Radio Astronomy

R. M. Taylor
Deep Space Operations Section

This article reports on the activities of the Deep Space Network in support of Radio Astronomy operations during the period September 1979 to December 1979.

I. Introduction

The Deep Space Network 26 meter diameter and 64 meter diameter antennas are used to support experiments in Radio Astronomy.

II. Radio Astronomy Operations

During the period of this report, support for radio astronomy operations increased somewhat even though two 26 meter stations, one in Spain and one in Australia, were taken out of service for upgrading to 34 meters and the addition of X-band downlink capability.

A. Support for NASA-Office of Space Sciences Activities

Support for activities in this category continued at previous levels except for the Southern Hemisphere Interferometer experiment which requires two stations in Canberra, Australia. One of the two stations is temporarily not available due to the upgrade work mentioned above.

Pulsar Rotation Constancy observations continue and the latest version of the timing and recording software from Spain is enroute to the Jet Propulsion Laboratory for pre-operational testing at Goldstone, California.

Planetary Radio Astronomy activities during this period included observations of Jupiter, Uranus, and the Saturn rings.

Microwave Spectroscopy activity recently picked up with five observations, producing a total of 37 hours support from the 64 meter antenna at Goldstone during December.

B. Support for Radio Astronomy Experiment Selection Activities

The Radio Astronomy Experiment Selection Panel (RAES) is now chaired by Dr. David S. DeYoung, replacing Dr. Burbridge who resigned recently. Dr. DeYoung, a scientist with the National Radio Astronomy Observatory, is involved in research into the origin and evolution of extended extragalactic radio sources, physics of galactic nuclei and quasi-stellar objects, evolution of dense stellar systems, solar flares, and interplanetary disturbances. The other panel members are Dr. Bernard F. Burke of the Massachusetts Institute of Technology; Dr. W. C. Erickson of the University of Maryland; Dr. Yervant Terzian of Cornell University; Dr. Barry Turner of the National Radio Astronomy Observatory; Dr. Marshall H. Cohen of the California Institute of Technology; and Dr. Richard M. Goldstein of the Jet Propulsion Laboratory.

Currently, twelve experiments have been approved by the RAES Panel. All of these experiments require the use of the

64 meter antennas plus the hydrogen maser frequency and timing subsystem. The one exception to this is the Quasar Patrol experiment which can on occasion use a 26 meter antenna when the 64 meter antenna is not available.

Two experiments were supported during this period:

RA 175 This experiment uses the Very Long Baseline Interferometry capability of the Deep Space Network in conjunction with other non-NASA telescopes to observe the galactic object 1909+04, popularly known as SS433.

RA 176 The 64 meter diameter antennas in Goldstone and Spain provided nineteen hours each of support to this experiment observing the "twin" quasi-stellar objects, 0957+561 A, B. The object of the observations, conducted simultaneously with non-NASA telescopes in Europe and the U.S.A., is to test the current "gravitational lens" theory about the source.

These observations were not successful due to an error in precessed predicts generation and further support has been requested.

The early support of RA 175 by the 26 meter antenna at Goldstone and the 64 meter antennas at Goldstone, Spain and Australia resulted in the reduction of support requirements for the monitor phase – only the 26 meter at Goldstone is required for that phase.

C. Support of Host Country Activities

1. **Australia**. During this period, host country activity in Australia has been almost exclusively Pulsar observations by the 26 meter station in Canberra. These observations are currently being supported at the rate of approximately 10 hours per week.

2. **Spain**. In Spain the very long baseline interferometry development activity was supported by both the 26 meter and the 64 meter antennas.