

THE AUSCOPE ARRAY - EXPANDING VLBI IN THE SOUTHERN HEMISPHERE

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Abstract

A major expansion of the Australian Long Baseline Array is underway that will increase the resolution and dynamic range of the existing array for a range of astronomical and geodetic applications. The University of Tasmania is working in collaboration with Curtin University and Geoscience Australia under the management of AuScope Ltd. to construct three new telescopes at two new VLBI sites in Australia. In collaboration with us, the Auckland University of Technology is constructing a VLBI dish in New Zealand. This array will be available for astronomy, and it will contribute extensively to geodesy through the International VLBI Service.

1. Background

The Australian **Long Baseline Array** (LBA) is a facility made up of radio telescopes of the Australia Telescope National Facility at Narrabri, Parkes, and Mopra, New South Wales, plus the University of Tasmania (UTas) telescopes at Hobart, Tasmania, and Ceduna, South Australia. Even longer baselines are obtained in collaboration with observatories in other countries, particularly Hartebeesthoek, South Africa. In addition to this astronomical Very Long Baseline Interferometry (VLBI), the Hobart telescope participates frequently in the International VLBI Service for Geodesy and Astrometry (IVS). Besides the UTas telescope there are only a few other IVS antennas capable of tracking sources south of -40° declination for long durations.

2. The New Array

In order to improve the monitoring of IVS radio sources at high southern declinations, the Australian Department of Education, Science, and Technology has funded a new array to be dedicated to geodetic VLBI in collaboration with the IVS. This array will consist of three 12m antennas fitted with S-band and X-band receivers compatible with IVS standards. The first new telescope will be installed at Hobart, Tas.; the sites for the other two are tentatively Yarragadee, Western Australia, and Katherine, Northern Territory. These sites will provide long baselines to the existing Australian telescopes, and tie down geodetic reference points for GPS arrays planned to cover the land area of the continent.

The new array will be available for radio astronomy for some fraction of the time, if funds are available for operational support. Many scientific applications can be considered, particularly for Galactic sources in the bulge and fourth quadrant of the Milky Way, and in the Magellanic Clouds. If a strong case can be made for independent funds, receivers at other frequencies might be constructed and installed on the array.

Correlation will be performed at Curtin University of Technology, WA. Eventually e-VLBI will be the standard, but at first data will be recorded and transported with Mk Vb disk packs. The first telescope will be in operation in 2009, with the other two following in 2010. Data analysis for geodetic applications will be performed at Geoscience Australia headquarters in Canberra, ACT. The possibility of collaboration with Northern Hemisphere telescopes is open, for astronomical VLBI as well as IVS geodesy.