THE CURRENT STATUS OF ASIA OCEANIA MULTI-GNSS DEMONSTRATION CAMPAIGN

Multi-GNSS Asia Secretariat
June 4th, 2012
8th ICG Providers’ Forum
ASIA OCEANIA MULTI-GNSS DEMONSTRATION CAMPAIGN

Multi-GNSS Monitoring Network

Application Demonstration
- Disaster Mitigation
- Precise Positioning
- ITS
- LBS
- Other, ionospheric observation etc

Regional Workshop
- 3rd Workshop, Nov. 2011 @ Jeju, Korea:
- 2nd Workshop, Nov. 2010 @ Melbourne, Australia
- 1st Workshop on GNSS, JAN. 2010, @ Bangkok, Thailand
Activities 1: MULTI-GNSS MONITORING NETWORK

Multi-GNSS (GPS, GLONASS, GALILEO) Tracking NW

QZSS

Monitor Station

Monitor Station

・・・ Monitor Station

Multi-GNSS Applications’ Demos

Multi-GNSS Precise Orbit Clock Determination System

Evaluation, Analysis function.

Precise Orbit Determination System
(Real-time, Post-processing)

Message Generator

Data I/F – NTRIP Caster

IGS

RINEX

RTCM

Other Multiple constellation Tracking NW

LEX msg

QZSS Master Control Station (MCS)

Multi-GNSS Precise Orbit Clock Determination System

Evaluation, Analysis function.

Precise Orbit Determination System
(Real-time, Post-processing)

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Other Multiple constellation Tracking NW

LEX msg

QZSS Master Control Station (MCS)
THE CURRENT STATUS OF MULTI-GNSS MONITORING NETWORK

<table>
<thead>
<tr>
<th>City</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulit Kayu Arang</td>
<td>Brunei</td>
</tr>
<tr>
<td>Jakarta</td>
<td>Indonesia</td>
</tr>
<tr>
<td>Daejeon</td>
<td>Korea</td>
</tr>
<tr>
<td>Putrajaya</td>
<td>Malaysia</td>
</tr>
<tr>
<td>Waigani</td>
<td>Papua New Guinea</td>
</tr>
<tr>
<td>Taguig city</td>
<td>Philippines</td>
</tr>
<tr>
<td>Hanoi</td>
<td>Vietnam</td>
</tr>
<tr>
<td>Ondrejov</td>
<td>Czech Republic</td>
</tr>
<tr>
<td>Delft</td>
<td>Netherland</td>
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<tr>
<td>Tainan</td>
<td>Republic of China</td>
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<tr>
<td>Singapore</td>
<td>Singapore</td>
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<tr>
<td>Alaska</td>
<td>U.S.A.</td>
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<tr>
<td>Yanbu</td>
<td>Saudi Arabia</td>
</tr>
<tr>
<td>General Santos</td>
<td>Philippine</td>
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</tbody>
</table>

Call for application has been opened continuously until enough number of sites are selected.

Selected Sites
(showed in above table)

Applied and under selection process arrangement
CONTRIBUTION TO IGS MGEX PROJECT

- 10 sites in MGM-net were registered to IGS M-GEX
  - Installation process are going on.
  - The site which installation was completed has started operation and is preparing data provision to M-GEX
  - Data exchange conversion issue should be resolved for inclusion QZSS into M-GEX experiments
## ACTIVITIES 2: APPLICATION DEMONSTRATION: WORKING GROUPS

<table>
<thead>
<tr>
<th>Working Groups</th>
<th>Examples of GNSS applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disaster Mitigation and Management</td>
<td>Tsunami monitoring, GNSS Meteorology, Landslide Monitoring, Emergency Message</td>
</tr>
<tr>
<td>Precise Positioning</td>
<td>Precise Agriculture, Construction machine guidance/control</td>
</tr>
<tr>
<td>Intelligent Transportation Systems (ITS)</td>
<td>Probe-car, Mobile Mapping System, Road Pricing, Car-navigation,</td>
</tr>
<tr>
<td>Location Based Services (LBS)</td>
<td>Mobile phone, Pedestrian Navigation, Short message, Sightseeing application</td>
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</tbody>
</table>
PROPOSED MULTI-GNSS JOINT EXPERIMENTS

- 8 Experiments were endorsed to be implemented <- 1\textsuperscript{st} CALL

<table>
<thead>
<tr>
<th>Experiment ID</th>
<th>Description</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Evaluation of Multi-GNSS for Precision Agriculture in Korea, Chungnam National University</td>
<td>Korea</td>
</tr>
<tr>
<td>2</td>
<td>Sustainable Resource Utilization by Precision Farming of Oil Palm Plantation; RTK-Auto Guided Oil Palm Planter; On-the-Go Soil ECa Mapping, University Putra Malaysia</td>
<td>Malaysia</td>
</tr>
<tr>
<td>3</td>
<td>Automated rice transplanter guided by using Multi-GNSS including QZSS, Agricultural Research Center, National Agriculture Research Organization</td>
<td>JAPAN</td>
</tr>
<tr>
<td>4</td>
<td>&quot;Joint QZSS/GPS positioning using L1/L5 band signals&quot;, National Cheng Kung University,</td>
<td>Republic of China</td>
</tr>
<tr>
<td>5</td>
<td>&quot;Multi-GNSS Experiment at RMIT University in Melbourne&quot;, RMIT University</td>
<td>Australia</td>
</tr>
<tr>
<td>6</td>
<td>Evaluation of QZSS-LEX and L1-SAIF signals based positioning compared to DGPS and IGS PPP, positioning for Thailand</td>
<td>Thailand</td>
</tr>
<tr>
<td>7</td>
<td>Exploiting the use of QZSS and GNSS for navigational and high precision applications and their performance assessment (EQUATOR)</td>
<td>China</td>
</tr>
<tr>
<td>8</td>
<td>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)</td>
<td>Thailand</td>
</tr>
</tbody>
</table>
Purpose
Discussion about new application experiments of GNSS and Information sharing of the results of the current status of the activities of Multi-GNSS Asia.

Date
9-10th Dec. 2012

Venue
Kuala Lumpur, Malaysia (Berjaya Times Square Hotel)

Co-Host Organization: JAXA, ANGKASA, SPAC
Support Organization: ICG, IGS

Contents
- What’s new about GNSS
- GNSS Applications presentations
- Reports of Activities of Multi-GNSS Asia (MGA)
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<thead>
<tr>
<th>No</th>
<th>Organizations</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Beach Building &amp; Civil Group (BBCG)</td>
<td>Australia</td>
</tr>
<tr>
<td>2</td>
<td>RMIT University (RMIT)</td>
<td>Australia</td>
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<tr>
<td>3</td>
<td>Japan Aerospace Exploration Agency (JAXA)</td>
<td>Japan</td>
</tr>
<tr>
<td>4</td>
<td>University Putra Malaysia (UPM)</td>
<td>Malaysia</td>
</tr>
<tr>
<td>5</td>
<td>National Cheng Kung University (NCKU)</td>
<td>Republic of China</td>
</tr>
<tr>
<td>6</td>
<td>Asian Institute of Technology (AIT)</td>
<td>Thailand</td>
</tr>
<tr>
<td>7</td>
<td>Chungnam National University (CNU)</td>
<td>Korea</td>
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<tr>
<td>8</td>
<td>SINGAPORE LAND AUTHORITY (SLA)</td>
<td>Singapore</td>
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<tr>
<td>9</td>
<td>The University of Nottingham Ningbo China (UNNC)</td>
<td>China</td>
</tr>
<tr>
<td>10</td>
<td>Tokyo University of Marine Science and Technology (TUMST)</td>
<td>Japan</td>
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<tr>
<td>11</td>
<td>National Electronics and Computer Technology Center (NECTEC)</td>
<td>Thailand</td>
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<td>12</td>
<td>Ministry of Science and Technology (MOST)</td>
<td>Vietnam</td>
</tr>
<tr>
<td>13</td>
<td>National Agriculture and Food Research Organization (NARO)</td>
<td>Japan</td>
</tr>
<tr>
<td>14</td>
<td>Earthquake Research Institute, the University of Tokyo (ERI)</td>
<td>Japan</td>
</tr>
</tbody>
</table>
PARTICIPATION TO MGA

- The organizations which have interests in GNSS utilization in Asia Oceania region are expected to participate:
  - Government agencies,
  - Universities, and research institutes
  - International organizations
  - Industries such as Receiver manufacturer, service providers
  - GNSS providers

Please visit to
http://www.multignss.asia/howto_join_mga.html
Seeking the possibilities of next proposals for “2nd call for joint experiment”

- User requirements to GNSS utilization
- Proposal to demonstrate the Multi-GNSS benefits
- The proposals should be discussed in 4th Asia Oceania Regional Workshop on Multi-GNSS
- The experiments endorsed by MGA Steering Committee in the workshop will be implemented in 2013.
WORK STRUCTURE FOR MULTI-GNSS DEMONSTRATION IN ASIA OCEANIA REGION

International Committee on GNSS (ICG)

Multi GNSS Asia (MGA)
International Organization on voluntary base to promote multi-GNSS use in Asia Pacific region

MGM-Net

IGS and Other Multiple Constellation Tracking NW

Call for Joint Experiments
Multi-GNSS Rx provided by JAXA

Asia Oceania Regional Workshop on GNSS

Call for Joint Experiments
Multi-GNSS Rx provided by CSNO = BADEC

Call for Joint Experiments
Other providers sponsored
SUMMARY

- 14 stations were selected for hosting sites of MGM net and selection process for some stations are still under going.
- Call for application has been open until enough number of sites are selected.
- 8 Joint Experiments were to be implemented as MGA experiments
- The 4th Workshop will be held on Dec. 9-10, 2012 at Kuala Lumpur, Malaysia.
- Multi-GNSS Asia (MGA) was established to promote the Campaign activities. 14 organizations joined as of the end of May, 2012.
- Seeking possibilities of next joint MGA experiments.
Multi-GNSS Demonstration Campaign

ORGANIZATION: STRUCTURE

MGA Member

Co Chair
Prof. Akio Yasuda, Tokyo University of Marine Science and Technology
Prof. Chris Rizos, University of New South Wales

Government agencies and international organizations related to GNSS utilization in the region

MGA Member will participate in either group or committee

Precise Positioning WG
Disaster Management WG
ITS WG
LBS WG

Team Tsunami Monitoring
Team GNSS Meteorology
Team Displacement, Landslide Monitoring

Steering Committee
Secretariat
Observer

JAXA