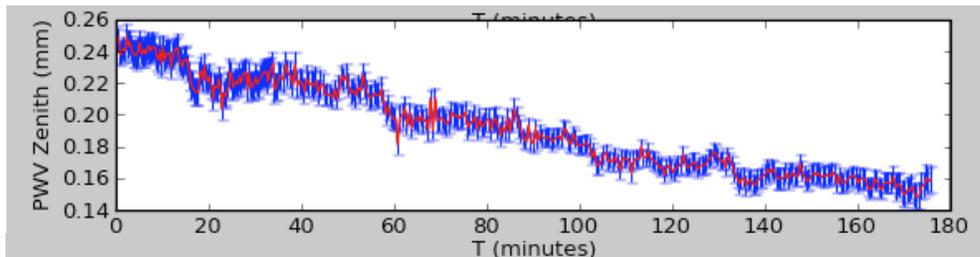


## SCIENCE IPT

### Commission and Science Verification

The pattern that appears to have become established in the last few months, where we are making some progress with technical tests and demonstration of new features, but where we are hindered by a combination of equipment unreliability, power outages and problems with some parts of the software, continued during the month of June. The weather was rather better than in May, although we did lose a good deal of time due to high winds and there were only a few periods of the dry conditions needed for high frequency observations. There were however spectacularly good conditions at the end of the month: here is a plot of precipitable water vapour for the evening of 30<sup>th</sup> June. (It actually carried on down to 0.12mm!)



We had five antennas at the high site for the first two weeks and four for the remainder of the month, but we only managed 5 nights of operation with all five antennas and 10 nights with four antennas. Leading causes of lost time were unexpected power outages<sup>1</sup> on the 12<sup>th</sup>, 18<sup>th</sup> and 23<sup>rd</sup> with some planned outages in between, a UPS failure on DV02, problems with brakes, a stow-pin and drive systems on various Vertex antennas and a problem with re-setting the hexapod on PM03 following a power outage. The cryostat on DV02 appears to have a poor vacuum which delayed getting it cold after the power outages. The difficulties in positioning the Amplitude Calibration Devices continued – some of these are attributed to the low temperatures in the receiver cabins, which can cause the ACD's to get stuck blocking the beam from the sky and therefore putting that antenna out of commission until the engineers can go up and work on it. A more general erratic positioning of the ACD's was a problem throughout the month, but this has now be traced to a software error and fixed.

The most important step forward during the month was the introduction of software release 7.1 which brought some important new functionality, including full control and monitoring of the few hardware items not previously covered, automation of the focussing, and many upgrades to the tools for supporting observations. In general the deployment of this new version went rather well, although the larger rate of updating the focus commands appears to stimulate a fault in the Vertex antenna control software, which remains to be resolved. Interestingly whereas the previous increases in the numbers of antennas, from two to three to four, had all gone smoothly, there were some significant problems when we went to five antennas. These involved both software and the correlator firmware and took some time to sort out. Some important additional features, including some designed to reduce the software overheads, were not ready in time for the original release but were being tested at

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<sup>1</sup> It is typically taking most of 2 days of intensive effort by the AIV and software teams to get everything working again after even relatively short unplanned outages. Planned power outages are somewhat better because everything can be shut down in the correct fashion, but this is still not easy. On 1<sup>st</sup> June, for example, a planned shutdown in the early morning meant that the technical people worked all day and late into the evening to deliver a working system to CSV by about midnight. It was particularly discouraging that on this occasion no useful work on the power system was done because a contractor failed to show up.

the OSF by the end of the month. This further update (7.1.1) will be deployed at the AOS as soon as it has been fully checked out.

Some of the technical problems that we are working on are proving quite difficult to resolve. For example we have no solution to the drifts in the inclinometer on DV01 and no proper understanding of the astigmatism that we see in some of the “astro-holography” measurements of the antenna surfaces. On the other hand the source of the phase “glitches” has been isolated to a particular place in the software and the scaling errors on the “cross-hands” terms in the full-Stokes polarization measurements have been corrected.

We are very much looking forward to the arrival of additional antennas later in July. With these, together with the improved reliability expected from the power system after the recent upgrades and the software in a stable condition, we should finally be in a position to start producing some interesting images.

#### Other

Because of changes to the road layout, it became necessary to find new site for the central weather station, which will house a range of ancillary devices, such as the oxygen-line temperature profiler, as well as a standard set of meteorological instruments. After several iterations a location was agreed with SiteIPT which has the desired properties – clear of obstructions but convenient for the power and communications connections.

Several members of the commissioning team attended the NRAO Synthesis Imaging Workshop in Socorro and comment very favourably on the excellence of the presentations and training.

#### Outreach

Peck attended the SPIE meeting in San Diego and co-chaired the conference on Observatory Observations.

#### Staffing

Aya Higuichi joined the commissioning team as the liaison from the East Asia ARC and Koh-Ichiro Morita was with us for the first half of the month. Gianni Marconi took up his post as Commissioning Scientist. Bojan Nikolic completed his three-month visit from Cambridge during which he made a lot of progress on phase-correction and atmospheric monitoring.

