

5th May 2020 – Online Meeting

Report on VLBI Operations for Jodrell Bank Observatory

1. February/March 2019 Session

The February/March 2019 session for JBO consisted of 25 experiments; 2 at 5cm, 13 at 6cm, 6 at 18/21cm and 4 at 1.3cm. None of these were joint EVN+e-MERLIN observations. Several experiments were cancelled due to the failure of the RadioAstron satellite prior to the session. At 5cm 13h of observations were performed on the Mk2 telescope with no reported data loss. At 6cm, 80 hours of observations were performed with the Mk2 telescope with 2.5h (3.1%) reported data loss due to high winds. At 18/21cm, 39h of observations were scheduled on the Lovell telescope with 12h (30.8%) reported data loss, again due to high winds. Finally, 15h were scheduled on the Mk2 telescope at 1.3cm with no reported data loss. In summary, 147h of observations were scheduled on JBO telescopes with 14.5h (9.9%) data lost, entirely due to high winds.

2. May/June 2019 Session

The May/June 2019 session for JBO consisted of 33 experiments; 18 at 18/21cm, 3 at 5cm, 8 at 6cm and 4 at 1.3cm. Four of these experiments were joint EVN+e-MERLIN. All observations were performed with the Mk2 telescope as the Lovell telescope was undergoing major engineering works through the entire session. At 18/21cm 142.5h of observing time were scheduled, at 5cm 21h were scheduled, at 6cm 54.5h were scheduled and at 1.3cm 18h were scheduled. There was no reported data loss at the telescope. In summary, a total of 236h were scheduled on JBO telescopes with a 100% success rate.

3. October/November 2019 Session

The October/November 2019 EVN session for JBO consisted of 29 experiments; 6 at 1.3cm, 10 at 6cm, 5 at 5cm and 8 at 18/21cm. Six of these experiments were joint EVN+e-MERLIN observations. At 1.3cm, 63.5h of observations were scheduled on the Mk2 telescope. No data was reported lost at 1.3cm. At 6cm, 73h were scheduled on the Mk2 telescope with 15m (0.3%) reported lost due to problems with the antenna control computer. At 5cm, 37h were scheduled on the Mk2 telescope again with no reported data losses. Finally, at 18/21cm 77.5h of observations were scheduled in the Lovell telescope which returned to service from major engineering works just prior to the EVN session. Approximately 1.5h of data were lost due to a problem with the PSU in the Fila10G. In summary, 251h of observations were performed with JBO telescopes with a total reported data loss of 1h45m (0.7%), i.e. a success rate of 99.3%.

4. Technical Developments

A new hydrogen maser has been installed at Jodrell and is now feeding timing signals to all equipment. This includes the Field-System VLBI-equipment (DBBC, Fila10G etc.) and also the e-MERLIN WIDAR correlator and synthesizers, which are used for e-MERLIN-VLBI operations. The new maser performs well and appears more stable than the old one in the sense that residual rates in the data due to the maser drifting should now be reduced.

e-MERLIN-VLBI operations continue with some improvements. The WIDAR correlator optical-fibre corrections are now turned off by default, which produces smoother residual rates and delays in the correlated data. e-MERLIN now participates in most eVLBI operations, adding significant sensitivity and UV-coverage.

The Jodrell-JIVE fibre connection has been upgraded to 5.5 Gbps, allowing real-time eVLBI observations with one DBBC2/Fila telescope at 2Gbps (Lovell/Mark 2) plus up to 6 e-MERLIN WIDAR telescopes at 512Mbps each.

Network hardware has been purchased to upgrade the e-MERLIN WIDAR VDIF streams from the current limit of 512Mbps (64MHz dual pol) to 1Gbps (128MHz dual pol). Along with some additional network hardware, software development is now needed to support the new hardware, after which we hope to commission 1Gbps e-MERLIN VLBI observations.

The Jodrell VLBI equipment has been rationalised and put in new RFI-shielded racks. Furthermore, a new UPS has been installed to feed all VLBI equipment, protecting it against power outages. Finally, network, power and RF cables have been significantly simplified, reducing the interdependence of VLBI hardware with other Jodrell activities. This has made the JBO VLBI equipment easier to maintain and operate, as well as simplifying possible future upgrades to the systems.

Our Fila10G developed an intermittent fault whereby power was lost and could only be returned with one of the optical modules removed. It was sent to Michael Wunderlich in Bonn who found a badly crimped connection which was replaced. After receiving the Fila10G back it showed the fault condition again after several days. It was fixed by removing and re-inserting one of the optical modules and seems to have behaved itself since. We are considering upgrading this unit.

Eskil Varenius left JBO in September 2019 to take up a position at Onsala.

Alastair Gunn, Eskil Varenius