Useful MWA status and observation pages

Overview

This page describes the human-readable web pages used to view information about the current MWA status, and MWA observations both past and future. If you are interested in machine-readable access to any of the data or plots shown on any of these pages, see the related article describing the MWA web services.

Live status page:

The live status page is http://telemetry-static.mwa128t.org/liveplots/

The status page is divided into five sections:

- The top frame is a collection of 128 full-spectrum (0-327.68 MHz) power plots ('PPD's), grouped by the physical receiver that each tile is connected to, one for each tile, with X-pol in blue and Y-pol in green. If the plot is greyed-out, it means that the tile is flagged, or has more than one bad dipole in the same polarisation. If the plots are drawn in red instead of blue/green, it means that tile failed to converge to a fit in the most recent calibration solution. Each tile's power data is updated every 64 seconds, with one tile on each receiver being updated every 8 seconds. Hovering the mouse over a tile's power plot gives a popup text summarising the known bad dipoles on that tile, and whether it is currently flagged (and why). Clicking on a tile's power plot opens up a new browser tab/window showing all **dipole test results** for that tile (see below).
- Below the PPDs on the left is a colour coded matrix showing any errors associated with the most recent observation - differences between the desired and actual state for each receiver, and each tile. The tiles are grouped by receiver in the same arrangement and order as in the PPD plots. Clicking on a tile name in that table opens up a new browser tab/window showing a **tile status map** centred on that tile (described below).
- Below the PPDs on the right is the current correlator and fine PFB status shown as two colour coded tables - if the correlator is running all entries should be green.
- At the bottom left is a live plot showing temperatures on site for the last 12 hours. The internal air temperatures inside the sixteen receiver enclosures are plotted in orange, the outside air temperature in green, the average beamformer temperature (updated only at the start of each observation) in blue, and the average BFIF (long baseline tile solar power controller) temperature in red.
- At the bottom right is a table showing the last 11 observations before the current time (in grey), and the next 11 observations after the current time (in black). If an observation is currently in progress, it will be shown in orange. Clicking on the observation ID for any observation in the table (the first column) opens up another browser tab/window showing the full **observation information page** (described below).

Find observation form:

To find observations, use this form: http://ws.mwatelescope.org/metadata/find

Fill in the search parameters you want to filter on, and click on the 'Search' button at the top of the page. The observations matching the search criteria will be shown in a table - use the page number buttons at the top of the page to view extra results. Clicking on the observation ID for any observation in the table (the first column) shows the full **observation information page** (described below).

If you want some statistics on all of the observations that match the criteria (currently just total observation time, in hours and seconds), click on 'Search', then click on the 'STATS' button on any of the pages of search results.

Observation information page:

You will generally get to the page describing an observation from one of the above pages, but you can use the direct URL - eg: http://ws.mwatelescope.org/observation/obs/?obs_id=1227437648

At the top of the page is a 'STATS' button, which gives the total observation time (in seconds and hours) of all observations that match the criteria - not just the ones on the current page.

The top of the page has three tables (Observation Settings, Schedule Metadata, and RF Streams) describing the desired state of the telescope, as recorded in the schedule database. Parameters include date/time, coordinates, frequency settings, etc. Another table (Quality Metadata) includes data from an automated quality analysis, if one has been run for that observation (currently only done for EoR observations).

Next is a table summarising the way the observation was carried out, including the MWA configuration at the time of the observation, the number of good and bad tiles, etc.

Below that is the full command and all arguments used to add that observation to the schedule.

Next is a sky map showing the whole sky (above the horizon) at the time of the observation, including bright GLEAM sources, other bright sources in the field including the Sun, Moon and Jupiter, and contour lines showing the primary (tile) beam at the centre frequency used in that observation.

To the right of the sky map is the **schedule map** for that day (described below) - a graphical representation of the MWA schedule covering that 24 hour period.

Next is a table with all log entries referring to that observation.

Next is a tile colour coded tile error matrix, as described above in the section for the live status page. As above, clicking on a tile name in the table brings up a **tile status map** (described below) centred on that tile, inside which you can zoom and recenter on other tiles.

Next is a graph of full-spectrum (0-327.68 MHz) powers for each tile, averaged over the duration of the observation. The units are in ADU, scaled to match the 4+4i bit numbers leaving the fine PFB. If the typical tile power at the frequencies used in that observation (indicated by the red bar on the horizontal axis) lie inside the green shaded region of the graph, then the data isn't going to be undersampled or saturated.

Last are three tables showing all data files associated with that observation.

Old observation schedule page:

The old web page to view the MWA schedule can be found here: http://ws.mwatelescope.org/admin/observation/observationsetting

Tile status map:

You will generally get to a tile status map by clicking on a tile name in the tile error matrix (on the live status page, or on an observation information page - see above).

Otherwise, you can use the direct URL - eg: http://ws.mwatelescope.org/tiles/tilemap/?obsid=1227492560

The tile status map shows the tiles as they are physically located in the desert, colour coded to show (for a particular observation) whether the actual state of the tile for that observation matched the desired state. Good tiles are shown as rectangles with a green '+' sign inside, and bad tiles (tiles with beamformer communication errors, receiver errors, flagged tiles, or tiles that have too many bad dipoles) have a red '+' inside instead.

Zoom in and out using the +/- buttons to either side of the scale bar at the top left. Click on a tile to recenter on that tile. If zoomed in far enough, individual dipole errors are shown on the tiles, using vertical or horizontal red bars.

Dipole test results:

For half an hour every morning, the MWA runs through a set of 20 observations, each 72 seconds long. These observations are:

- 72 seconds at the zenith (zero delay) with all dipoles enabled (including those usually switched off due to known faults).
- 72 seconds with all dipoles disabled (switched off at the summing junction in the beamformer).
- A series of sixteen observations, each 72 seconds long, with one dipole enabled with zero delay, and the rest disabled. Dipoles A through P are tested in order.
- 72 seconds with all dipoles disabled (switched off at the summing junction in the beamformer).
- 72 seconds at the zenith (zero delay) with all dipoles enabled (including those usually switched off due to known faults).

During that time, PPD data (full spectrum power averaged over 1 second) is collected from all of the tiles. Since PPD data is only read from each tile every 64 seconds, using 72 second observations guarantees that the PPD data will be read at least once from each tile, in each observation.

This PPD data is plotted and saved as the results of that day's dipole test. The full list of dipole tests is visible here:

http://telemetry-static.mwa128t.org/dipoles/

Clicking on a date/time in that list takes you to a page describing the results of that particular set of 20 observations as described above.

The test results are displayed as a pair of plots (X and Y pol) for each physical tile in the array. Each plot has frequency (0 to 327.68 MHz) on the horizontal axis. The individual PPD powers for each dipole are shown in two ways:

- A horizontal coloured bar for each of the 20 observations in order (bottom to top), labelled on the X axis as 'On', 'Off', or 'A' through 'P'. The colour represents power at that frequency.
- A set of overlaid white curves showing the power spectrum for each of the 16 dipoles (the all-off and all-on observations are not plotted this way)

The overlaid white curve plots allow differences between dipoles to be compared easily, while the coloured bar background allows the specific dipole/s to be identified.

On the vertical axis, a dipole name (A through P) is marked with a '**' marker if that dipole has a KNOWN fault (at the time of the test), and is disabled in normal observations at that time.

Clicking on a the plot for a single tile brings you to a page showing ALL test result plots ever carried out on that tile, with the most recent at the top of the page. This makes it easy to identify intermittent faults, and to see when faults appeared, and when they were fixed.

12 hour waterfall plots:

This page lets you view waterfall plots of the PPD data from all of the tiles: http://telemetry-static.mwa128t.org/powerplots/

These plots are generated at 6am every morning (AWST), and cover the preceding 12 hours, from 6pm the previous night. Clicking on a date/time brings up a page showing thumbnail images for all tiles (ask the ops team for username/password details, the password protection is just to deter web-scrapers that ignore our robots.txt directives).

These thumbnails show X-pol and X-Y (the difference between the polarisations) for either the median of all tiles (the first plot) or the individual tiles on each receiver. Clicking on a thumbnail brings up the full waterfall plot for that tile.

The full waterfall plot is divided into three sections, left-right - X pol, X-Y, and Y pol. Each has frequency (0 - 327.68 MHz) on the horizontal axis, time (hours before the time that the plot was generated, most recent times at the top of the plot) on the vertical axis, and colour indicating the PPD power for that tile, at that frequency, at that time. There are tick markers on the inner vertical axes - major ticks every two hours, and minor ticks at the start of each scheduled MWA observation. Clicking inside the plot shows a new page with a graph of the full-spectrum power from that tile, at that instant (which depends where in the plot you click).

RFI is visible as short lived (small height) narrow band (small width) bright patches. For example, in every plot, there's a series of bright streaks at 137 MHz going up the plot, which is Orbcom. The vertical axis has tickmarks between the X and XY sections, and between the XY and Y sections, but they aren't visible in some plots against the background colour.

Schedule maps:

Graphical maps showing the contents of the MWA schedule are available here: http://telemetry-static.mwa128t.org/schedmap

The main page shows thumbnail maps of each day, grouped in rows by week, most recent at the top. Clicking on a week date (left column) brings up the maps for all seven days in that week, each showing a 24 hour period.

Inside each plot, UTC time is on the vertical axis, and Right Ascension (in hours) is on the horizontal axis. A diagonal line of black circles shows the RA at the zenith (the Local Sidereal TIme) at that time. A vertical line of yellow circles shows the RA of the Sun at that time. MWA observations in the schedule are shown as horizontal coloured bars. The height of each bar is determined by the length of the observation. The horizontal position and width of the bar is determined by the coordinates of the observation - if the observation was created using Azimuth and Elevation coordinates, then a solid bar is drawn where the centre is at the RA value for that Az/El at that time, and the width is the range of RA values covered by the primary beam width. If the observation was created using RA and Dec values, a solid bar is drawn centred on that RA with a width given by the primary beam size, and a lighter coloured bar is drawn on either side, showing the range of RA values above the horizon at that time, at that declination.

Clicking on the bar representing a single observation in that schedule map brings up a new window showing the **observation information page**, for that observation.