



Australian Government
Geoscience Australia



Positioning Infrastructure: an Australian Perspective

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Precise Positioning and the Economy

Precise satellite positioning technology will potentially add up to 2.1% to Australia's gross domestic product by 2030 through productivity gains in mining, construction and agriculture alone.



Precise Positioning Applications: Examples

Land, Sea, Air Navigation

- Aviation
- Marine navigation
- Intelligent transport

Surveying and Mapping

- Civil engineering
- Mining/exploration
- Precision agriculture
- GIS
- Datum

Timing

- Time transfer
- Financial transactions
- Cellular networks
- Electrical power grids

Scientific Research

- Sea level change
- Crustal deformation
- Environmental studies

→ Lots more applications yet to be conceived

Science and Policy Response - Sea Level Change

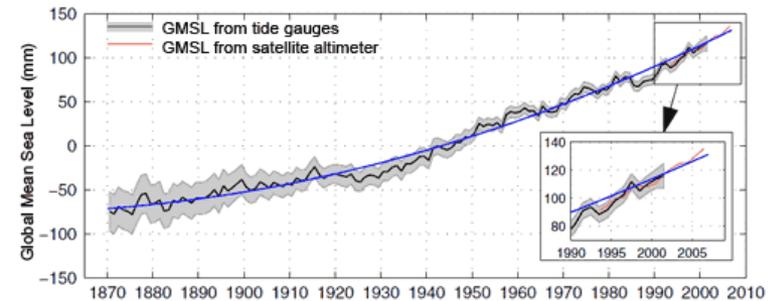
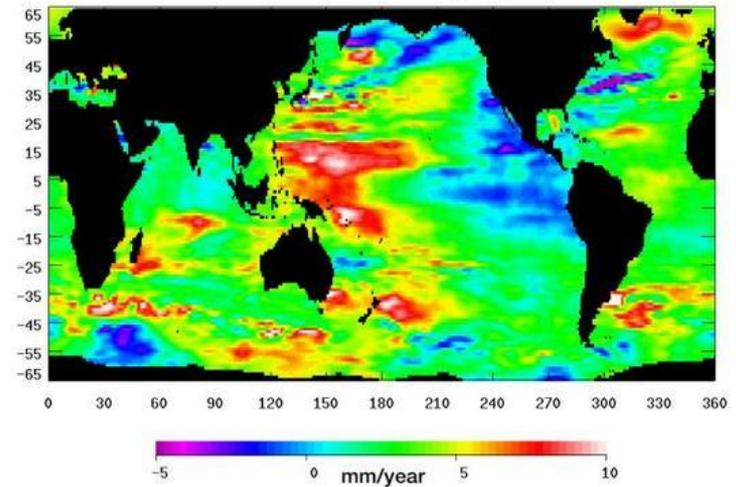
85% of Australia's population live in the coastal zone

Rising sea levels and storm surges will have significant impacts on many of our coastal towns and cities.

Understanding the risks to infrastructure and private property is particularly important for highly populated urban areas.

Positioning/Geodetic Infrastructure underpins our understanding of sea level change

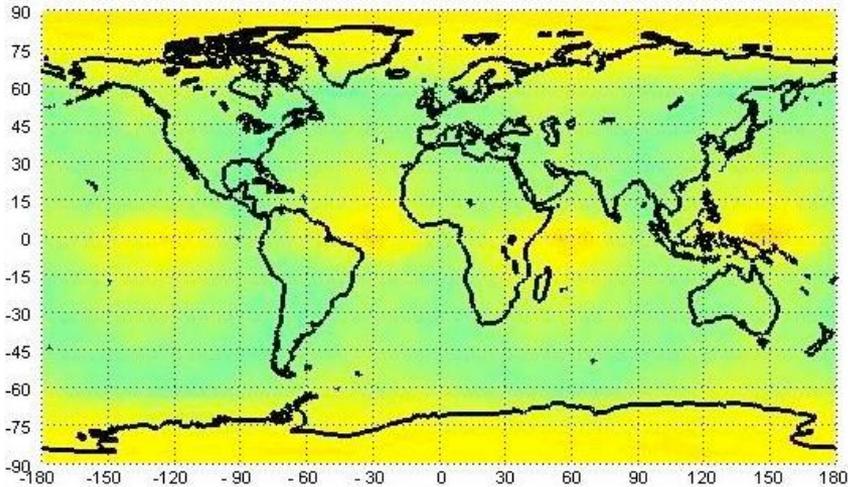
Trend of Sea Level Change (1993-2008)



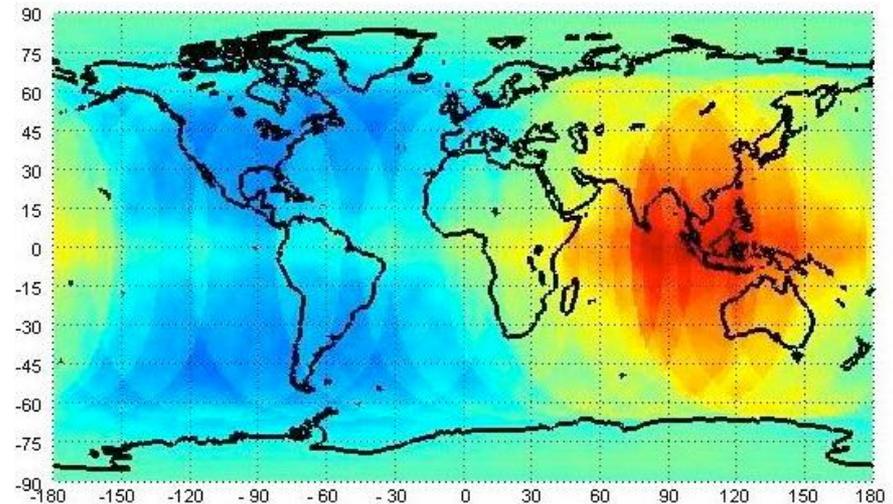
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GNSS Opportunities for the Asia Pacific

2011: Average satellite coverage: 8-10



2018: Average satellite coverage: 40



GPS (USA), GLONASS (Russia), Galileo (Europe), Beidou (China), QZSS (Japan), IRNSS (India)

→ More satellites in view provides improved precise positioning capabilities

Components of a Precise Positioning Infrastructure

**GNSS CORS data and
the relationship to
other geospatial data**

**Global Geodetic
Observing System
e.g., Global Geodetic
Reference Frame (ITRF)**

**Positioning
services (public
and private),
including
delivery**



**Satellite
infrastructure
-- GNSS**



Australian Government Positioning Policy

In 2012, the Australian Government developed a National Satellite Utilisation Policy

- National Earth Observation from Space Strategic Infrastructure Plan
- National Positioning Infrastructure (NPI) Plan

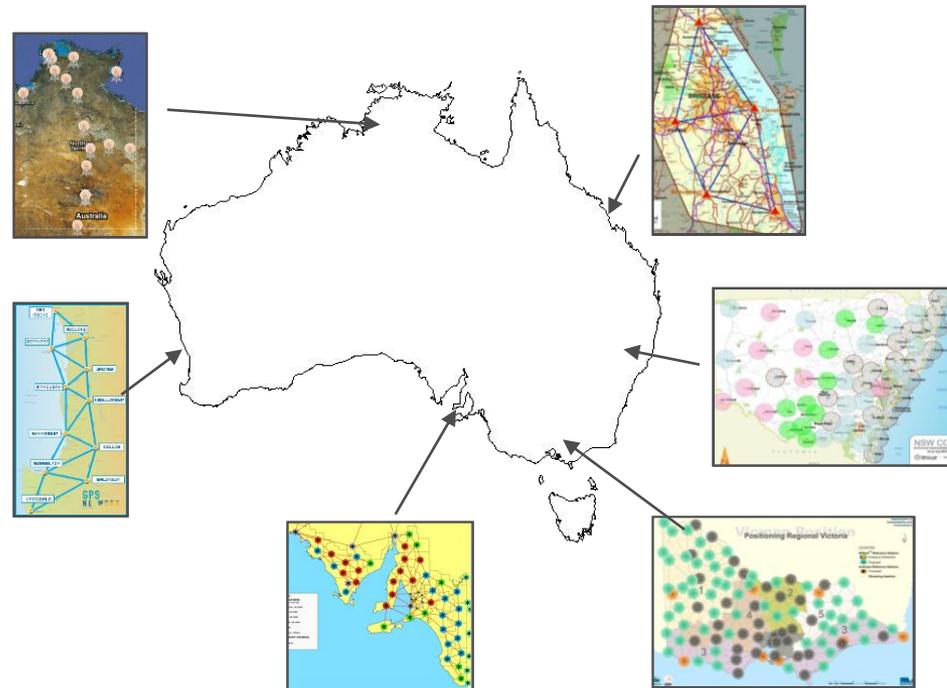
Australian NPI Vision

Instantaneous, reliable and fit-for-purpose positioning and timing services anywhere, anytime across the Australian landscape and its maritime jurisdictions

Australian Government Positioning Policy

Australian Government's NPI Plan recognises that there is:

- Duplication and gaps in service provision and that growth and investment in positioning infrastructure has occurred organically, predominantly in high population density zones or hotspots around mines and major urban centres



Australian Government Positioning Policy

Australian Government's NPI Plan recognises:

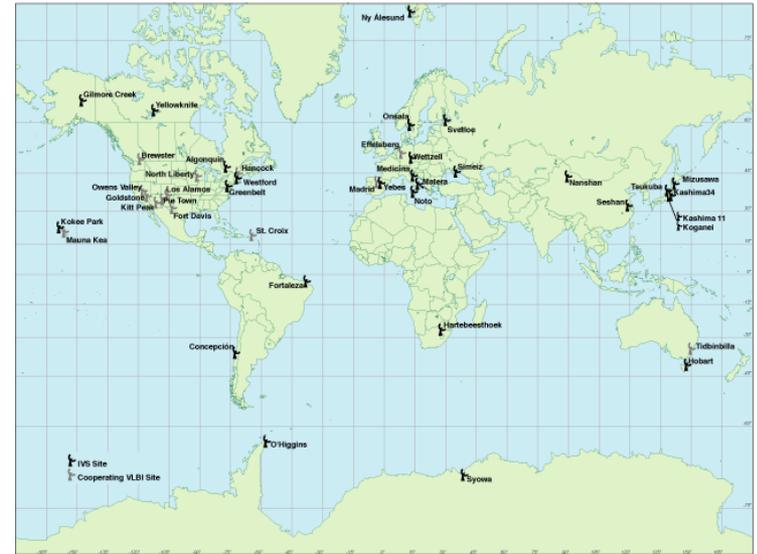
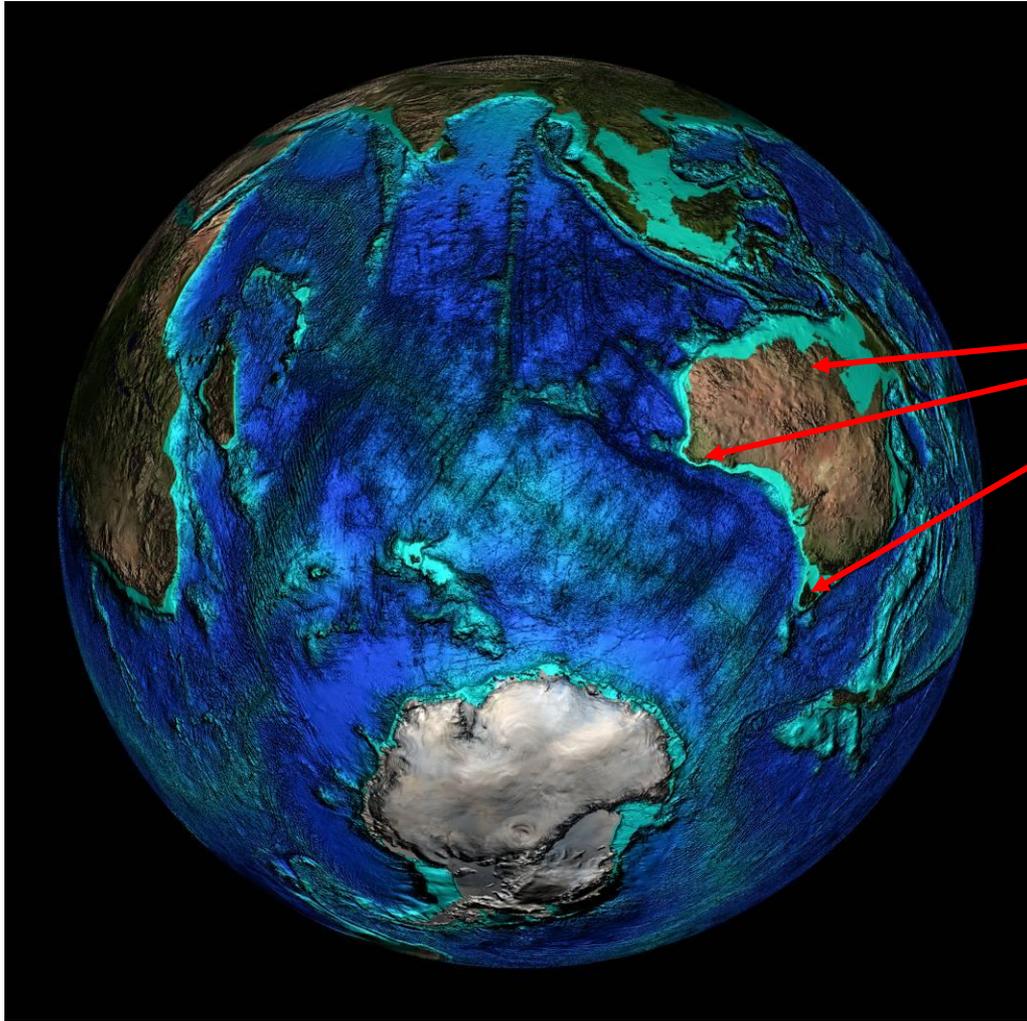
- Significant national opportunity through mass adoption of precise positioning technology
- A lack of interoperability between current equipment and systems
- Current lack of adherence to standards (e.g. coordinate systems)
- Government involvement will accelerate the emergence of national standards

Australian Government Positioning Policy

Australian Government's NPI Plan recognises the need to:

- Facilitate international engagement through the Australian Government to ensure ongoing access to space systems
- Ensure that sustainability of the Global Geodetic Observing System (GGOS) which underpins all Positioning Infrastructure
 - **in particular, we need to pay attention to the sustainability of the global geodetic tracking infrastructure**

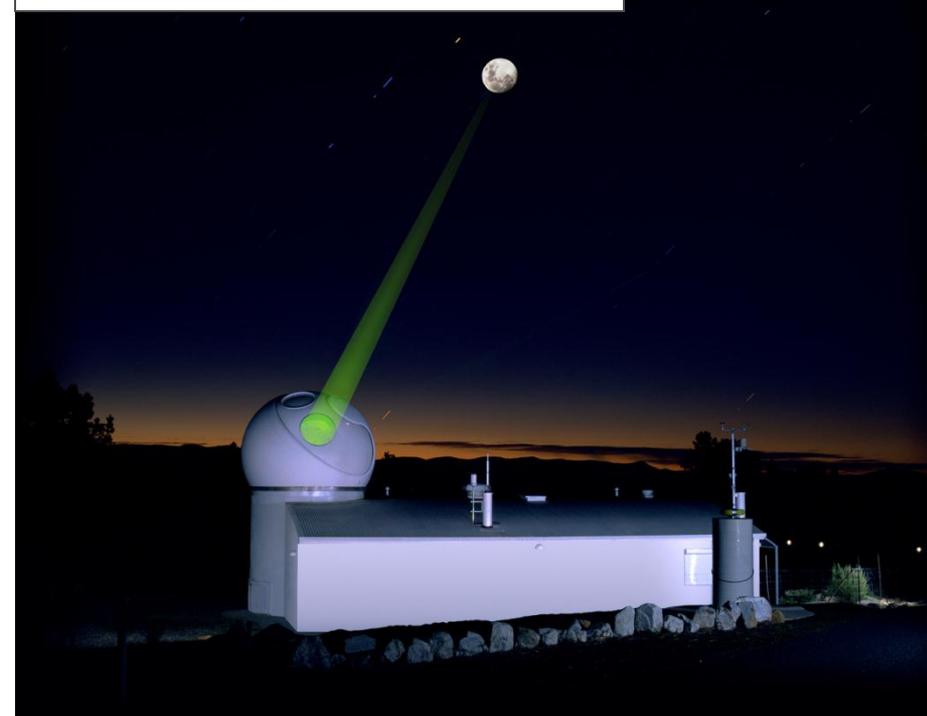
Australia's Geodetic Infrastructure – VLBI



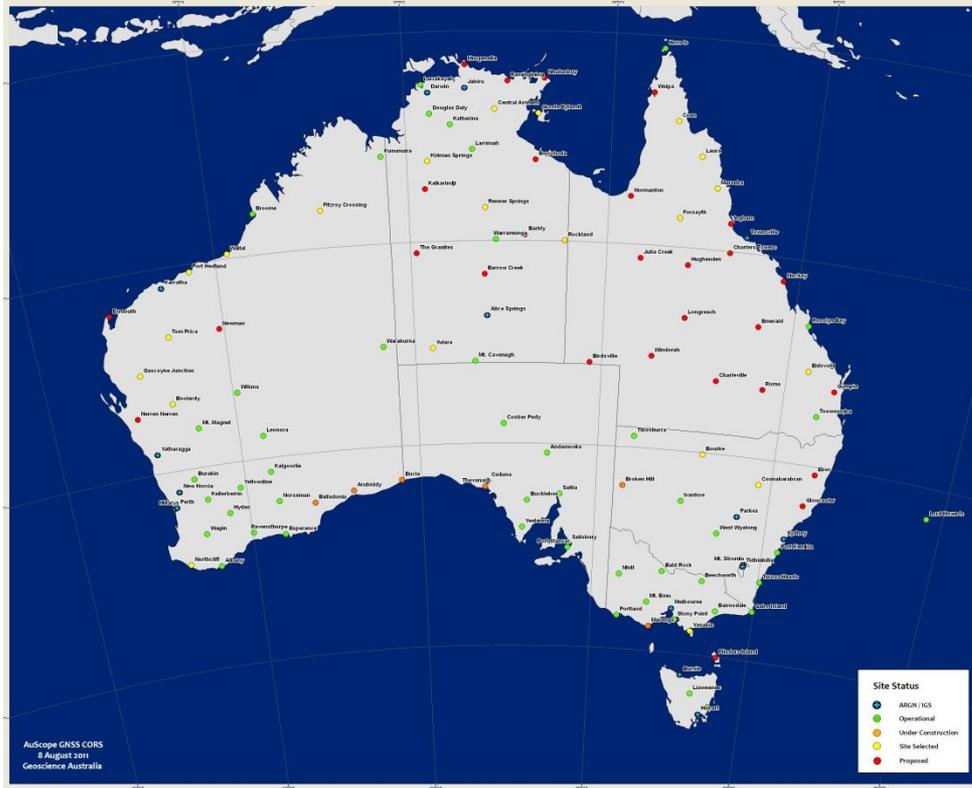
Australia's Geodetic Infrastructure – SLR



SLR, Mount Stromlo, Canberra



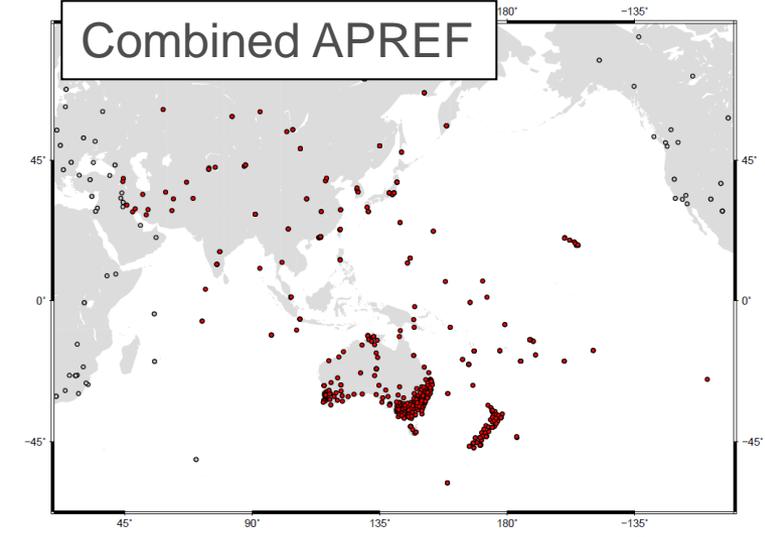
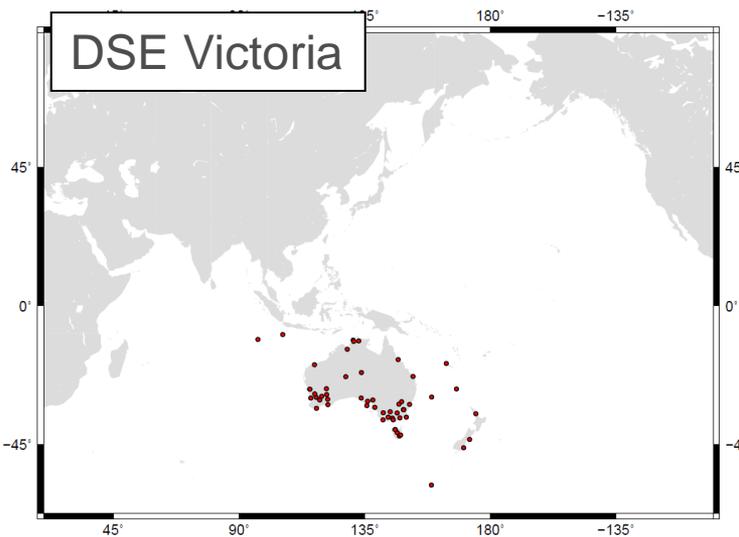
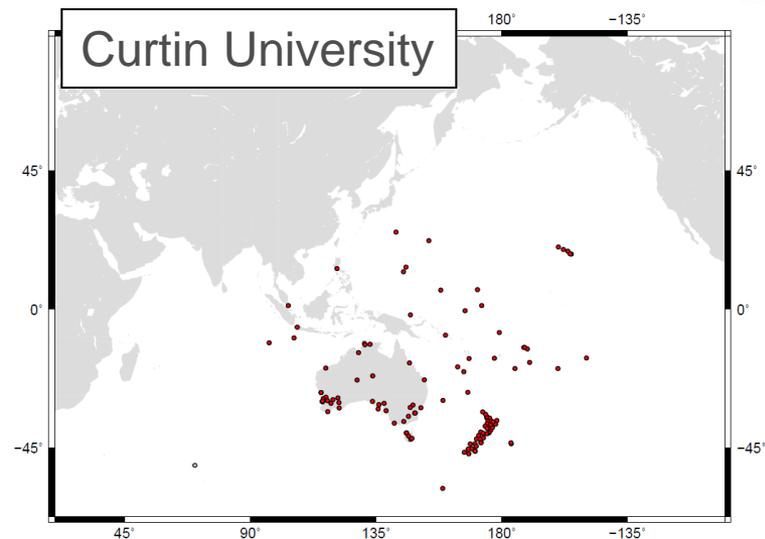
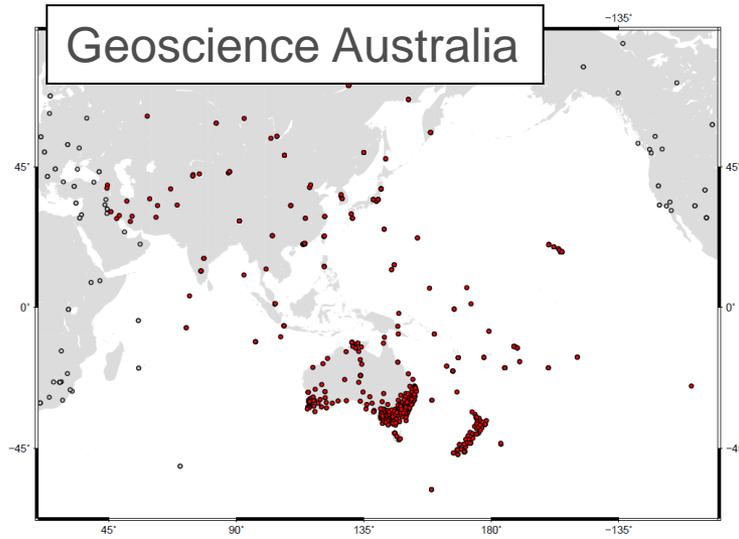
Australia's Geodetic Infrastructure – GNSS



GNSS CORS + VLBI, Hobart, Tasmania



Asia Pacific Reference Frame (APREF)



Take Home Messages

- Australian Government sees precise positioning technologies as an enormous opportunity and has a vision of mass-market adoption
- Key weakness of this vision is the sustainability of the global geodetic infrastructure
 - Requires improved international data sharing and investment
 - Requires global action
 - Global infrastructure old and requires upgraded
 - Common good approach required
 - UN action would help



