

## Statement regarding the public release of MWA data

From: MWA Director

24/05/2015: Version 1 (SJT).

25/05/2015: Version 2 (SJT, following MJ-H comments)

11/06/2015: Version 3 (SJT, following MWA Board endorsement)

2016-11-07: Version 4 (RBW, minor updates for contact details and how to search)

2018-03-12: Version 5 (APB, Update "Retrieval of Publicly Available Data" for ASVO)

## PURPOSE

To describe the practical mechanisms for publicly releasing data collected with the MWA, including data discovery, and to describe any conditions on the public release of MWA data.

## DEFINITIONS

1. Data: For the purposes of public release, "data" is defined as the visibility output of the MWA correlator that resides in the MWA data archive at the Pawsey Centre in Perth, along with relevant metadata that are stored in the same archive.
2. Proprietary period: the [MWA Data Access policy](#) states that data will be made publicly available after a proprietary period of 18 months from the date of observation. The only exception to this is for Epoch of Reionisation (EoR) data, where the public release date will be set to be 18 months after the end of an EoR observing season (see below).

## RELEASE DATES FOR PUBLICLY AVAILABLE MWA DATA

A list of all MWA observations undertaken up until 30 June, 2015 is posted at:

<http://www.mwatelescope.org/astronomers/public-data-release/145-observation-list>

This page lists the date of observation, the MWA project identifier code (ProjectID), the project title (Description, with contact PI), and the starting and ending observation IDs (ObsIDs).

This information can be used to determine the date at which a given set of data will become publicly available and will be periodically updated to progressively include more observations.

For all project identifier codes except G0009, G0010, G0017 (EoR project codes), the public release date for observations on this list is 18 months after the observation date. For G0009, G0010, and G0017, for observations conducted in the first MWA EoR observing season ending on June 28, 2014, the release date has been set by the MWA Board to be December 29, 2015. For G0009, G0010, and G0017 observations ending before June 28, 2015, the release date is expected to be 29 December, 2016.

Example: An example sequence of observations is described at the web page above as:

| Date       | ProjectID              | Description                                     | ObsID start | ObsID end  |
|------------|------------------------|---|-------------|------------|
| 2013-11-12 | G0008 (Staveley-Smith) | A Galactic and Extragalactic All-Sky MWA Survey | 1068324256  | 1068293784 |

This entry describes a sequence of observations that starts with ObsID 1068324256 and ends with

ObsID 1068293784 on November 12, 2013. These observations were made as part of project G0008, “A Galactic and Extragalactic All-Sky MWA Survey”, led by Lister Staveley-Smith.

As a non-EoR observation (not part of projects G0007, G0010, or G0017), these data are publicly available 18 months after the observation date. I.e. May 11, 2015.

Further information regarding the description of the project under which data have been obtained can be found by cross referencing the ProjectID with the proposal abstract for that project, linked to at: <http://www.mwatelescope.org/astronomers/observing-awards>

Note that ProjectIDs that start with a “G” or “O” correspond to “Guaranteed Time” or “Open Access”, respectively, as defined in the [MWA Time Allocation policy](#). These projects have been assessed and approved by the MWA Time Allocation Committee.

ProjectIDs that start with a “D” correspond to “Director’s Discretionary Time” (DDT) and do not have an entry in the summary of awarded time. Information on DDT projects can be obtained via email from the MWA Director ([MWA-Director@curtin.edu.au](mailto:MWA-Director@curtin.edu.au)). ProjectIDs listed with a “C” prefix are commissioning observations for the full MWA and are encountered during the commissioning/operations transition in June/July/August 2013.

The same ProjectID has been used for projects that span different MWA observing semesters. In order to determine the appropriate proposal abstract, the observation date should be mapped to the appropriate observing semester:

2013B: July 1, 2013 – December 31, 2013

2014A: January 1, 2014 – June 30, 2014

2014B: July 1, 2014 – December 31, 2014

2015A: January 1, 2015 – June 30, 2015

2015B: July 1, 2015 – December 31, 2015

2016A: January 1, 2016 – June 30, 2016

## **DISCOVERY OF PUBLICLY AVAILABLE MWA DATA**

In order to discover further details regarding the data themselves, the observation date, ProjectID, and ObsID information can be used as the basis of a search at the online portal to the MWA data archive: <http://mwa-metadata01.pawsey.org.au/admin/observation/observationsetting/>

The detailed information available via the portal will allow the user to determine if the data are of interest for a given analysis. The username and password to discover publicly available MWA data are “MWA-guest” and “guest”, respectively.

The MWA archive contains data from the “32T” MWA prototype system and the partially constructed MWA commissioning sub-arrays, prior to July 2013. All these data are discoverable via the portal and all these data are publicly available, with varying quality. A good reference for the 32 tile construction sub-arrays is Hurley-Walker et al. (2014, PASA, 31, 45).

Example: For the data identified in the example above, the relevant observing semester is 2013B (July 1, 2013 – December 31, 2013). Thus, the relevant proposal abstract from the [observing awards](#) is:

**Abstract** : *We propose a GaLactic and Extragalactic All-sky MWA (GLEAM) survey at the full range of MWA*

frequencies (80-230 MHz) in order to study phenomena ranging in scale from pulsar wind nebulae to the Cosmic Web. Commensurate with the low frequency and high surface brightness sensitivity of the MWA, our science aims are dominated by the study of non-thermal processes in diffuse objects. For example, detection of new giant radio galaxies will allow us to probe intergalactic pressure in a wider range of environments than currently available; stacking of emission from the cosmic web will allow us to better constrain the amplification of primordial magnetic fields; and a study of clusters will allow us to discriminate between viable cosmic ray acceleration processes in the largest virialised objects in the Universe. Studies of nearby galaxies will allow de-blending of the non-thermal and thermal components of radio emission, an examination of the non-thermal radio/FIR relation, and its dependence on spatial scale. Within our own Galaxy, the proposed frequency coverage will give excellent spectral coverage for rotation measure studies of the Galactic magnetic field and its three dimensional configuration. It will also be a valuable resource for the discovery of the Galaxy's "missing" supernova remnants. The GLEAM survey will provide valuable knowledge on foreground subtraction techniques for the proposed EOR project, will provide an important sky template for the study of transient radio sources, and will provide a list of polarisation-selected pulsar candidates for further study. Furthermore, the GLEAM survey overlaps and complements the ongoing LOFAR MSSS survey, and will provide a valuable low-frequency reference for the ASKAP EMU survey. Finally, the science aims are related to at least two of the key SKA science goals, provide a low-risk, high-return range of science and will be a valuable all-sky legacy for the astronomy community.

At the MWA data archive portal, searching on the ProjectID for the given date with the ObsID sequence, will return the list of observations with full detail regarding the observation configuration and (usually) comments regarding data quality.

## **RETRIEVAL OF PUBLICLY AVAILABLE DATA**

Once users have discovered publicly available MWA data of interest, the data needs to be retrieved. The MWA archive contains over 20PB of data, much of which is now publicly available. The MWA provides a web-based data portal: the MWA All-Sky Virtual Observatory (MWA ASVO) at <https://asvo.mwatelescope.org> which provides access to publicly available MWA data. The data available consists of un-calibrated raw visibilities for observations, along with their associated metadata.

Users may download the raw visibilities in their native MWA-specific format that the correlator produces, or optionally, request that their data be pre-processed via "cotter" to produce frequency/time averaged visibilities converted to uvfits or CASA measurement set format. Download and conversion jobs and the resulting data products can be managed via the website or via the command-line client. The MWA ASVO portal is available to the general public, however, MWA Collaboration members have the ability to access their own project's proprietary data as well (currently this is by request to an administrator). See <https://asvo.mwatelescope.org/support#gettingstarted> for a getting started guide. During 2018, the MWA ASVO is being enhanced to support optional on-the-fly calibration and integration with federated identity providers which will allow users to login via their institution's credentials.

NOTE: requests for extremely large MWA public datasets (thousands of observations or more) will need to be handled on a case-by-case basis by contacting the MWA Director [director@mwatelescope.org](mailto:director@mwatelescope.org) in the first instance.

## **PROCESSING OF PUBLICLY AVAILABLE MWA DATA**

The MWA is a dramatically new type of radio telescope and, while basic radio interferometric processing techniques are applicable, the processing of MWA data requires a number of deviations from techniques that those familiar with tracking, dish-based arrays routinely use.

A full description of MWA data processing is well beyond the scope of this document and assistance in processing MWA data is well beyond the resources available to the MWA project Operations Team. However, dozens of MWA project members have analysed very large volumes of MWA data and produced scientific results. Key publications that describe many aspects of MWA data processing are listed in the ADS library of MWA publications (<http://adsabs.harvard.edu/>), as a starting point for users wishing to analyse publicly available MWA data.

Individual Members of the MWA collaboration familiar with MWA data processing may be willing to provide advice and assistance to prospective users of publicly available MWA data (a list of individuals familiar with MWA data analysis, willing to assist on a collaborative basis is maintained at: <http://mwatelescope.org/astronomers/public-data-release/146-data-analysis-help>). However, establishing collaborative arrangements between such prospective users and Individual Members of the MWA is not the responsibility of the MWA project and should be undertaken on an individual-to-individual basis.

## **CITATION OF KEY MWA PUBLICATIONS**

It would be appreciated if users of publicly available MWA data acknowledge the facility as the source of the data by citing the key MWA technical publication in any publications resulting from the use of publicly available data (plus any other MWA publications referred to in the use of those data):

Tingay, S.J. et al. 2013, PASA, 30, 7 ([ADS link](#))

It would also be appreciated if the MWA could be listed as a facility by using `\facility{MWA}` in journals utilising the AAS journal style (ApJ, AJ, PASP etc).