EUROPEAN VLBI NETWORK – TECHNICAL & OPERATIONS GROUP

24th March 2006 – JIVE, Dwingeloo, the Netherlands

Report on VLBI Operations for Jodrell Bank Observatory

This report covers the period from August 2005 to March 2006 and includes the VLBI observing sessions carried out in October 2005 and February 2006.

1. October 2005 Session

This session comprised 7 experiments at C-band, 2 at K-band, 15 at L-band and 2 at P-band. At C-band, the Lovell telescope was originally scheduled for 71 hours but it did not return from summer engineering (wheel girder repairs) before the start of the session. The Mk2 telescope was used instead. A total of 3.3 hours (4.7%) were lost at C-band due to technical problems (Mk5 communication loss and vacuum failures). At K-band, the Mk2 telescope was used for 15 hours of observations with 48^{m} (5.3%) lost time. At L-band, the Lovell was scheduled for all 15 experiments (125.5 hours), and Cambridge for 3 of these (31 hours), although the observations were not joint MERLIN programs. A power supply on the VLBA rack was beginning to fail as the K-band session began, resulting in a maximum of 27 hours (90%) lost time, although fringes were obtained during the N05L5 experiment and data may be recoverable for much of the early part of the Cambridge observations. For the Lovell L-band observations, a total of 12.5 hours (10%) were lost. 14% of this time was due to high winds and the remainder due to two major failures of the Lovell azimuth drive system. At P-band, 14 hours were scheduled on the Lovell and no time was apparently lost at the telescope. The total scheduled observing time for all telescopes was 256.5 hours. The worst-case scenario, where all Cambridge data is considered lost due to the power supply failure, is 17% lost time. As noted, much of the Cambridge data may well be recoverable. Hence, excluding the Cambridge figures, the total lost time was 16.75 hours, giving an overall success rate (at the telescope) of 92.6%.

2. February 2006 Session

The February 2006 session comprised 5 experiments at C-band (6cm) using the Mk2 telescope (one of these used Cambridge in addition), 10 experiments at C-band (5cm) using both Mk2 and Cambridge and 5 experiments at L-band using the Lovell telescope (3 of which also included Cambridge). Six of the 5cm experiments were co-observed with MERLIN. The total scheduled observing time for JBO telescopes was 268 hours (128 hours on Mk2, 102 on Cambridge and 38 on Lovell). There was no loss of Cambridge data during this session. At C-band (6cm) 1 hour (2.5%) of Mk2 time, and at L-band 1 hour (2.6%) of Lovell time was lost due to equipment failures. During the C-band (5cm) session, high winds resulted in 9.25 hours (10.5%) lost time and an error in the Mk2 offset position resulted in 2 user experiments and 2 network tests (totalling 15.2 hours) being observed off-axis. This resulted in a 27.8 % loss at C-band (5cm) for Mk2. The total lost time was 26.45 hours, or 9.8% of the total scheduled observing time. During the 5cm session, a single Mk5 disk pack developed an error related to flawed or missing disk directories, and this may have compromised most of the Mk2 5cm observations. However, this error has been seen before at the correlator, and it is almost certain that the data will be recoverable. Two of the experiments this session were Target-of-Opportunity programmes on the recent nova outburst RS Oph. One of these was used to test the process of recording two MERLIN antennas (Cambridge and Darnhall) simultaneously on a single Mk5 recorder, utilising unused bandwidth, and essentially supplying an additional EVN antenna for minimal increase in resources.

3. Technical Developments

The VLBA recorder has now begun to be decommissioned. We will keep as many of the parts as is practical. The MkIV recorder is being maintained for the present but has seen less use with each session. We will retain it for at least another 12 months. We have installed RF mixers and synthesisers to support recording of two more MERLIN stations, and have tested one unit (Cambridge and Darnhall) during the February 2006 session for Target-of-Opportunity observations of the nova RS Oph. The Cambridge calibration issue has been revisited, and we have a plan to supply simple T_{sys} over one 16MHz band. One of our Mk5 units (Cambridge) was

upgraded to a 2.8GHz Xeon-based Asus motherboard. It has demonstrated eVLBI data transfers at 512mbps in real-time. This unit has been fringe-tested with standard recording and is working normally, so we will upgrade the other unit before EVN tests to be carried out on 16th March. We are attempting to arrange a second, permanent 'lightpath' link to JIVE (essential due to congestion of 'production' routers in Manchester). It seems probable we will upgrade the JBO-Manchester link to 10Gbps later this year. Local operational hardware has also been upgraded.

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