

# Proposal for Multi-GNSS Demonstration Campaign

- Asia Oceania is the “Showcase of  
New GNSS Era” -

Sep. 15 and 16 2009  
4<sup>th</sup> International Committee on GNSS  
WGA WGD  
St. Petersburg, Russia

# Contents

- Back Ground
- Introduction of Preliminary Concept
  - Objectives
  - Outline of Proposal
  - Planned Schedule
  - Expected Participation
  - Organization
  - Information Dissemination
- Summary

# Background

## Showcase of New GNSS Era

- **In Asia Oceania region**

Three major global systems

- GPS (24 SVs in nominal constellation, currently 32 SVs)
- GLONASS (24 SVs)
- Galileo (27 + spare 3 = 30 SVs)

Plus three regional satellite PNT systems

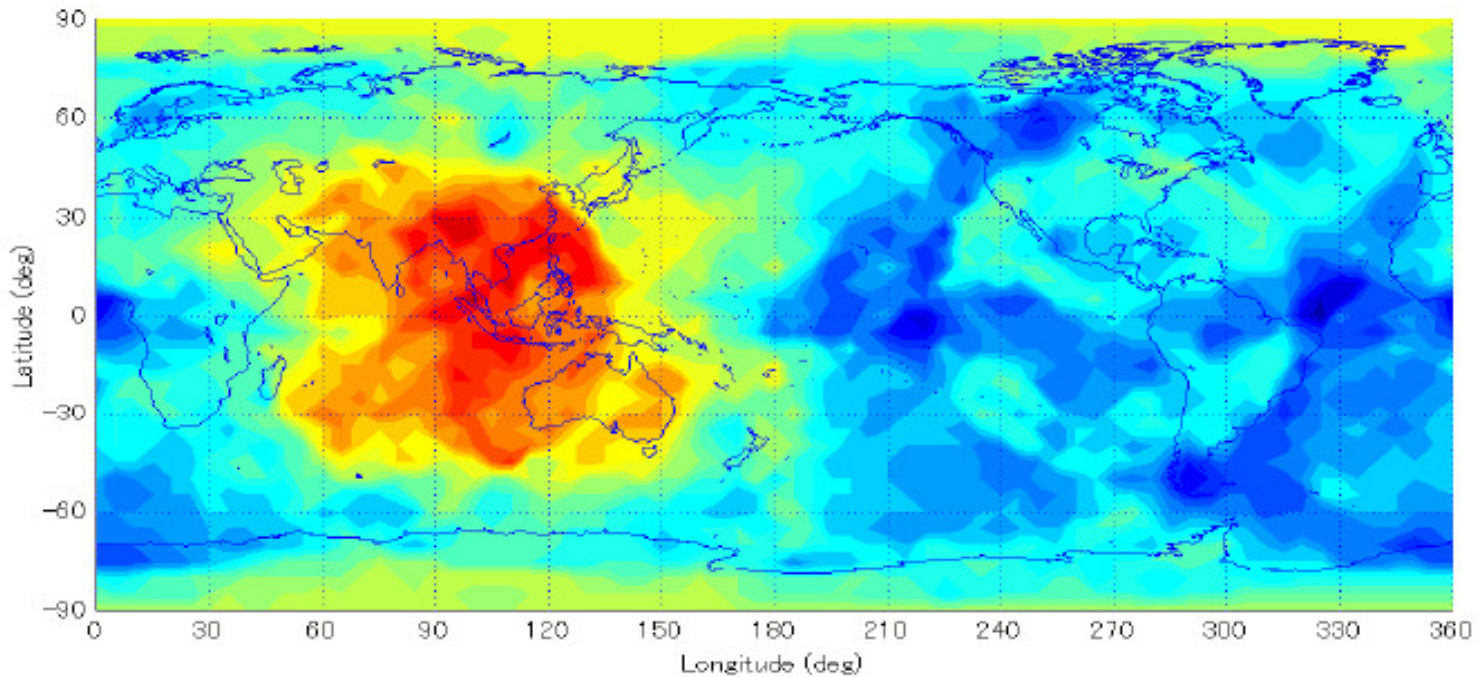
- QZSS (3)
- IRNSS (7)
- COMPASS (10 => 35)
  - China has announced its start of the regional service by the year 2010, gradually to expand toward the global service in the future.

- **New modernized GNSS signals, multi-frequency and multi-GNSS signals can be utilized earlier rather than other region in the world**

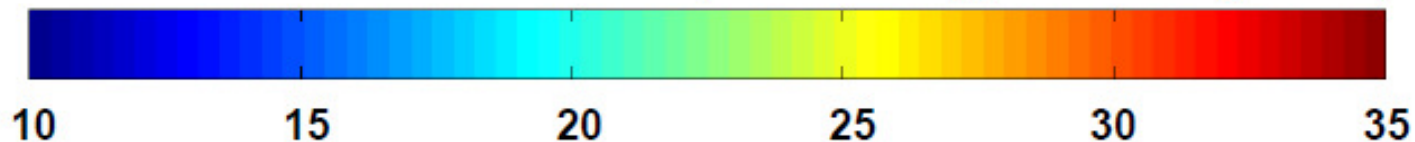
# Background

## Showcase of New GNSS Era

- GPS+GLONASS+Galileo+COMPASS+IRNSS+QZSS



Visible satellite number (mask angle 30 degrees)



# Background

## Showcase of New GNSS Era

- User benefits

- Increase in usable SVs, signals and frequencies



- Increase in availability and coverage
- More robust and reliable services
- Higher accuracy in bad conditions
- Less expensive high-end services



Emerging new and expanding existing applications are to be expected.

# Introduction of Preliminary Concept

## 1. Objectives

Main objectives are to;

- Encourage and promote the introduction and utilization of satellite positioning, navigation and timing services in the Asia and Oceania region through assistance with the integration of GNSS services into their infrastructures;
- Promote new multi-GNSS utilization and applications in the region and **feedback needs and requirements related to interoperability from user communities** to GNSS providers
- Encourage GNSS provider and users in Asia Oceania region to develop new applications and carry out experiment or demonstration jointly.

# Introduction of Preliminary Concept

## 2. Outline of Proposal

- *Asia Oceania Multi-GNSS Demonstration Campaign*
  - *is a series of activities for four or five years from 2010*
  - *comprises the following parts*
    - *Infrastructure Establishment*
      - *Multi-GNSS Monitoring Network*
    - *Projects*
      - *Development of new or extended multi GNSS applications*
      - *Carrying out Experiments and Demonstrations*
    - *Regional Work Shop*
      - *Annual base Workshop in Asia Oceania region*
      - *Announcement of joint experiment plans and reporting results of the experiments*

# Introduction of Preliminary Concept

## 2. Outline of Proposal

- Establishment of the Multi-GNSS observation network
  - Is aimed to generate precise orbit & clock offset estimation and prediction, time offset bias among multi-GNSS systems, iono, tropospheric delay, and other beneficial information for experiments
  - Is to be promoted in collaboration with IGS and other related organizations.
- JAXA is planning to provide
  - Multi-frequencies multi-GNSS receivers for the above purposes
  - Opportunity to experiment using first QZSS satellite LEX and L1-SAIF signals
- Collaboration with IGS (International GNSS Service) and related organizations is considered essential. JAXA would like to request cooperation with them by all means.
- Contributions from other GNSS providers such as provision of receivers and co-locations to their MS site are highly welcomed.



# Introduction of Preliminary Concept

## 2. Outline of Proposal

- Joint Development of Multi-GNSS applications
  - Is aimed to demonstrate benefits of multi-GNSS use as well as importance of interoperability among multi-GNSS systems
  - Is to be promoted by groups or teams which are to be established by each interest and requirement depending on their services, applications field and countries.
  - A group or team is to be structured by universities, industries and local public bodies.
- Establishing groups which will implement joint development and demonstrations of applications in Asia Oceania region is encouraged.
- Funding support for the above international activities are highly welcomed from any countries.

# Introduction of Preliminary Concept

## 2. Outline of Proposal

- Followings are instances picked up for the joint applications development and experiments
  - Disaster Management
    - Tsunami, Earthquake, Landslide monitoring
    - GPS meteorology
    - Emergency broadcast via QZSS
  - ITS
    - Road pricing, probe car's application
  - Precise Positioning
    - Precise Agriculture, Machine Control
  - LBS, pedestrian navigation

# Introduction of Preliminary Concept

## 2. Outline of Proposal

- Asia Oceania Regional Workshop on GNSS
  - Is aimed to discuss the future joint project and announce the status and the results of the existing projects annually.
- The first Workshop will be held on January 25-26, 2010 in Thailand.
  - Hosted by SPAC, JAXA, GISTDA
  - Location: Bangkok, Thailand
  - Draft Agenda
    1. Keynote Speech
    2. Introduction of the concept for Asia Oceania Multi-GNSS Demonstration Campaign
    3. Overviews of GNSS systems
    4. GNSS Applications Session
    5. Project Planning Session
    6. Closing session

*SPAC: Satellite Positioning Applications Center is Japanese non-profit organization*

*GISTDA: Geo Informatics and Space Technology Development Agency is a space agency in Thailand*

# Introduction of Preliminary Concept

## 3. Planned Schedule

2010-2011

- Establishment of the network of the Multi-GNSS monitoring
  - JAXA would like to provide multi-GNSS receivers for the network establishment, and also would like to propose that other GNSS providers should provide some of their utilities as well, if they can accept this concept.
  - Collaboration with IGS
- Development of applications
  - Using multi-GNSS signals and their augmentation.

2011-2013

- Phase I Experiment
  - Before enough multi-GNSS SV can be used, the experiments can be done by using GPS+QZSS
  - Existing GPS local network can be used to generate local Ionospheric and/or tropospheric delay corrections.
  - QZSS can transmit local error correction message for those joint experiments.
- Phase II Experiment
  - After enough multi-GNSS SV can be used, the experiments can be expanded to use other GNSS

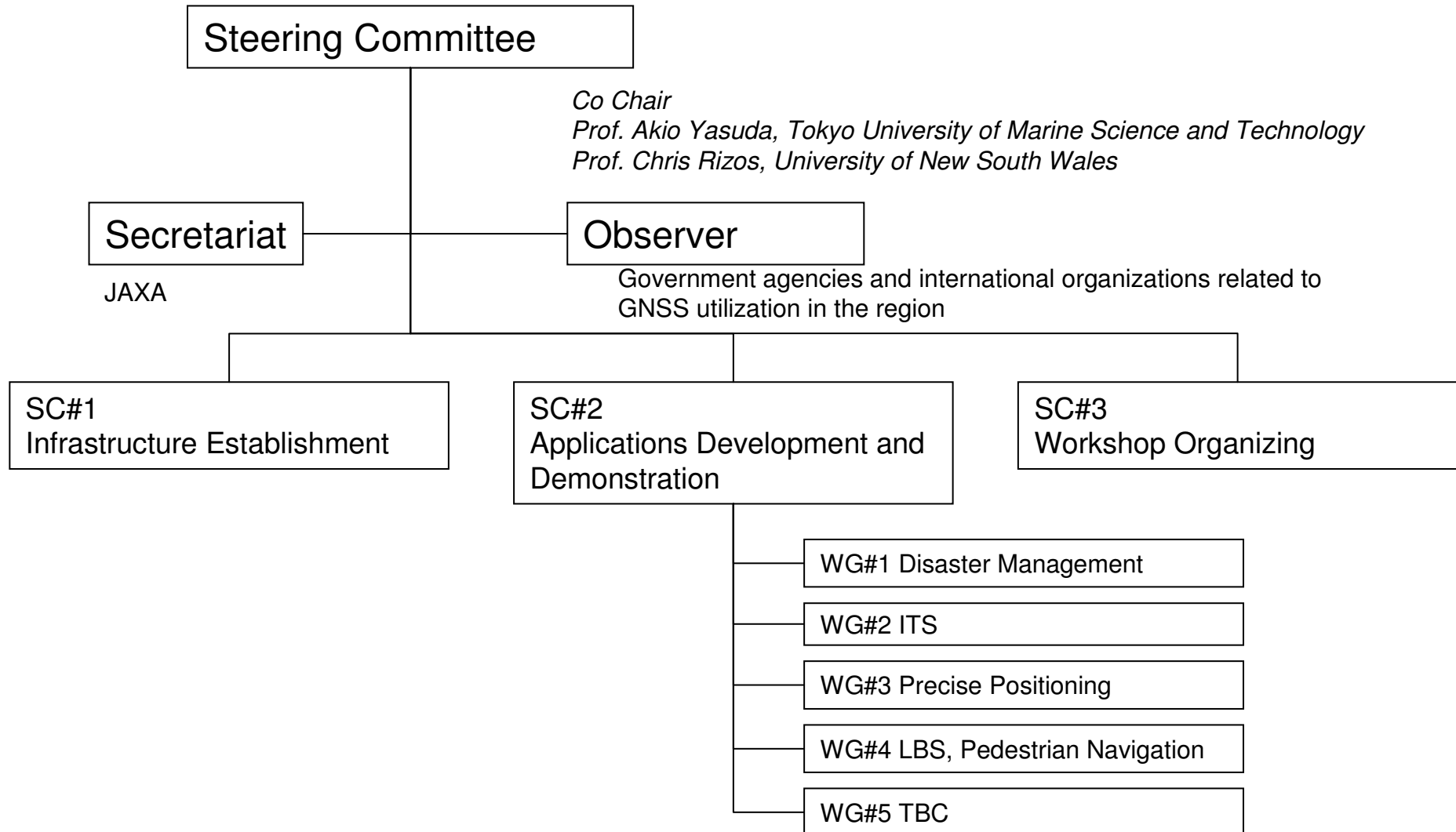
# Introduction of Preliminary Concept

## 4. Expected Participation

- Expected participants are
  - GNSS providers
  - International organization related to GNSS utilization
    - IGS, FIG, IAG ....
  - Government agencies and international organizations related to GNSS utilization in Asia Oceania region
    - Mapping, Transportation, GIS, Tourism, and relevant fields in each country
    - UN ESCAP, ADB
  - Industries
    - Receiver manufacturer, service providers
  - Universities and research institutes

# Introduction of Preliminary Concept

## 5. Organization



# Introduction of Preliminary Concept

## 6. Information Dissemination

- Official announcement and information about the activities as well as registration form of the first Workshop are to be provided by web site.
  - It will be opened in early October 2009.
  - URL is <http://www.multignss.asia/>
- Tentative contact for further information is [IS-QZSS@jaxa.jp](mailto:IS-QZSS@jaxa.jp) until the above site is opened.

# Summary

- Preliminary concept for Multi-GNSS demonstration campaign is introduced.
- It is expected to contribute to ICG activity defining interoperability among GNSS systems.
- JAXA would like to ask for
  - Other GNSS providers participation and contribution
  - Collaboration with IGS and related organizations
  - Endorsement from ICG.