

# Hobart, Mt. Pleasant, Station Report for 2008

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## Abstract

This is a brief report on the activities carried out at the Mt. Pleasant Radio Astronomy Observatory at Hobart, Tasmania. During 2008, the observatory participated in 59 IVS VLBI 24-hour observing sessions, and significant progress was made on the AuScope VLBI array which will see three new antennas installed across Australia for geodesy.

## 1. Introduction

The Mt. Pleasant Observatory is located about 15 km northeast of Hobart at longitude 147.5 degrees east and latitude 43 degrees south. Hobart is the capital city of Tasmania, the island state of Australia located to the south of the mainland. The station is operated by the School of Mathematics and Physics at the University of Tasmania. The station has a co-located GPS receiver and a site which is used for absolute gravity measurements.

## 2. Brief Description of VLBI Facilities

The antenna is a 26 m prime focus instrument with an X-Y mount. The focus cabin has a feed translator with provision for four different receiver packages, which enables rapid changeover between geodetic and astronomical requirements. Standard receiver packages provide for operations at L-, S-, C-, X-, and K-bands. There is also a dual frequency S/X geodetic receiver. All of these receivers are cryogenically cooled. The antenna has a maximum slew rate of 40 degrees per minute about each axis. The station is equipped with a Mark IV electronics rack and a Mark 5 VLBI recording system. There is another disk based recording system used by other Australian VLBI antennas.

## 3. Staff

Staff at the observatory consisted of academics, Prof. John Dickey (director), Dr. Simon Ellingsen, and Prof. Peter McCulloch, who has had a large input into the receiver design and implementation. Dr. Jim Lovell is Project Manager for the AuScope VLBI project. Dr. Jamie Stevens is a research fellow and has had input into the Linux systems at the observatory. Mr. Brett Reid is the Observatory Manager whose position is funded by the university. In addition we have an electronics technical officer, Mr. Eric Baynes. For operation of the observatory during geodetic observations, we rely heavily on support from astronomy Ph.D. and postgraduate students.

## 4. Geodetic VLBI Observations

Hobart participated in 59 geodetic VLBI experiments during 2008. These were divided between the APSG (2), CRDS (6), CRF (3), CRFS (1), OHIG (6), R1 (25), R4 (11), RDV (2), and T2 (3) programs. All experiments were recorded using Mark 5A.



Figure 1. The Mt. Pleasant 26 m antenna (photo by Jim Lovell).

## 5. Future Plans: AuScope

AuScope is part of the Australian Government's National Collaborative Research Infrastructure Strategy (NCRIS). It encompasses NCRIS Capability 5.13: "Structure and Evolution of the Australian Continent". An important part of this is the acquisition of three new radio telescopes and a data processing facility for geodesy. AuScope aims to provide a fundamental reference frame in Australia to 1 mm accuracy based on the locations of three radio telescopes as established by VLBI observations. Each site will also host a permanent GPS receiver to tie the telescope reference frame to a denser GPS frame (Figure 2). The construction and operation of the array is being managed by the University of Tasmania, with data correlation supported by Curtin University of Technology.

Three 12 m diameter antennas have been ordered from Patriot Antenna Systems, Inc. The first will be installed at Mt. Pleasant, the second at Katherine (Northern Territory), and the third at Yarragadee (Western Australia). Construction of the first antenna is expected to start at Mt. Pleasant in April 2009 and, once commissioned, will replace the 26 m antenna as the University of Tasmania's contribution to IVS. It is hoped that construction of the Katherine and Yarragadee antennas will be completed by the end of 2009. Each site will be equipped with S/X receiver systems, Vremya-ch Hydrogen maser standards, DBBC samplers, and Mark 5B+ recorders.

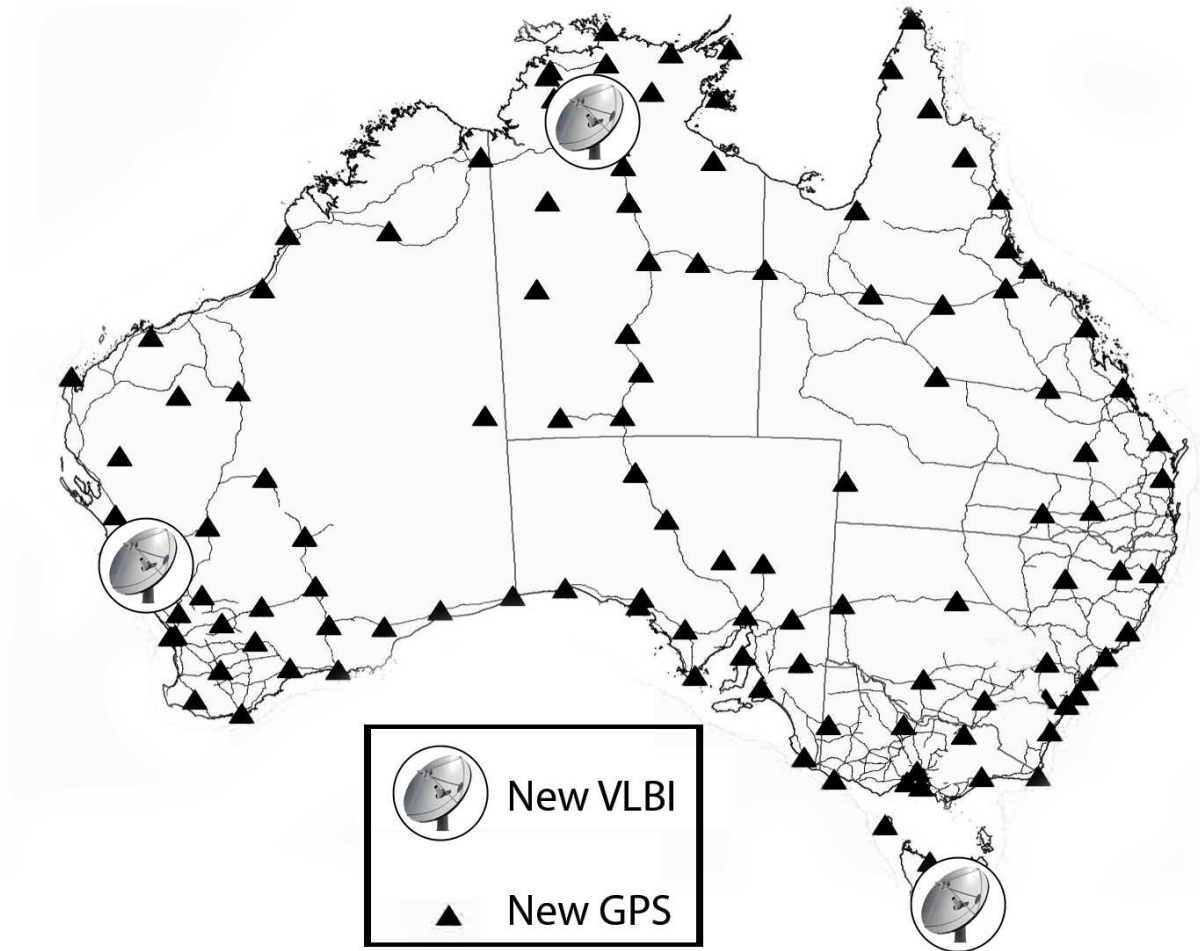


Figure 2. The geographical distribution of VLBI and GPS infrastructure for AuScope. New VLBI stations will be established at Yarragadee (Western Australia), Katherine (Northern Territory), and Hobart (Tasmania) with co-located GPS receivers. An additional  $\sim 100$  GPS receivers will be distributed across the continent.