

International Member Regional Update Australia

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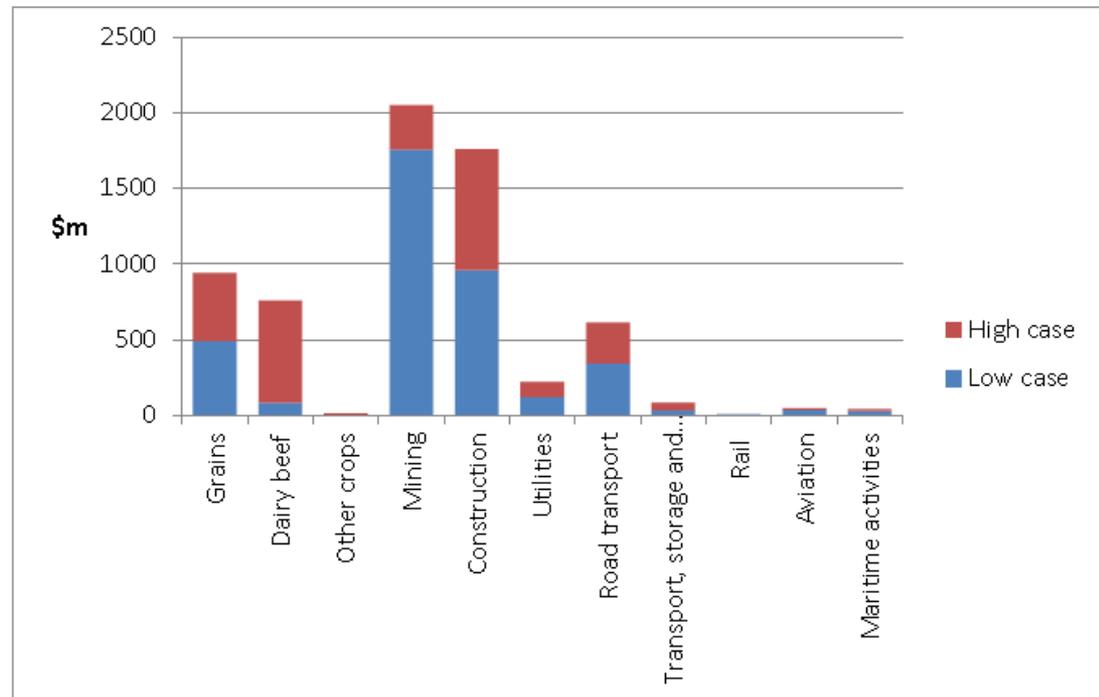


Outline

- Decided to structure this presentation around issues suggested in the Agenda as possible topics for the Advisory Board's Working Groups:
 - *Economic Value of GPS;*
 - *Spectrum Issues;*
 - *Assured PNT;*
 - *Affordability Options;*
 - *International GNSS Contributions;*
- So I will comment briefly on each of these from an Australian perspective.

Economic Value – Acil Allen Study

- Builds on the findings of the 2008 Allen Consulting report '*Economic benefits of high resolution positioning services*'
- Estimates that Australian GDP in 2020 will be between \$7 billion to \$14 billion higher due to the benefits of augmented GNSS positioning services
- Overview and sector reports available at www.ignss.org for information and comment



(Source: Andrews for Space Coordination Office, IGNSS 2013)

Spectrum Issues

- **Australia has legislation against the use of GPS Jammers;**
- **Resourcing for ACMA to enforce could be an issue in a country as large and as sparsely populated as Australia;**
- **Australian Defence Department holds Space Licence for GPS:**
 - **required before ACMA can act;**
 - **What about other GNSS systems?... I believe ITU is encouraging member states to act anyway but still...**

Assured PNT

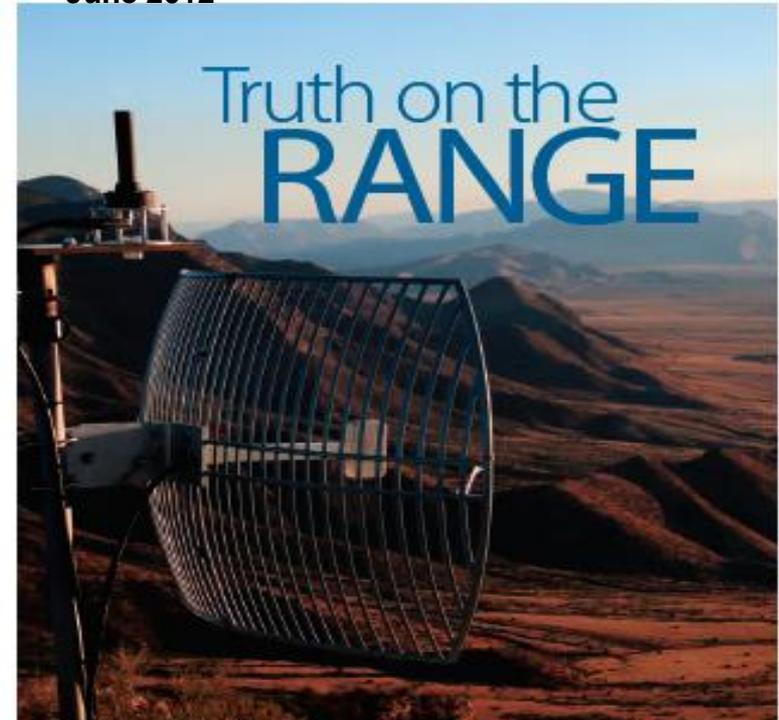
Locata – Beyond GNSS

Locata: An Australian-designed, terrestrial, GNSS-like technology involving time synchronised ground stations (“Locatalites”) able to:

- Augment GNSS (e.g. open-cut mines) or;
- Replace GNSS (e.g. vulnerable applications) or;
- Be used where GNSS never could operate (e.g. indoors);
- Within coverage area of local transmitter network.

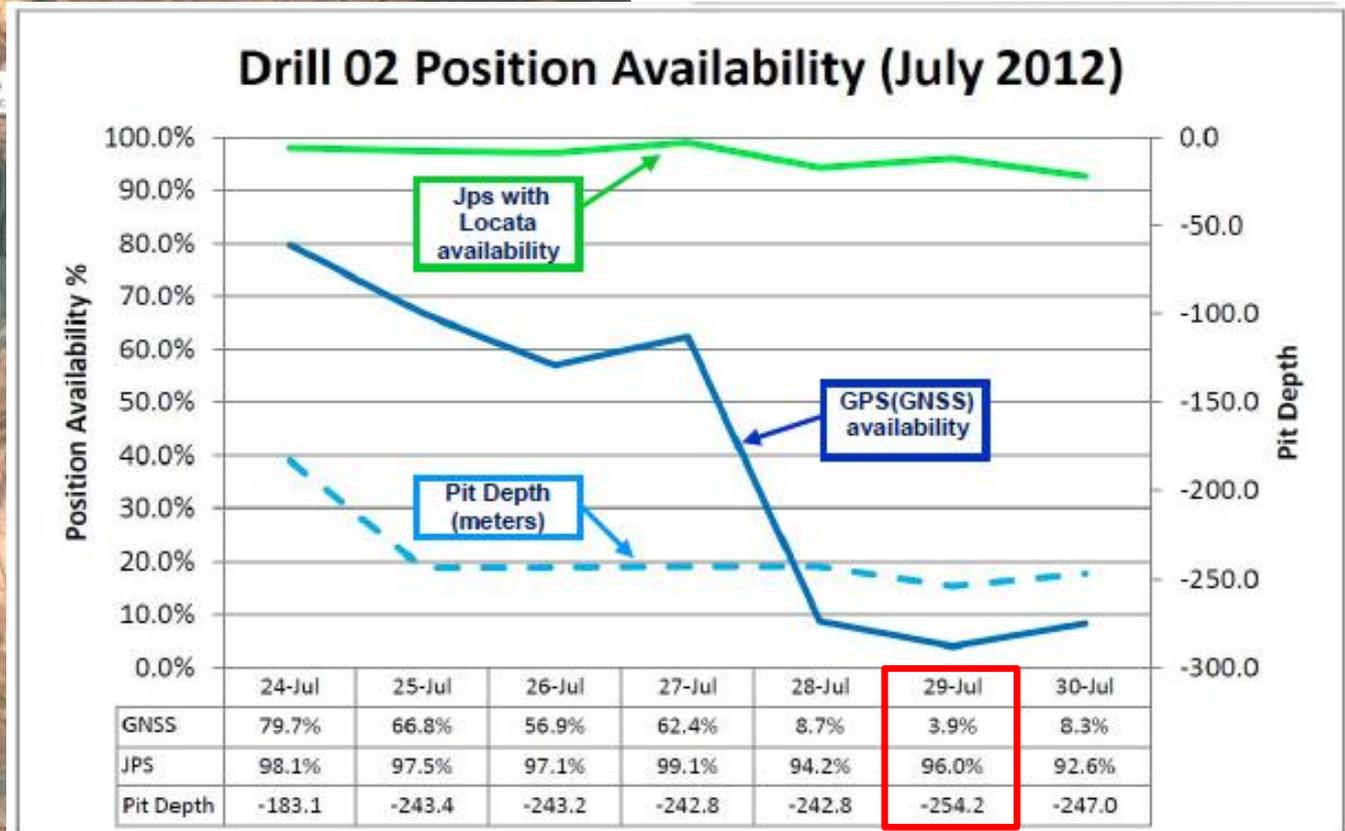
(Source: Rizos, 2012)

June 2012



Sole-source contract from US Air Force to cover > 2,500 sq. miles White Sands Missile Base as “truth” when jamming GPS

Leica + Locata - Application in Open Cut Mine



Typical example of position availability for a drill rig operating in South Pit at Newmont Boddington Gold over a 1-week period in July 2012. Positioning available from Jps Locata is compared directly against high-accuracy GPS-only availability

(Source: Rizos, 2012)



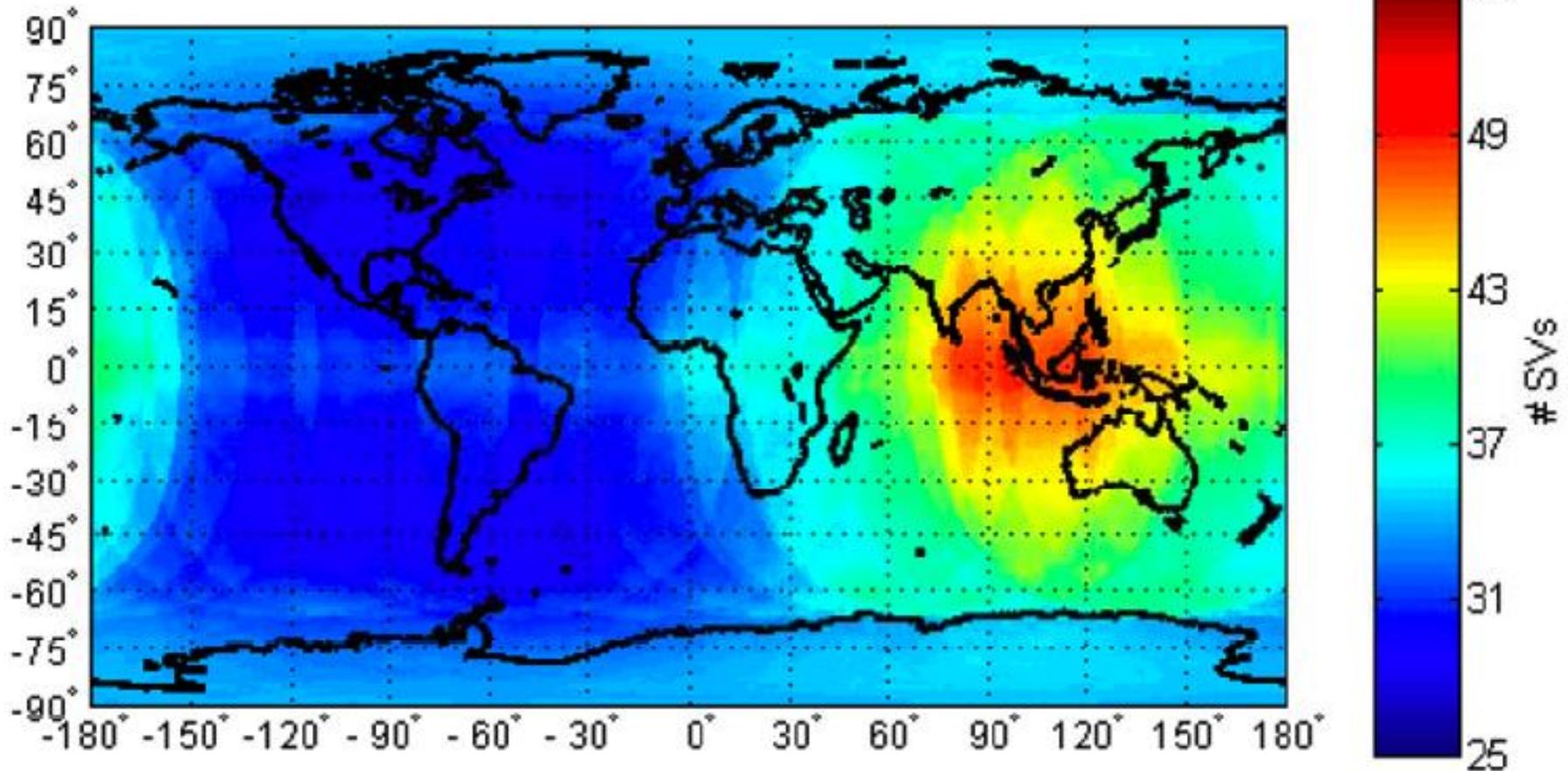
Affordability Options

- I assume this applies to options for improving future affordability of the GPS System, in which case I have nothing specific;
- Only additional comment is to ideally include consideration of any possible impacts on users and on the additional/augmentation infrastructures on which they rely.

International GNSS Contributions

Australia's Advantage in the Multi-GNSS Era

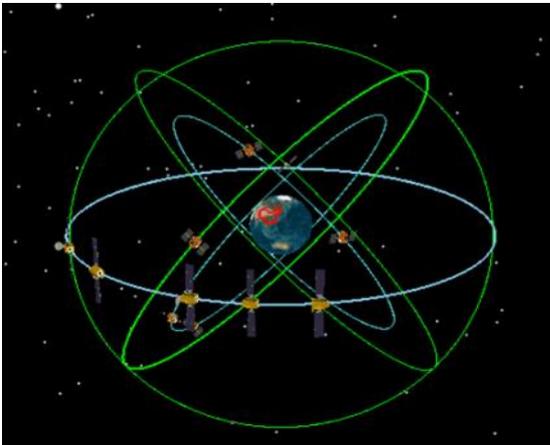
Average Combined GNSS visibility over 24 hours (15 Degree Mask)



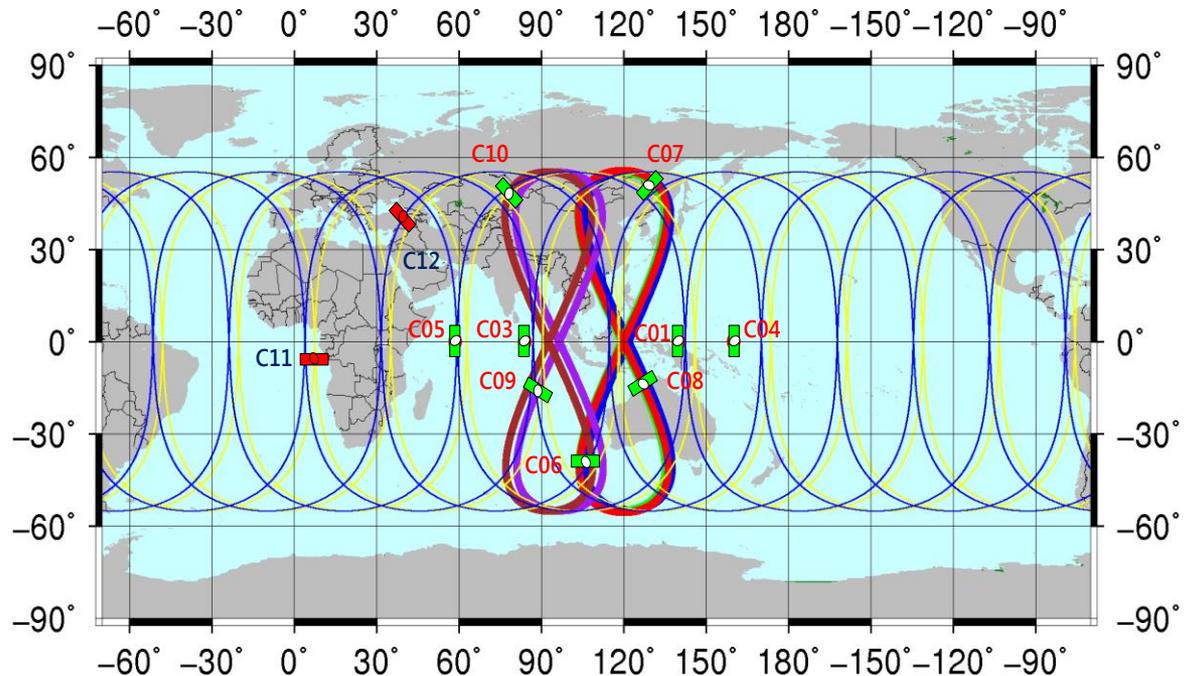
Constellations GPS, Galileo, Glonass, Compass, QZSS, WAAS, EGNOS, MSAS, GAGAN, IRNSS
(Source Dempster, 2009)

China: Beidou

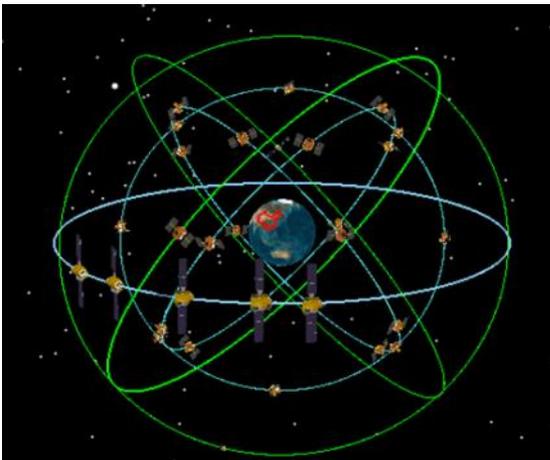
- 2013: 5GEO+5IGSO+4MEO (Regional Service)
- 2020: 5GEO+3IGSO+27MEO (Global Service)



2013



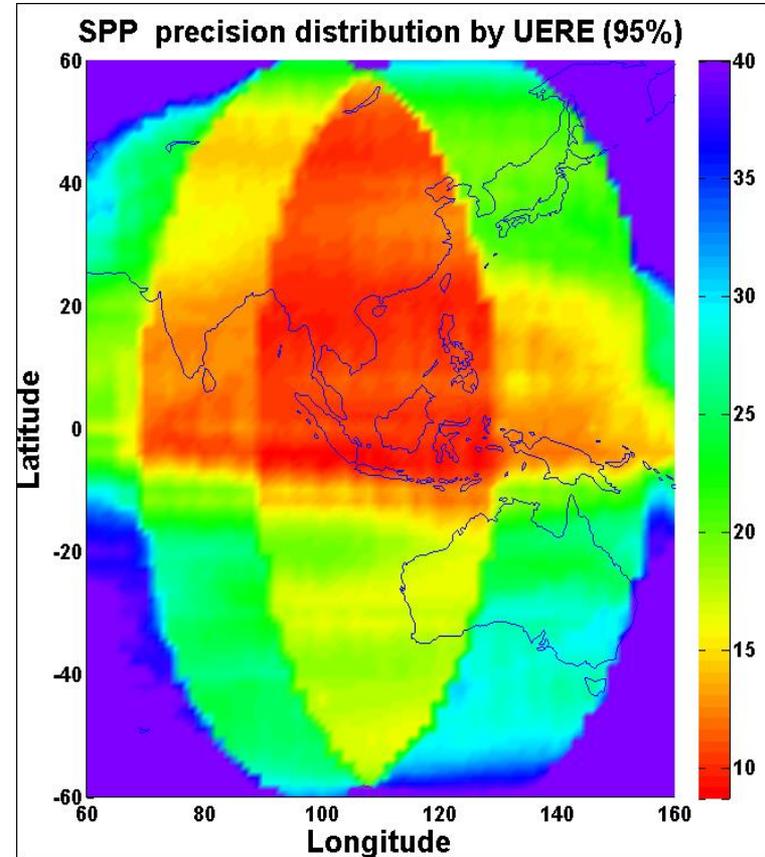
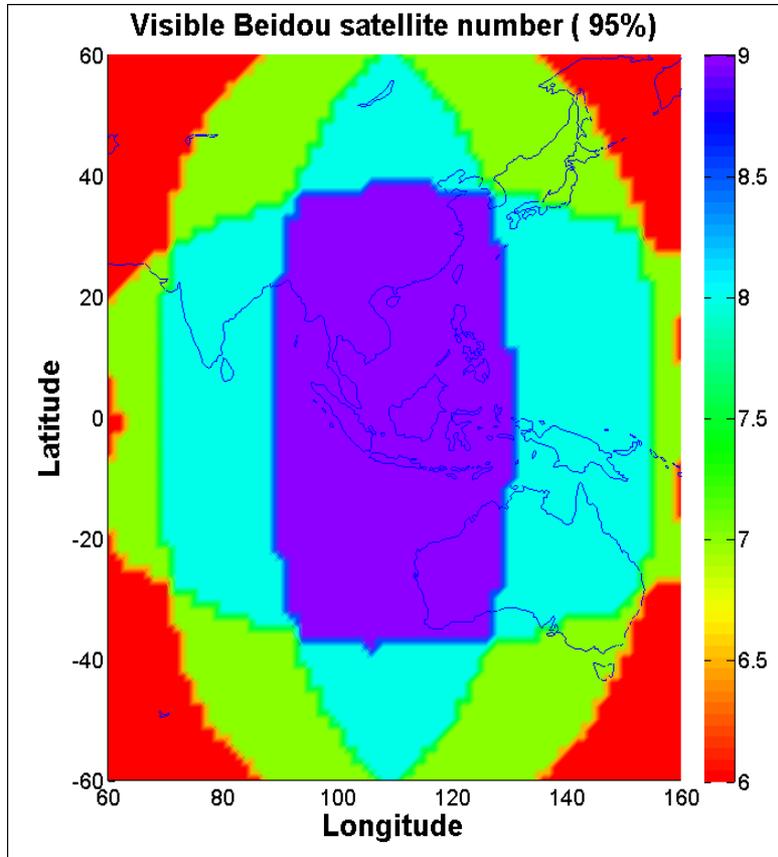
2020



(Source: Prof Shi Chuang, Director GNSS Research Center of Wuhan University presented at QUT, 9/8/2012)

China: Beidou

Single Point Positioning Performance of Current Constellation

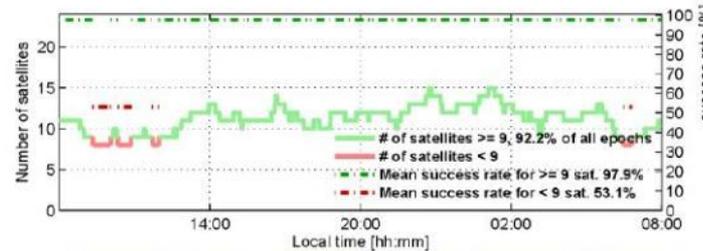
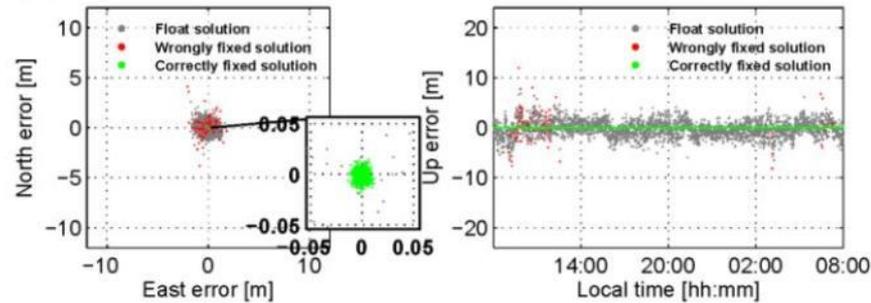


- *Beidou Short Messaging capability already proven invaluable during natural disasters;*
- *Space Based Augmentation capability (SBAS) also integrated into system architecture.*

(Source: Prof Shi Chuang, Director GNSS Research Center of Wuhan University presented at QUT, 9/8/2012)

Single-frequency RTK ambiguity resolution + positioning results – cut-off elevation: 35 deg

BeiDou B1 +
GPS L1



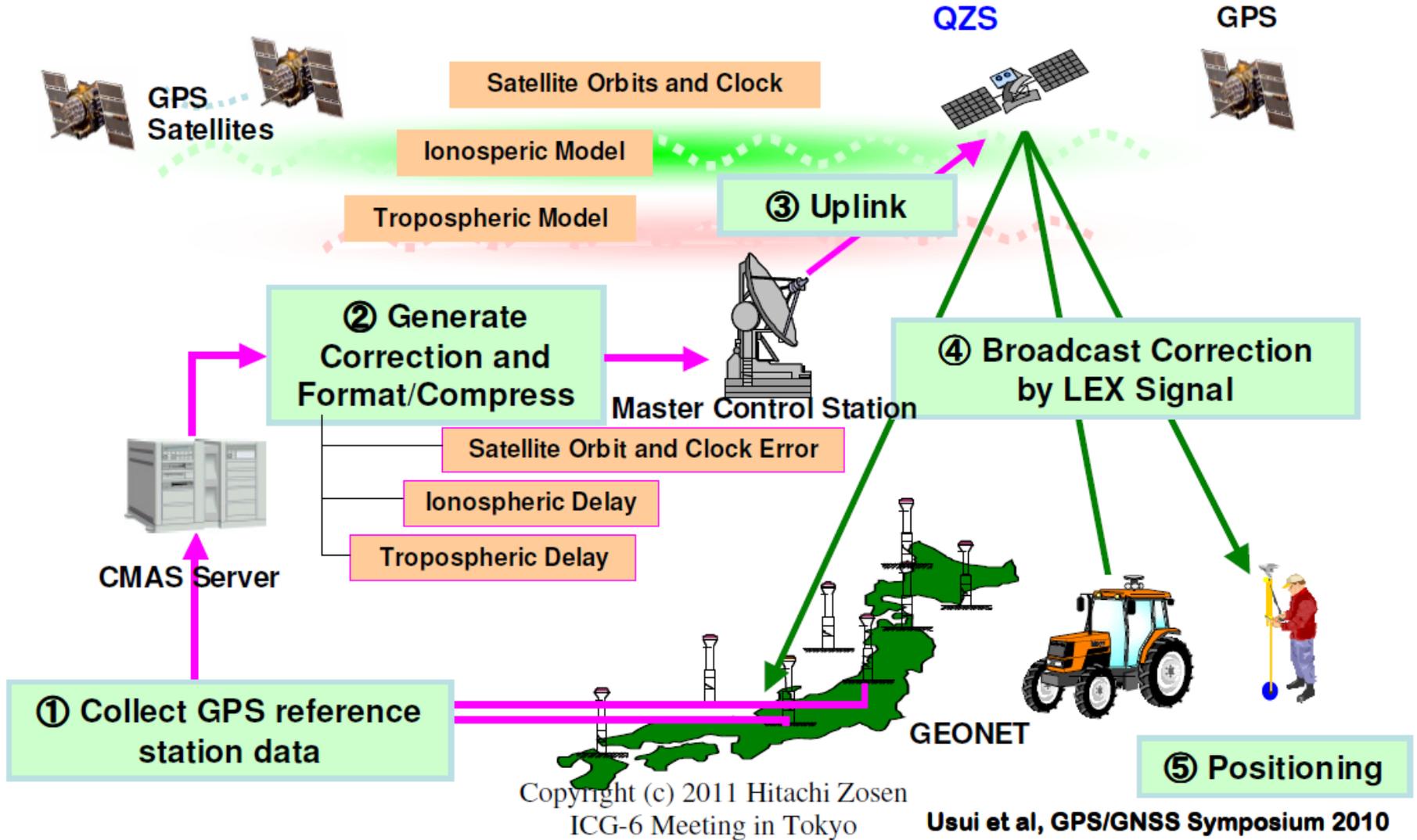
System/ Frequency	Ambiguity resolution success rate % for cut-off [deg]					
	10	15	20	25	30	35
BEIDOU B1	96.4	96.1	86.9	83.4	66.8	51.5
GPS L1	79.4	68.9	52.6	33.4	19.3	9.0
COMBINED B1+L1	98.1	100	100	100	99.4	97.0

24 h of data (21/04/13)

- Multi-path less of an issue?
- L1 only so very low cost receivers can do this;
- L1 and L5 will give even better results.

(Source: Robert Odolinski, Teunissen, and Odijk, GNSS Research Centre, Curtin University, Presented at CSNC 2013)

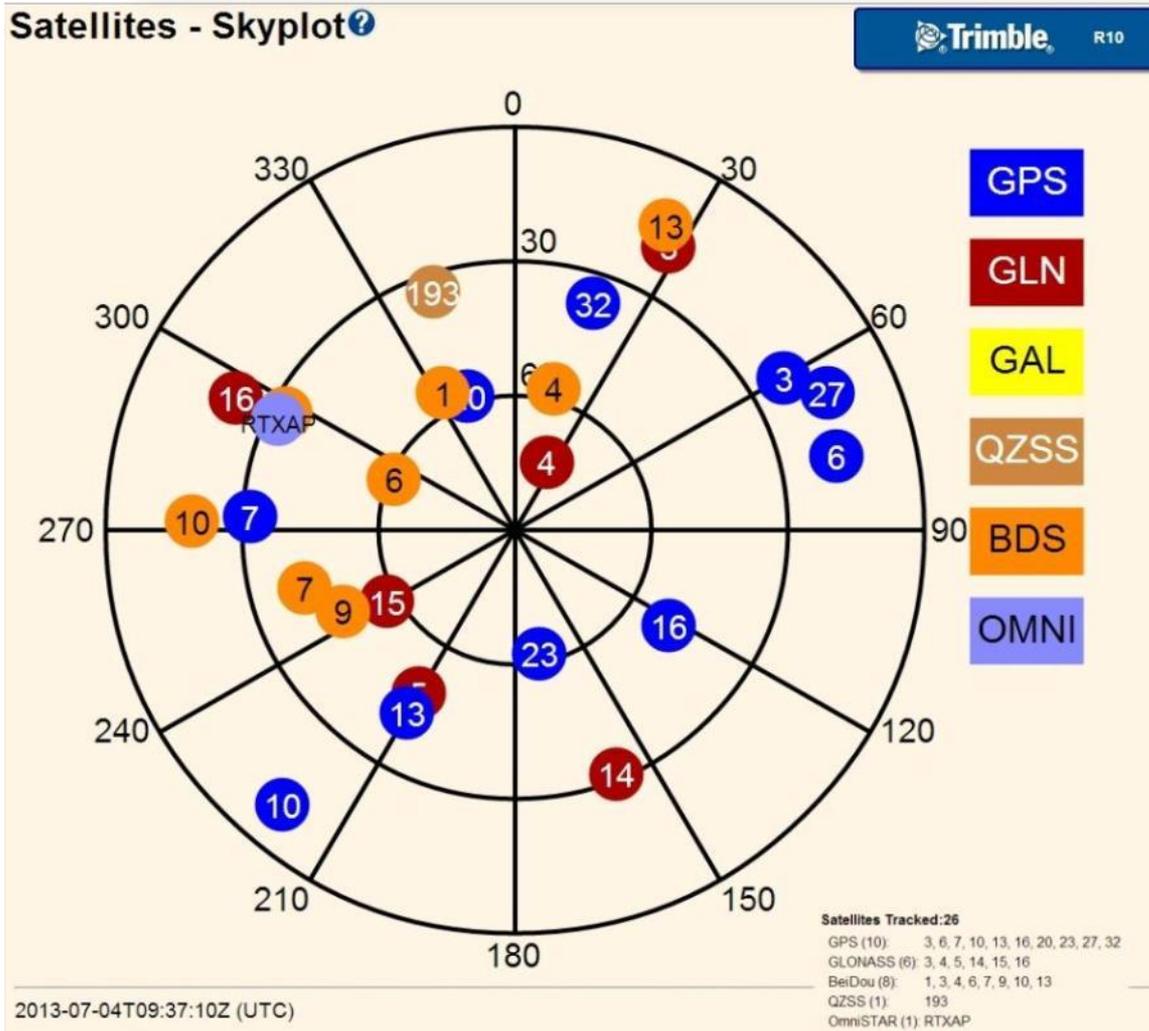
Australian Interest in the Augmentation Capabilities Built into QZSS



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ICG-6 Meeting in Tokyo

Usui et al, GPS/GNSS Symposium 2010

Australia's Advantage in the Multi-GNSS Era



- QZSS's IGSO and Beidou's GEO and IGSO orbits mean they will bring significantly improved results for many users in the Asia Pacific Region;
- Probably more significant than addition of GLONASS.

GNSS Strategic Plan



01

▼
ENSURE THERE IS LEADERSHIP FOR THE AUSTRALIAN GNSS COMMUNITY

02

▼
ADOPT A WHOLE-OF-NATION APPROACH TO A SUSTAINABLE, MULTI-GNSS-ENABLED NPI

03

▼
MITIGATE VULNERABILITIES IN EXISTING AND FUTURE GNSS INFRASTRUCTURE

04

▼
CAPITALISE ON AUSTRALIA'S UNIQUE GEOPOLITICAL ADVANTAGE

- ***Developed by the Australian Spatial Consortium;***
- ***Recommendations seen as contributions to new Australian Government Satellite Utilisation Policy***

Satellite Utilisation Policy

- Australia's national space policy, released on 9 April 2013;
- Outlines Australia's space aims and capabilities;
- Aims to ensure ongoing, cost effective access to space capabilities for Australia;
- Called for Infrastructure Plans for Earth Observation and for PNT;
- Seemed to be bi-partisan support for the policy prior to recent Federal election but yet to see details of the new Government's "position".

(Source: Andrews for Space Coordination Office, IGNSS 2013)



Thanks for your attention

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