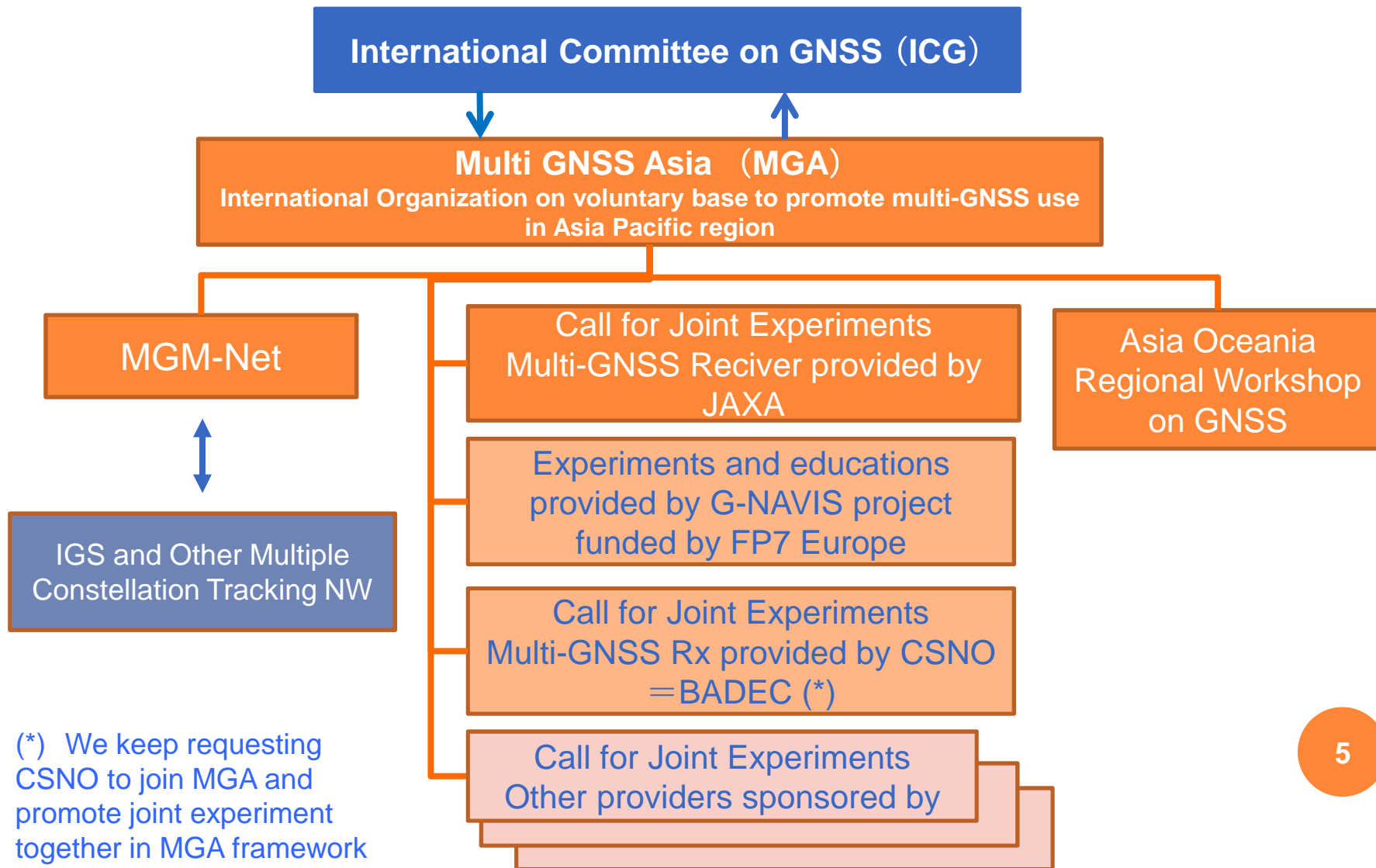
1<sup>st</sup> Workshop on GNSS, JAN. 2010, @ Bangkok, Thailand





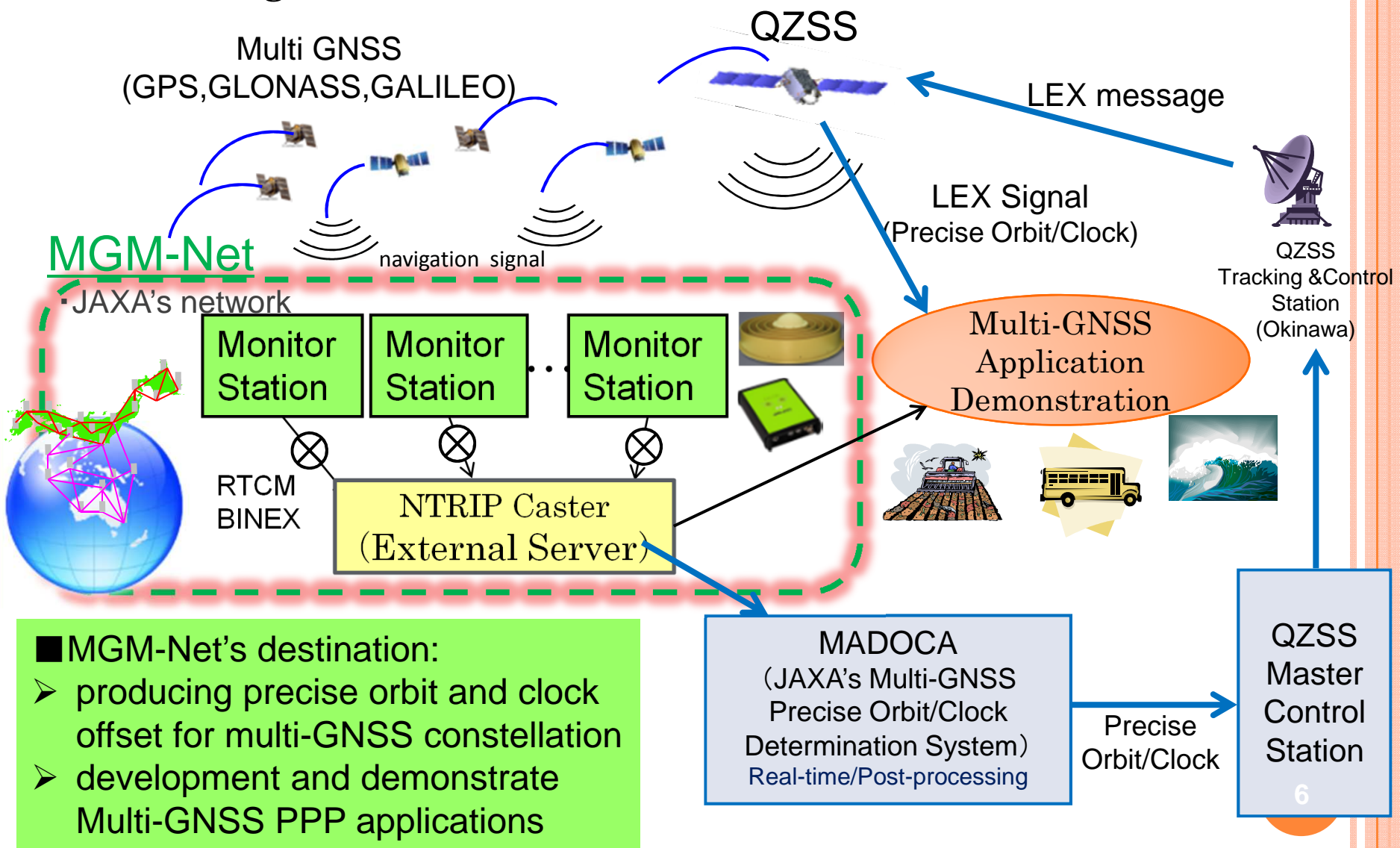


# WORK STRUCTURE FOR MGA



(\*) We keep requesting CSNO to join MGA and promote joint experiment together in MGA framework

# Activities 1 : Establishment of Multi-GNSS Monitoring Network



- MGM-Net's destination:
  - producing precise orbit and clock offset for multi-GNSS constellation
  - development and demonstrate Multi-GNSS PPP applications

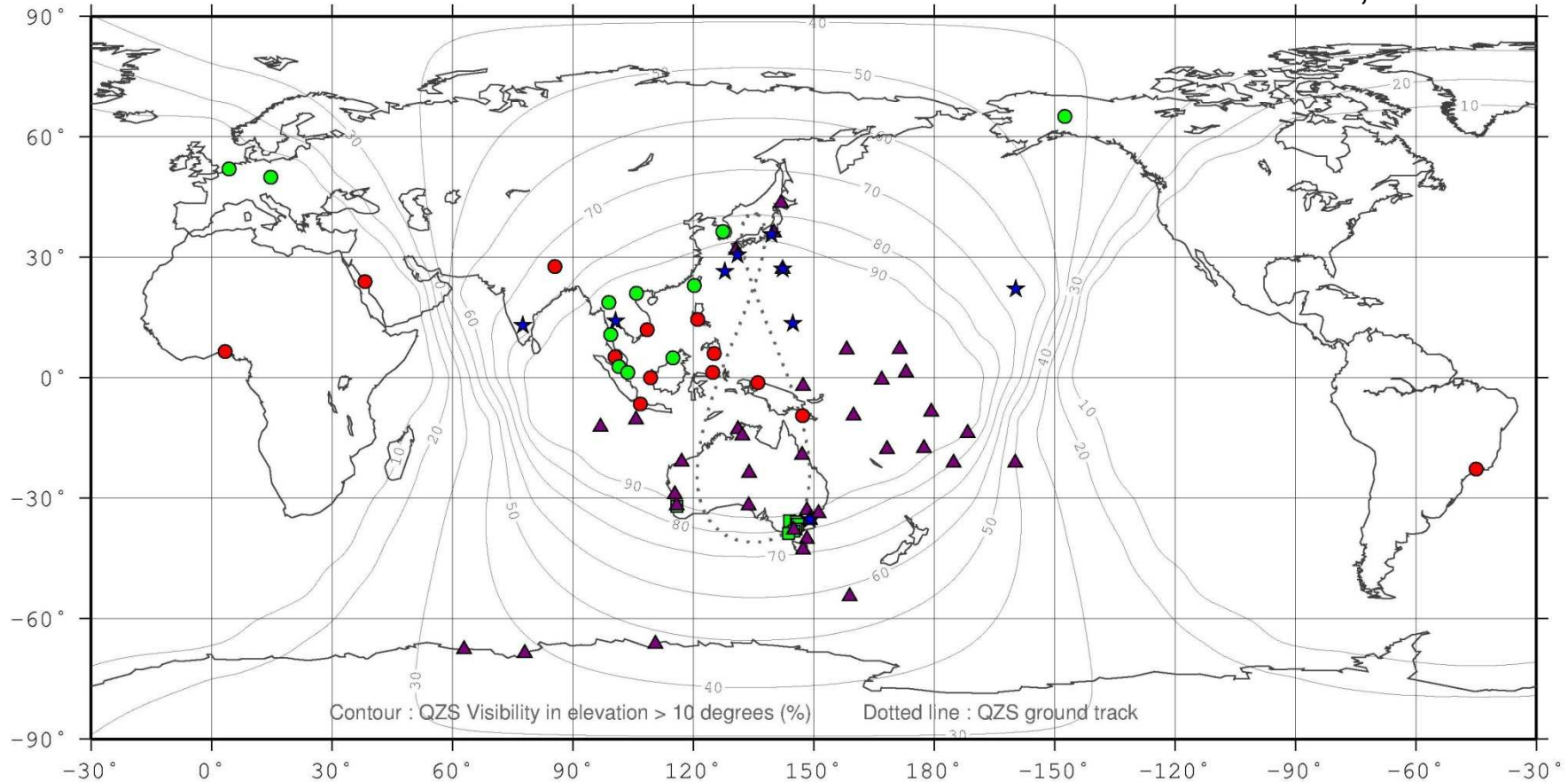
LEX: QZSS's experimental signal including some information such as precise orbit /clock for PPP

## Activity - 1

# Multi GNSS monitoring network (MGM-net)

Latest Status of MGM-net

June 14, 2013



**MGM-net stations (Hosting)**

**MGM-net stations (Data Sharing Partner)**

**Other Partner**

**JAXA Sites**

● 11: Installed ● 13: Constructing

■ 7

▲ 40

★ 9

**Total : 80 sites**

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# Multi-GNSS Demonstration Campaign



## PROPOSED WORKING GROUPS

Multi-GNSS Joint Experiments will be promoted in the following Working Groups



Proposed Working Groups	Examples of GNSS applications
Precise Positioning	Precise Agriculture, Construction machine guidance/control
Disaster Mitigation and Management	Tsunami monitoring, GNSS Meteorology, Landslide Monitoring
Intelligent Transportation Systems (ITS)	Probe-car, Mobile Mapping System, Road Pricing, Car-navigation,
Location Based Services (LBS)	Mobile phone, Pedestrian Navigation, Short message, Sightseeing application





## Activities 2: Application Demonstration

◆JAXA's Multi-GNSS Joint Experiments, which selected in 2011, have just started from summer in 2012



	Title, Organization [Application Field]	Country/Region
1	Evaluation of Multi-GNSS for Precision Agriculture in Korea, <i>Chungnam National University</i> [ <b>Precise Positioning</b> ]	Korea
2	Sustainable Resource Utilization by Precision Farming of Oil Palm Plantation; RTK-Auto Guided Oil Palm Planter; On-the-Go Soil ECa Mapping, <i>University Putra Malaysia</i> [ <b>Precise Positioning</b> ]	Malaysia
3	Automated rice transplanter guided by using Multi-GNSS including QZSS , Agricultural Research Center , <i>National Agriculture Research Organization</i> [ <b>Precise Positioning</b> ]	Japan
4	"Joint QZSS/GPS positioning using L1/L5 band signals“, <i>National Cheng Kung University</i> [ <b>Disaster Mitigation and Management</b> ]	Taiwan
5	"Multi-GNSS Experiment at RMIT University in Melbourne“, <i>RMIT University</i> [ <b>Disaster Mitigation and Management</b> ]	Australia
6	Evaluation of QZSS-LEX based positioning compared to IGS PPP, positioning for Thailand, <i>Asia Institute of Technology</i> [ <b>ITS</b> ]	Thailand
7	Exploiting the use of QZSS and GNSS for navigational and high precision applications and their performance assessment (EQUATOR), <i>University of Nottingham Ningbo</i> [ <b>Precise Positioning</b> ]	China
8	Development of Driver Behavior Measurement Method for Level of Safety Estimation from High Precision and High Resolution Global Positioning System with Quasi-Zenith Satellite System (QZSS), <i>National Electronics &amp; Computer Technology Center</i> [ <b>ITS</b> ]	Thailand



## PROPOSED MULTI-GNSS JOINT EXPERIMENTS

- Six proposed Multi-GNSS Joint Experiments were endorsed to be implemented in 2013

	Joint Experiment, Organization, [application}	country/ region
1	“WARTK test in Vietnam for enabling precise positioning for land-sliding applications”, NAVIS Centre – HUST[DMM]	Vietnam
2	Proposal for landslide monitoring test under vegetated slope in Malaysia using multi-GNSS, JKR (Ministry of Construction of govt. of Malaysia)[DMM]	Malaysia
3	Field Evaluation of the Japanese QZSS LEX receiver for the Malaysian padi Field in Precision Rice Farming, MARDI,[Agriculture]	Malaysia
4	Enhancement of multi-GNSS positioning solutions for Precision Agriculture using multiple QZSS signals and ground infrastructure, QUT and UNSW,[Agriculture]	Australia
5	Improvement of GPS tracking accuracy for traffic information platform for Asia mega city, TTET [ITS]	Thailand
6	Identifying of needs within Asia Oceania Region for emergency messages from QZSS with Demonstration, NTT data, [DMM, LBS]	Japan



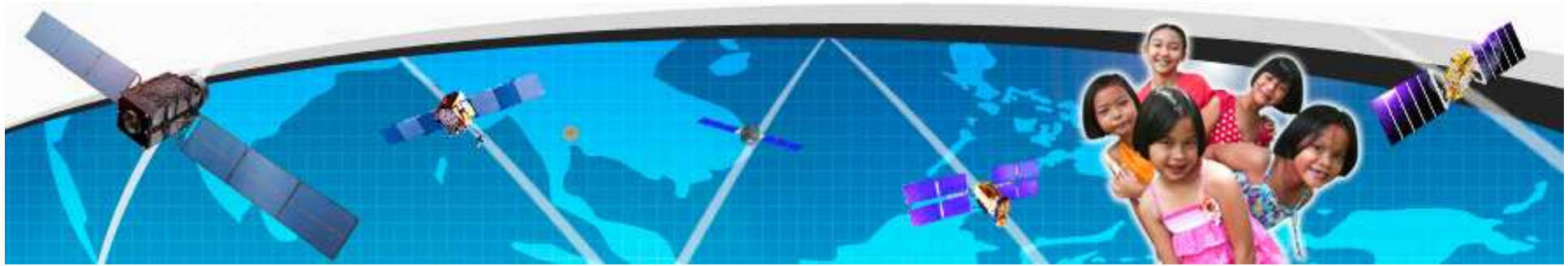
# The 4<sup>th</sup> Asia Oceania Regional Workshop on GNSS



8<sup>th</sup> – 10<sup>th</sup> December 2012 @ Kuala Lumpur, Malaysia



136 participants from various organizations including universities, related research institutes and government agencies gathered from 17 countries.



# The 5<sup>th</sup> Asia Oceania Regional Workshop on GNSS



- will be held in Hanoi, Vietnam, in 1-3 December 2013,
- jointly organized by Hanoi University of Science and Technology (HUST), Japan Aerospace Exploration Agency (JAXA), and Satellite Positioning Research and Application Center (SPAC) of Japan, G-NAVIS and QZS system Services Inc.(QSS).
- The detail information is available in the MGA website:  
[www.multignss.asia](http://www.multignss.asia)



## Multi-GNSS Demonstration Campaign



### ORGANIZATION: WHAT IS MGA?

- “Multi GNSS Asia (MGA)”, established in September 4<sup>th</sup>, 2011 in Tokyo, is an international organization to promote and support activities of the “Asia Oceania Multi-GNSS Demonstration Campaign”



1<sup>st</sup> meeting of MGA Steering Committee

To Join MGA community, please visit to  
[http://www.multignss.asia/howto\\_join\\_mga.html](http://www.multignss.asia/howto_join_mga.html)

# MGA PARTICIPATING ORGANIZATIONS



No	Organizations	Countries/Region
1	Beach Building & Civil Group (BBCG)	Australia
2	RMIT University (RMIT)	Australia
3	Japan Aerospace Exploration Agency (JAXA)	Japan
4	University Putra Malaysia (UPM)	Malaysia
5	National Cheng Kung University (NCKU)	Taiwan
6	Asian Institute of Technology (AIT)	Thailand
7	Chungnam National University (CNU)	Korea
8	SINGAPORE LAND AUTHORITY (SLA)	Singapore
9	The University of Nottingham Ningbo China (UNNC)	China
10	Tokyo University of Marine Science and Technology (TUMST)	Japan
11	National Electronics and Computer Technology Center (NECTEC)	Thailand
12	Ministry of Science and Technology (MOST)	Vietnam
13	National Agriculture and Food Research Organization (NARO)	Japan
14	Earthquake Research Institute, the University of Tokyo (ERI)	Japan
15	Research Faculty of Agriculture, Hokkaido University (AGHU)	Japan
16	Toyama National College of Technology (TNCT)	Japan
17	National Space Agency of Malaysia (ANGKASA)	Malaysia
18	Hanoi University of Science and Technology (HUST)	Vietnam
19	Growing NAVIS (GNAVIS)	Europe
20	Malaysian agricultural research and development institute (MARDI)	Malaysia
21	University of New South Wales (UNSW)	Australia
22	Keio University	Japan
23	Burdwan University	India
24	Electronic Navigation Research Institute (ENRI)	Japan
25	SOARTECH SYSTEMS Sdn Bhd (SSSB)	Brunei
26	Industrial Geodetic Systems	Russia
27	GNSS.asia	Europe



## SUMMARY

- Asia Oceania Multi-GNSS Demonstration Campaign
  1. 80 Stations as Multi-GNSS Monitoring Network
    - JAXA utilize MGM-Net for Precise Orbit and Clock Determination
  2. Getting Results by Multi-GNSS Application Demonstration
    - satellite positioning service can be improved by Multi-GNSS
  3. Asia Oceania Regional Workshop on GNSS
  
- How about Joining to MGA!?
  - Your participation will be welcomed!!