

**THE NASA MARS 2020 MISSION PERSEVERANCE ROVER MASTCAM-Z SCI CALIBRATED DATA ARCHIVE.** A.M.Bailey<sup>1</sup>, L.K.Mehall<sup>1</sup>, E.Cisneros<sup>1</sup>, J.F.Bell III<sup>1</sup>, K.N.Paris<sup>1</sup>, E.H.Jensen<sup>2</sup>, J.N.Maki<sup>3</sup>, and the Mastcam-Z science and operations team.

<sup>1</sup>Arizona State Univ., Tempe, AZ ([ambail10@asu.edu](mailto:ambail10@asu.edu));

<sup>2</sup>Malin Space Science Systems, Inc., San Diego, CA;

<sup>3</sup>JPL/Caltech Pasadena, CA

**Introduction:** The Mars 2020 Perseverance rover has been on the surface for 393 sols, and the Mastcam-Z instrument has acquired over 85,000 observations [1]. As a data producer on a NASA mission, the team is required to archive this data with the Planetary Data System (PDS). The Arizona State University (ASU) Mastcam-Z Science Calibrated archive provides the highest fidelity images available in addition to resources for data users to make the archive more user-friendly.

Persons interested in finding Mastcam-Z observations elsewhere from the PDS have several interfaces available: [ASU Mastcam-Z website](#), the [Perseverance Analyst's Notebook](#), the [NASA raw images website](#), and the [NASA Photojournal](#) website. Which site to use depends on the intended use and knowledge of the end-user seeking data.

On the Mastcam-Z website, you will find [blog posts](#) on where to find the PDS data and other resources about the calibrated images, decoding the image filenames, and information about the instrument itself. You will also find enhanced color and natural color png products. The Analyst's Notebook has all [Mastcam-Z observations](#) that are PDS-archived available in a searchable catalog. You can view the images and add them to your cart and when you are ready to "check out" you can have the products emailed to you in a downloadable zip file (requires an account). The NASA website has a catalog of raw products that shows you images as they become available in downloadable pngs. The NASA Photojournal website has an assemblage of [Mastcam-Z products](#) available in jpeg and tiff format. For the remainder of the abstract, we will focus on the Mastcam-Z archive hosted by the PDS Imaging Node.

**What Mastcam-Z PDS data are available?:** The ASU and Jet Propulsion Laboratory (JPL) Instrument Data Systems Operations (IDSO) teams make Mastcam-Z archives for the PDS. The IDSO products are primarily used for rover operation, while the ASU science calibrated products are used for scientific analysis. At ASU, Mastcam-Z EDR images (made by IDSO) are radiance (RAD) and radiance factor (IOF) calibrated to make the best images available for seamless mosaic generation and scientific analysis [2,3]. These products are archived in the [Mastcam-Z Science Calibrated PDS bundle](#) along with browse products, ASU calibration-specific documentation and resources, and RAD calibrated [videos of the Ingenuity](#)

helicopter flying (Fig. 1). The ASU calibrated images are thoroughly vetted to ensure high quality and accurate products are publicly available.



**Figure 1:** [Mastcam-Z Rad calibrated Ingenuity helicopter 1<sup>st</sup> flight video](#) /NASA/JPL-Caltech/ASU/MSSS

**PDS Resources:** In the Science Calibrated PDS bundle the [Mastcam-Z release notes](#) serve as a guide for data users with helpful information on the archived products. The release notes point users to any issues within the images, labels, or changes to previously delivered products. In the [document collection](#) there are instrument papers detailing more about ASU calibration as well as a software interface specification (SIS) specific to ASU calibrated images that is intended to be a general user's guide for the archive and its contents.

**Future Plans:** An ASCII table containing derived atmospheric properties, pre-flight calibration data acquired during ATLO testing, cruise data products, as well as support files used during science calibration will be available in a future release [4].

A CSV table that is currently being worked on for the archive, that will correlate Mastcam-Z sequence information; sequence id, target info etc. to better guide the data user in finding the images they are looking for.

The product data quality will be cataloged for the Mastcam-Z image products in a future release, this infrastructure is currently under development. [4].

All Mastcam-Z data products are available through the PDS every 4 months in 120-sol increments through primary mission. The next release will cover sols 300-419 and be available on July 22<sup>nd</sup>, 2022.

**References:** [1] Bell, J.F., *et al. Space Sci Rev* **217**, 24 (2021). <https://doi.org/10.1007/s11214-020-00755-x>. [2] Hayes, A.G., *et al. Space Sci Rev* **217**, 29 (2021). <https://doi.org/10.1007/s11214-021-00795-x>. [3] Kinch, K.M., *et al. Space Sci Rev* **217**, 46 (2021). [4] Bailey, A. M., *et al.* (2020) 5<sup>th</sup> *Planetary Data Workshop Abstract #7038*.