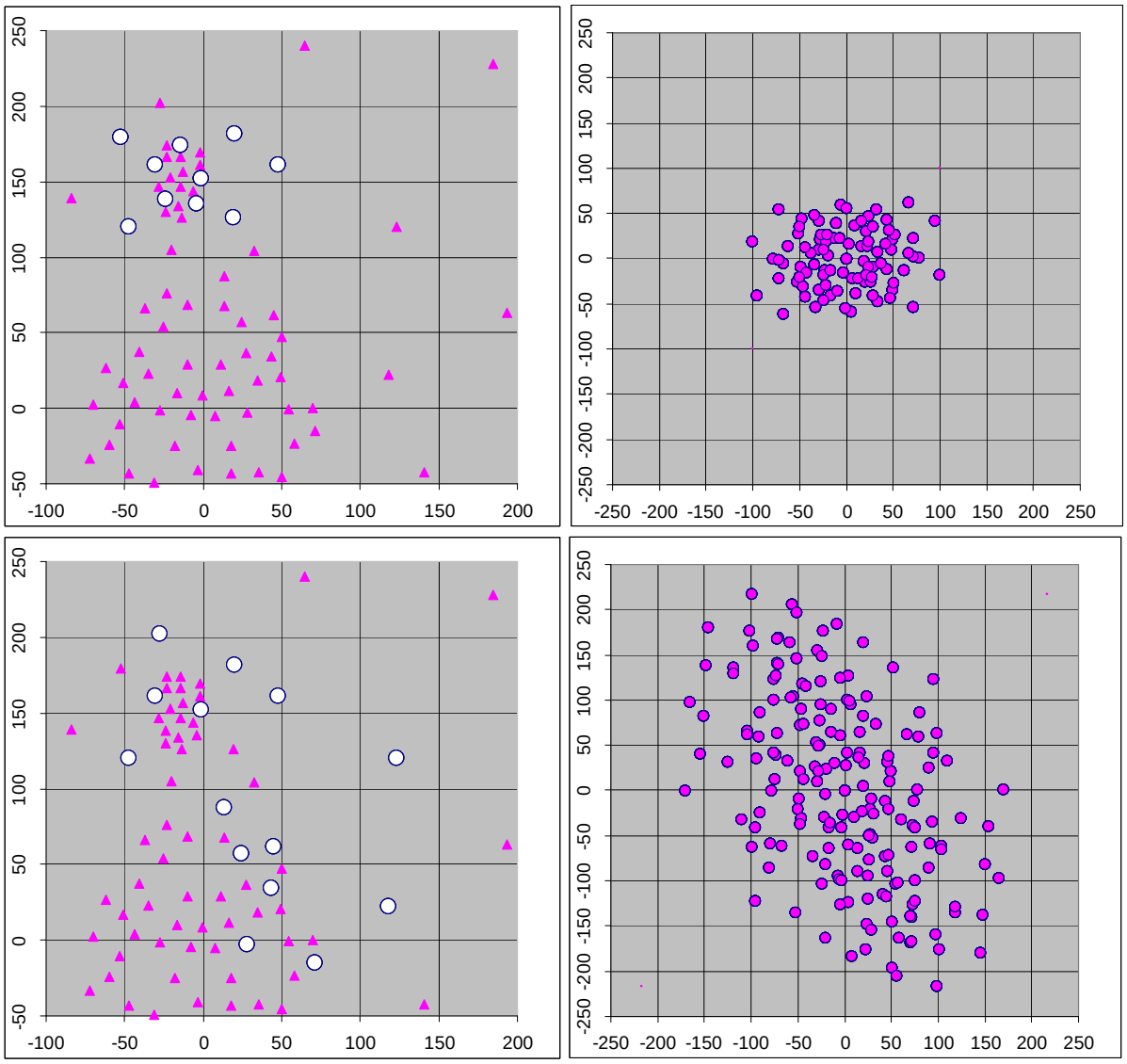
9. SCIENCE IPT

9.1 Commissioning and Science Verification

Observing conditions in May were generally quite good with some periods of extremely dry weather, although we did still loose two nights to bad weather (fog and snow). A further night was lost due to a problem with new computers in the correlator. The number of antennas at the high site rose from 10 to 14 in the course of the month, which is of course extremely good news. Putting the lost nights to one side, the average availability of "array elements" (antennas and their associated instrumentation) was around 70% fully operational with a further 15% available with some limitations, e.g. a receiver band non-functional.

The configuration of the array also changed dramatically during the month because we were finally able to move the antennas off the ACA foundations and onto the north-east quadrant of the central cluster. Here are plots showing the antenna positions (left) and snap-shot UV coverage (right) at the start of this process on April 27th and at the end of May:



Clearly this change has produced a substantial increase angular resolution, although the beam is quite elliptical as a result of the peculiar distribution of available pads. This is the best that we can do until the current problems with the temporary power system are resolved and we can occupy more of the central cluster.

As has been the pattern recently, the work has been a combination of observations for science verification, software testing and investigation of various instrumental problems.

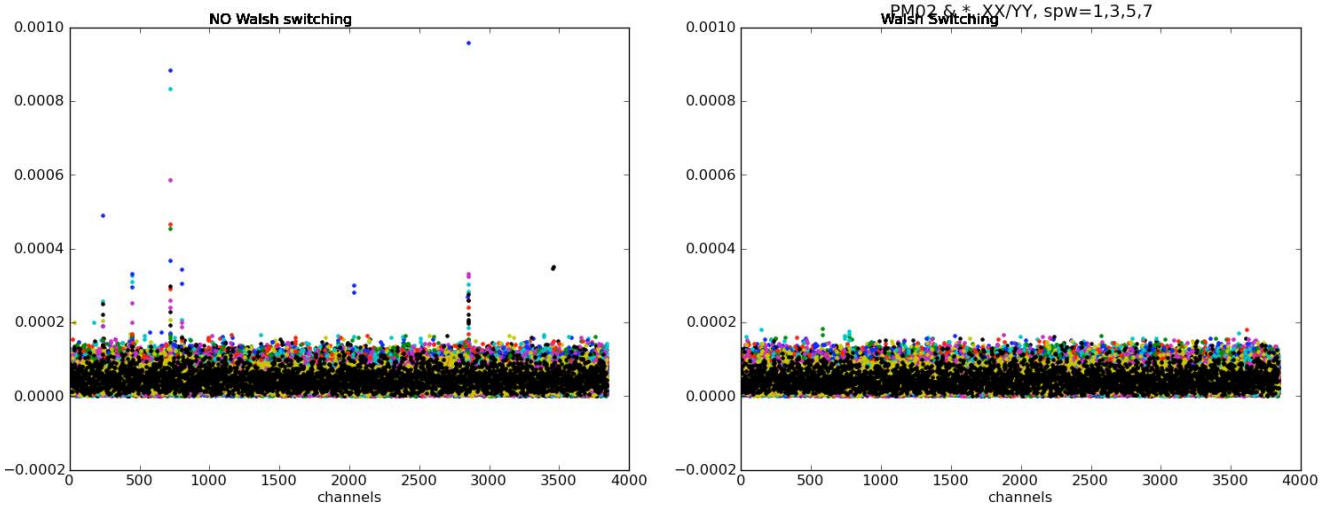
We did succeed in collecting a reasonable number of science verification data sets, though the state of the system is such that it generally takes many attempts to get one good set. It has also proved to be quite laborious and time consuming to perform a satisfactory reduction of the data at this stage. It was only through dedicated efforts by the team, and very strong support from people in the ARC's, that it was possible, on June 2nd, to announce the release the first two data sets complete with fully reduced images and, very importantly, detailed guides for performing the reduction in CASA.

The major step on the software side has been the transition to release 8.0.3. This uses an updated format for the data and contains all the functionality that is essential for Cycle 0 and we expect this version to provide the stable, secure operation system needed for the start of Early Science. This transition, and the associated "migration" of the old data to the new format, went relatively smoothly, the main problems being the re-occurrences of old bugs due to the patches being left out of the new release and difficulties in accessing scheduling blocks and data due to the temporary configurations in place during the transition.

The critical problems related to data storage and the archive have continued and from our perspective, as users of the system, actually got worse – in the later part of the month a significant fraction of the data was being lost completely. Computing IPT has been focusing strongly on this topic and a number of causes for this were found and resolved. At the time of writing the situation has improved but is not yet satisfactory. Meanwhile we are preparing to start the testing of version 8.1. This contains substantial added functionality which we need to start using for commissioning the capabilities that we plan to announce for Cycle 1, and should also provide an increase in efficiency which may make it desirable to use it for Early Science observations, should the upcoming testing go well.

An important step towards those Cycle 1 capabilities was that the first Solar Observing campaign took place under the leadership of Masumi Shimojo from Nobeyama. For a first trial this was very successful – we were able to make maps of the Sun's disk, track active regions and measure fringe amplitude and phase on the limb. One finding is that we seem to have chosen the high an attenuation for the solar filter, so this is being reconsidered.

As an example of the work on technical issues, the plots below show cross-correlation spectra made on blank sky. The plot on the left shows the "spikes" in the spectra that are probably the most significant defect in the system at present. They are almost all harmonics of 7.8125 MHz, a frequency that is used in generating the clock signal used to digitize the data at the antennas, but which is of course not supposed to get into the signal path. The plot on the right shows that these are strongly suppressed (but not, we think, completely removed) when Walsh switching is activated.



This has of course raised the priority of commissioning Walsh switching, and that is being done, but we are hoping that gaining a proper understanding of the mechanism by which these features are leaking into the signal path will lead to a cure for the problem at source.

Looking ahead the biggest short-term threat is from the continuing problems with the power systems at the AOS. It is at present not clear how we can move on to occupy the other antenna stations needed for Early Science and it is uncertain how much disruption will be caused by remedial actions that may be needed on the 23 kV systems. The other major concern is the continuing slippage of the dates when we expect to have sufficient antennas at the high site to support the Cycle 0 observing.

Science IPT members from the Executives continue to work on antenna testing at the three vendor sites and an enormous amount of effort went into preparing for the acceptance tests of the AEM 12m and Melco 7m antennas.

9.2 ASAC

There was an ASAC telecon on May 11th where progress on CSV and preparations towards Early Science, particularly the notices of intent and the membership of proposal review panels, were discussed, along with the future role of the ASAC.

9.3 Staffing

There were no changes in CSV staffing during the month. We carried out interviews to fill some vacancies in the team of Commissioning Scientists. There was a pleasingly strong field and a selection has been made and offers are being prepared.