AuScope

AN ORGANISATION FOR A NATIONAL EARTH SCIENCE INFRASTRUCTURE PROGRAM

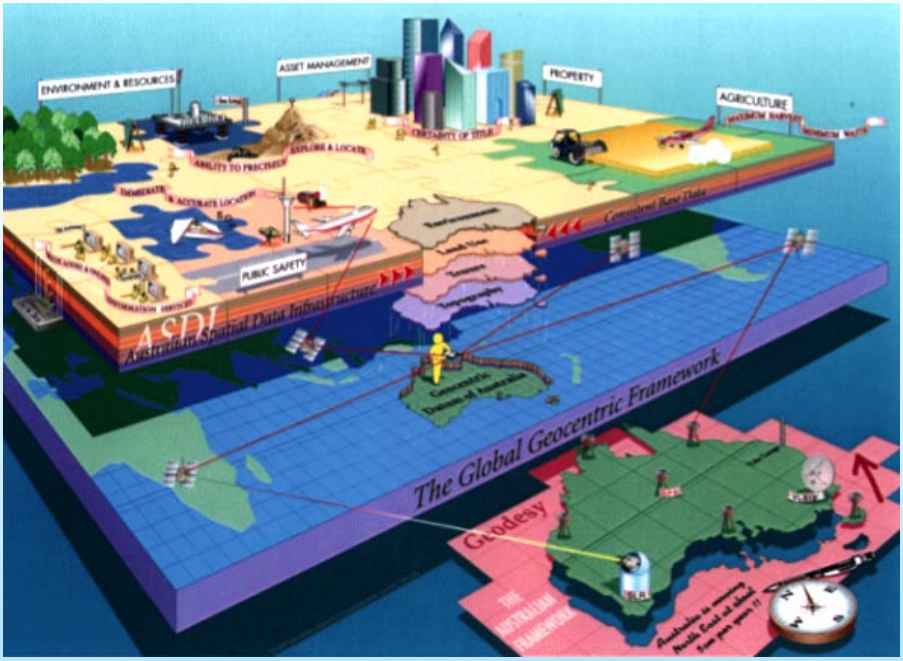
Geospatial Framework & Earth Dynamics

The geospatial component of AuScope will establish and operate a comprehensive national geodetic infrastructure at increased levels of accuracy and time resolution. The new geospatial infrastructure will generate a significant quantity of data that will be used to improve the accuracy of Australia's Reference Frame, and allow Australian scientists to investigate pressing questions such as sea-level variation. AuScope is a component under the National Collaborative Research Infrastructure Strategy (NCRIS).

AuScope's key geospatial infrastructure investment comprises new and upgraded:

- Very Long Baseline Interferometry (VLBI) systems;
- Satellite Laser Ranging (SLR) facilities;
- Global Navigation Satellite Systems (GNSS) ground stations and receivers; and
- Gravity measurement instruments.

VLBI and SLR are the key techniques that provide the long-term accurate determination of the fundamental components of a reference frame. VLBI is the most accurate technique available to define the scale and orientation of



a reference frame, whereas SLR is the best technique to determine the origin of the reference frame and can also make a contribution to the scale. GNSS is the primary means for users to access the reference frame, and is the most effective way of providing high resolution observations of crustal deformation. Gravity provides the information required to link between the mathematical ellipsoidal coordinate system and the height system defined by level surfaces (geoid).

Very Long Baseline Interferometry (VLBI)

The AuScope investments include:

New VLBI sites at Yarragadee (WA) and Katherine (NT) and a replacement for the ageing Hobart (TAS) system. This will include 12 metre radio telescopes, atomic clocks, signal receivers and processing equipment. There will also be some building infrastructure at the Yarragadee and Katherine sites. This investment will link with the new VLBI antennae being acquired concurrently by our New Zealand collaborators.

A VLBI software correlator has been developed and associated dedicated hardware purchased, permitting near-real time analysis of the data collected under this program. This will ultimately allow data from many VLBI sites to be streamed into the correlator system via high speed internet and be analysed in near real time.




Satellite Laser Ranging (SLR)

An upgrade of components at the Mt Stromlo SLR facility, including larger power modules and increased laser pulse fire rates, has enhanced the SLR system's ability to range to high orbiting satellites. This power upgrade has significantly improved ranging to the GNSS constellations (GPS, Glonass and the proposed Galileo System) allowing both optical ranging via SLR and radiometric ranging via GNSS to the same satellites; thus allowing for direct technique inter-comparisons and system calibrations.

NCRIS funding has also been used to bring a French mobile SLR system to Burnie (TAS) during 2007 as a pilot study for a possible future acquisition, enabling a continued presence in international altimeter programs.

Global Navigation Satellite Systems (GNSS Approximately 100 Sites)

The new GNSS network will be distributed across continental Australia. NCRIS funds combined with State funding are being used to build approximately 100 new stations. Each site includes a GNSS receiver, antenna and meteorological sensors. The sites will be selected such that the antenna monuments will be anchored to a solid foundation, preferably bedrock, and support the most precise positioning applications.

This network will compliment the existing Australian Regional GNSS Network (ARGN) and State GNSS networks. Additional sites will add higher resolution to deformation monitoring and have a direct beneficial impact on the refinement of the National Geospatial Reference System. It will also provide a stable framework upon which sea-level monitoring research can occur.

The final choice of transects will be based around an east-west line at about the latitude of Perth, and a north-south line at a longitude of Alice Springs. A string of stations will also be included around the perimeter of the Australian landmass.

The AuScope GNSS receivers are be able to track the existing GPS and GLONASS constellations and their new signals (i.e. L2C), with the possibility of also tracking the Galileo constellation should it become operational later on. They will also be capable of streaming data in real-time, and meteorological sensors will also be installed at these sites to aid atmospheric studies.

Gravity measurement

New absolute and relative gravimeters will be acquired and utilised to observe gravity at strategic sites across the country. The investment consists of upgrades to the gravity building at Mt Stromlo, the purchase of three relative gravimeters and a portable FG5 absolute gravimeter for the Australian National University (ANU). The ANU in collaboration with Geoscience Australia will establish a national gravity observation program using the acquired equipment.

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