Metsähovi station report Q2/2009
TOG meeting – Torun 2009

We studied the feasibility of upgrading our 22 GHz VLBI receiver to avoid the spectral water line. This item was raised during last TOG meeting in Bologna. Unfortunately, the results were not so satisfactory. The number of components needed to be replaced are too high and so it makes more sense to build a new rather than re-use the old receiver. In this case, a new 22 GHz receiver is low priority. With similarly low priority we also contemplate building a 22 GHz WVR.

A new 86 GHz receiver is due to arrive next month and be ready for the next mm-VLBI session at the beginning of May. This receiver has been designed in Finland and manufactured in Russian. On the other hand, 43 GHz receiver has been out of order for the last years and still waiting to be repaired. The receivers engineer is working on it and we hope to have it operative this year.

Four new empty Conduant SATA disk pack enclosures were bought in March. They will be the first SATA disks to be used at Metsähovi. As of today, only one of disk pack is satisfactory built and we plan to used it for the next EVN session.

There was an attempt to calibrate the antenna and calculate the free-opacity gain curve as requested during last TOG meeting. Bad weather conditions hampered our efforts to gather valid data and we have postponed it for the next session in May-June.

Together with Sergei Pogrebenko et al. JIVE, software for Intel and Playstation3 was developed that can be used as a versatile classic spectrometer at real-time rates. We also created new sample processing software for phase-locked satellite tracking that is based on the phase referencing method (J. Wagner et al, Presentation at RadioNet FP6 Workshop, Yebes, Spain, Nov, 2008). JIVE developed the analysis tools. As an example, ESA Venus Express spacecraft was observed with Metsähovi radio telescope at X-band on June 11 2008 using multi-bit data sampling and capture instrumentation and high performance processing software, developed at Metsähovi. See figure below.

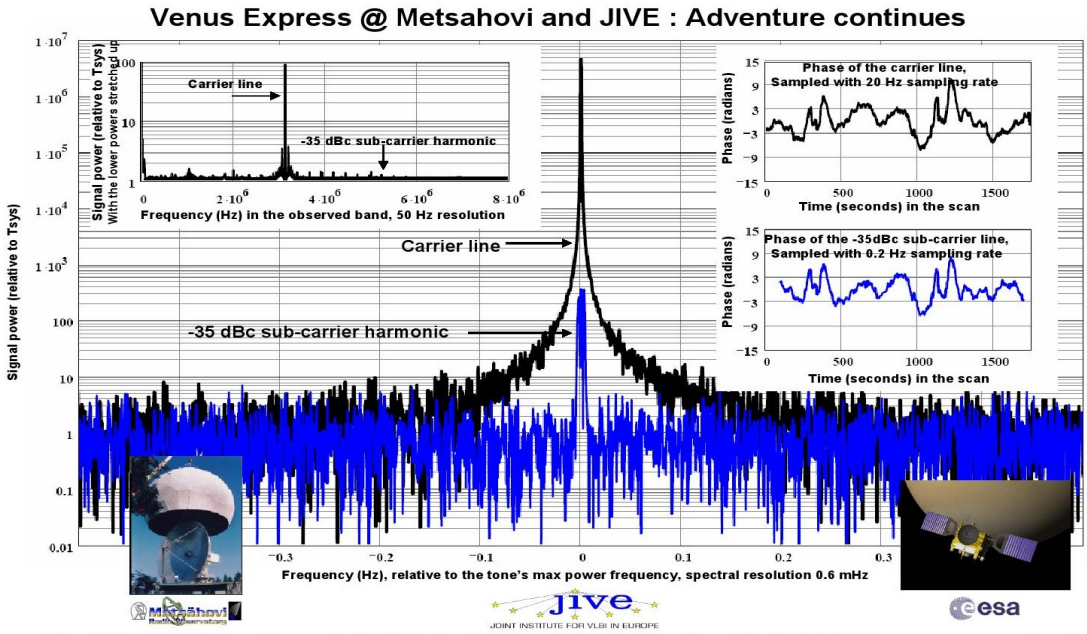
At the beginning of the year we got time to upgrade the hardware and operating system of the Field System. An unexpected power failure caused the power supply and motherboard to be replaced earlier in summer 2008. New disks in Raid-1 mode were added in January 2009. Finally, the latest stable OS version of Debian Etch 4.0 and fs-9.10.4 were installed. A major problem noticed during the installation was the failure of the communication between the serial port board and the formatter. Jan added a few lines to the fs source code, the fixes should be part of the next fs release. Also, the Debian community stopped the development of the package PLPLOT used by antabfs, it needs to be compiled from source code.

Mark5A hardware was also upgraded to a 10G PC last summer. See notes relating to the process in : http://www.metsahovi.fi/en/vlbi/vsib-docs/mark5_upgrade.shtml.

VLBI hardware status remains the same as last time: a number of rack BBCs are broken and beyond worthwhile repair. We are waiting for Gino's dBBC to come into production with 10G connectivity. We already requested one unit for geodetic purpose as soon as possible. Jan offered Gino help with vhdl for UDP/VDIF-based solutions for dBBC and 10 Gigabit connectivity, first work has started.

We also developed a new data storage system (4G-EXPReS) after comprehensive testing of SATA equipment that is capable of 4-6 Gbits today and 8 Gbps in the near future. Based on COTS

components and a standard 10G network card, a single “gamer” computer can store or send network data such as raw Ethernet frames or iBOB/dBBC/etc UDP packets at above 4 Gbps. The 4G-EXPReS can be command compatible to the proposed Mark5C and allows to use better file formats. Picture 2 shows a standard configuration with a host-computer, cooling system and disk enclosure. An updated version of the Tsunami file transfer software is capable of sustaining rates up to at least 7 Gbps. VDIF library and data capture program were developed.



The ESA VEX S/C was observed with Metsahovi 14m antenna at X-band on July 11 2008. Data were processed and analyzed using the high-performance software developed at Metsahovi and analytical tools developed at JIVE. We made what we promised at the previous picture, issued 3 weeks ago, and even more: we got 0.6 mHz resolution, 10^6.7 dynamic range, and phase lock to the VEX as if it could be at 100 AU, in the Kuiper belt or even farer.

New VLBI rack with the 10 Gigabits internal switch, ibob, windows-ibob development pc, new host computer for the disk pack and the disk-pack itself.