

Onsala Station Report

R&D activity

A 2L2H DBBC3 dedicated for Astronomical VLBI observations has been received, installed and tested. Together with the new FS computer Froste and the new Flexbuff Koll, Onsala has an independent VLBI backend to support broadband VLBI observations. With the latest firmware DDC_U_v125 (16 BBCs per Core3H board, tunable 2-128 MHz filters) and the existing 4-GHz-bandwidth IF system, this backend allows Onsala to run 16/32 Gbps observations at C, K, Q and W bands now.

A local project to develop a backend to search for fast radio bursts has been initiated by Gary Hovey et al. Investigating COTS ADC/FPGA (ADQ7WB) initially for FRB monitoring. The unit has two 12bit ADCs with 6 GHz BW and samples at 5Gbps.

Onsala is currently designing a 3-band (22/43/86 GHz) receiver for the 20 m telescope. The C/X (4-9 GHz) receiver has been designed. While its building plan may be significantly delayed because of the very limited space of the receiver cabin of the 20 m telescope.

EVN Session 3/2022

The session was operated by Franz Kirsten during the L-band part and Jun Yang during the rest parts. Before the session, the 25-m antenna pointing model was updated. There were fringes in all the NME experiments. All the X- and K-band observations went smoothly with the 20-m telescope. The X-band LO signal was provided by a synthesizer because the 30-year old oscillator had poor phase stability. This is a temporary solution for the X-band observations. The C-band part went successful with a few minor losses. During the L-band observations EC088C, EB096L and EC088D, the L-band synthesizer failed to function properly because of no external 10 MHz reference signal. This problem was found in the evening and solved in the second day by replacing the 10 MHz cable with a new one. Because of high-speed winds, the 25-m telescope missed some observations: EC089B (2.3-h loss), EM164D (14.5-h loss), EL064B (2.3-h loss) and EM156C (3.8-h loss) .

We noticed a great number (>100) of transient (<~10 s) off-source events during some experiments (N22C2, EM166B, EC089A, GM081E) because of an antenna tracking issue. Certainly, it is a known problem for years. These off-source data will be flagged out with station uvflgfs files during the post data reduction. To some degree, the high-speed winds also affects the amplification calibration in particular at C band. This tracking issue is usually seen when the wind direction is close (<~50 deg) to the antenna azimuth direction. The 25-m telescope was built in 1963. Its motors, encoder and controller are still usable but getting old. There might be

some tricky issues in the antenna tracking system. Currently, the local investigation is still ongoing.

Onsala also participated in all the e-VLBI sessions between sessions 3/2021 and 3/2022. Except for some minor loss due to strong winds, these e-VLBI sessions went successfully.

EVN Session 2/2022

The session was operated by Franz Kirsten between the L-band experiments GM081C and EC073A and Jun Yang during the rest parts. The Onsala station participated in all the experiments. Because of strong winds, the Onsala 25m telescope was off-source in N22L2 and partly in EB091B, EM164A, EW029B, EB096E, EG111A and EC086C. Because of a broken disk, our Astro-Flexbuff somehow crashed. This problem caused no data recorded in EC073A. In the C-band NME experiments, there were high-SNR fringes to the Onsala 25-m telescope.

EVN Session 1/2022

There were clearly seen fringes to the Onsala 20-m telescope at Q band and the Onsala 25m telescope at L and C bands in the NMEs.

This session went incredibly smoothly. Thanks to the nice weather, the Onsala 25m and 20m telescopes successfully participated in all the experiments.

The two old FS computers were replaced with two new computers before the session. The 64-bit FS version 10.1.0.beta1 has been used since the session.

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