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**SCIENCE MISSION DIRECTORATE (SMD)
ARTEMIS II LUNAR SCIENCE TEAM
OPEN SCIENCE AND DATA MANAGEMENT PLAN
(OSDMP)**

PREPARED BY:

Matthew Miller, Ph.D.
Artemis Internal Lunar Science Team
Data and Software Lead
Astromaterials Research and
Exploration Science
NASA JSC-XI411/Amentum

David Hollibaugh Baker, Ph.D.
Research Space Scientist
Solar System Exploration Division
NASA GSFC

Sara Schmidt
Artemis Internal Lunar Science Team
Data and Software Deputy Lead
Astromaterials Research and
Exploration Science
NASA JSC-XI411/Amentum

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REVISION AND HISTORY PAGE

Revision No.	Change No.	Description	Effective Date
Baseline	-	Establishes an initial set of data management plan expectations within the Artemis II Lunar Science Team	2026-02-20
Rev A	1	Updates the Baseline version to reflect the actual experience of Artemis 2 to help narrow in on content and descriptions relevant to the data that plans to be archived	2026-08-15
Rev B	2	Updates the Rev A version to address comments and minor edits from the Planetary Data System (PDS) archive peer review. Rev B to be included in the initial release of the PDS Artemis II science data archive.	2026-10-07

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1.0 INTRODUCTION

1.1. PURPOSE

Artemis II mission relied on a dedicated Lunar Science Team to execute mission objectives, requiring timely data access for immediate scientific inquiry and long-term analysis; however, the purpose of this Open Science Data Management Plan (OSDMP) extends significantly beyond internal mission support. This document outlines the procedures for specifically managing Artemis II Lunar Science Team mission data to ensure it is not only preserved for the Artemis II Lunar Science Team but also made publicly available to share this historic mission with the world. By opening this archive to a broad and global community, the OSDMP enables widespread science analysis that will benefit future lunar exploration and support the development of a robust lunar economy.

Fundamentally, the OSDMP demonstrates how the Artemis II Lunar Science Team will comply with Federal law and NASA directives and requirements. To serve stakeholders ranging from technical researchers to the general public, this data management strategy is built upon measurable objectives: ensuring the timeliness of data distribution, establishing full accessibility via a centralized archive, guaranteeing the completeness of all validated science products and metadata, and maintaining interoperability to facilitate synthesis with other datasets. Through these measures, the OSDMP secures the legacy and utility of the Artemis II mission's scientific return.

1.2. SCOPE

This document pertains specifically to the Artemis II mission and the data expected to be managed by the Artemis II Lunar Science Team.

1.3. CHANGE AUTHORITY/RESPONSIBILITY

The NASA Office of Primary Responsibility (OPR) identified for this document is the Exploration Science Strategy Integration Office (ESSIO). Proposed changes to this document shall be submitted via a Change Request (CR) to the SMD Science in Human Exploration (SHE) Control Board (CB) for consideration and disposition.

2.0 DOCUMENTS

2.1. APPLICABLE DOCUMENTS

The following documents include specifications, models, standards, guidelines, handbooks, and other special publications. The documents listed in this paragraph are applicable to the extent specified herein.

TABLE 1: APPLICABLE DOCUMENTS FOR THIS OSDMP

Document Number	Document Title
M2M-30018	Moon to Mars (M2M) Mission Integration Implementation Plan
M2M-30002	Moon To Mars (M2M) Artemis Requirements Document (ARD)
M2M-30007	Artemis Integrated Concept of Operations

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Document Number	Document Title
M2M-30025	Artemis Communications Network Tracking (CNT) Positioning Navigation Timing (PNT) Architecture Description Document (CPADD)
M2M-30155	Moon to Mars (M2M) Imagery-Institutional Support Plan
NASA STD-2821	Audio and Video Standards for Internet Resources - Version: 2.0
NASA STD-2822	Still And Motion Imagery Metadata Standard
NASA STD-2831	Metadata Standard for Data Discoverability
SPD-41a	Scientific Information Policy for the Science Mission Directorate (SMD): SMD Policy Document SPD-41a
NRRS 1441.1	NASA Records Retention Schedule (Program and Project Records (see page 281) 08/101.0)

2.2. REFERENCE DOCUMENTS

The following documents contain supplemental information to guide the user in the application of this document.

TABLE 2: REFERENCE DOCUMENTS FOR THIS OSDMP

Document Number	Document Title
Wilkinson et al., (2016)	Wilkinson, M., Dumontier, M., Aalbersberg, I. <i>et al.</i> The FAIR Guiding Principles for scientific data management and stewardship. <i>Sci Data</i> 3, 160018 (2016). https://doi.org/10.1038/sdata.2016.18
FAIR Principles	https://www.go-fair.org/fair-principles/
PDS Standards	https://pds.nasa.gov/datastandards/documents/policy/
M-16-21	Office of Management and Budget Memorandum: Federal Source Code Policy: Achieving Efficiency, Transparency, and Innovation through Reusable and Open-Source Software
NPD 2200.1	Management of NASA Scientific and Technical Information
NPD 2091.1	Inventions Made by Government Employees
NPR 7120.5F	NASA Space Flight Program and Project Management Requirements
NPR 7120.6	Knowledge Policy for Programs and Projects
NPR 7123.1D	Systems Engineering Processes and Requirements
NPR 7150.2D	NASA Software Engineering Requirements
M2M-30155	Moon to Mars (M2M) Imagery-Institutional Support Plan
M2M-40032-ANX04	Artemis II: Moon to Mars (M2M) Utilization Imagery Plan for Artemis II V3
SMD-LUN-203	SMD Artemis II Mission Systems Data Expectations Plan
M2M-40036	Artemis II, M2M High-Level Imagery Architecture

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3.0 MISSION OVERVIEW

3.1. MISSION OVERVIEW

The Artemis II mission existed as the pivotal crewed flight test required to bridge the gap between uncrewed hardware validation and an actual lunar landing. Its primary purpose was to prove that the integrated Space Launch System (SLS) rocket and Orion spacecraft could safely support human life in the deep-space environment beyond low-Earth orbit. By placing astronauts on board for the first time, NASA aimed to verify the performance of life support, communication, and navigation systems that cannot be fully simulated without a human presence. This mission served as the ultimate safety check, ensuring that the technology and mission-control procedures were robust enough to support the complex lunar surface operations planned for future Artemis missions.

The mission was a major international collaboration led by NASA in partnership with the Canadian Space Agency (CSA), which provided Mission Specialist Jeremy Hansen—the first non-American to travel to the Moon's vicinity. He was joined by a NASA crew consisting of Commander Reid Wiseman, Pilot Victor Glover, and Mission Specialist Christina Koch. Beyond the crew, the European Space Agency (ESA) was a critical partner, providing the European Service Module that powered and propelled the Orion capsule. This massive undertaking involved thousands of people across the globe, including recovery teams from the U.S. Navy and industrial partners such as Lockheed Martin (the prime contractor for Orion) and Boeing (the lead for the SLS core stage), all working together to establish a sustainable framework for deep-space exploration. For a more complete description of Artemis II, see <https://www.nasa.gov/artemis-ii-press-kit/>

The Artemis II Lunar Science Team (LST) enabled the study of the Moon and the Earth during the first human visit to cis-lunar space in over 50 years through crew handheld camera images, audio recordings, annotations, and vehicle imagery. The crew used Orion's handheld cameras and Portable Computing Devices (PCDs) to document the lunar surface. They captured photos and recorded verbal and written observations throughout the transit and the far-side flyby. The crews' observations provided new insights into the Moon with humans seeing parts of the lunar surface for the first time from a first-person perspective (e.g., some of the lunar far side). This mission also established the presence of the LST within the Flight Operations Directorate mission structure to enable future science mission operations.

3.2. MISSION OBJECTIVES

We refer the reader to Artemis II Preliminary Science Report, Section 1, for a full description of the science objectives for the LST. A summary of these details is shown in Table 3.

For a broader description of the Artemis II mission priorities, refer to <https://www.nasa.gov/wp-content/uploads/2026/01/a2-reference-guide-012825.pdf?emrc=979554>.

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TABLE 3: ARTEMIS II LST SCIENCE THEMES AND OBJECTIVES

Science Themes and Objectives
1. Impact History (Priority 2) • Characterize features of impact structures. • Characterize features of young crater systems. • Characterize ejecta interactions with surrounding features.
2. Impact Flashes (Priority 1) • Characterize impact events observed by the crew.
3. Volcanic History (Priority 3) • Characterize the variety of mare volcanism. • Characterize the variety of non-mare volcanism. • Determine if cryptomare are identifiable from orbital data.
4. Tectonics (Priority 2) • Characterize region-scale fault complexes including relationships (e.g., cross-cutting) with surrounding features. • Characterize floor-fractured craters. • Characterize massifs.
5. Color Provinces and Albedo Variations (Priority 1) • Characterize color/albedo associated with different physical properties. • Characterize color/albedo associated with different geochemical/compositional properties.
6. Lunar Environment and Deep Space (Priority 2) • Determine whether lofted lunar dust is identifiable from lunar orbit that would allow for the characterization of the lunar exosphere environment. • Characterize deep space.
7. Earth Observations (Priority 3) • Characterize Earth's atmosphere. • Characterize Earth's surface.
8. Limb and Terminator Morphology (Priority 3) • Characterize the lunar limb, surface features along the limb, and the horizon. • Characterize surface features at the lunar terminator.
9. Future Sites and Poles (Priority 2) • Characterize the regional context for past landing sites. • Characterize the regional context for potential future landing sites. • Characterize polar regions.
10. Photometric Observations (Priority 2) • Describe changes in spatial and temporal scales of color/albedo variations.

Deutsch, A., Gross, J., Heldmann, J., Needham, D., Colaprete, A. et al. The Artemis II Scientific Targeting Plan. LPSC 2026, #1602 <https://www.hou.usra.edu/meetings/lpsc2026/pdf/1602.pdf>

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3.3. LAUNCH, ORBIT, AND OPERATIONS

The Artemis II mission began on Flight Day 1 on April 1, 2026, at 22:35 GMT with a successful SLS launch and a proximity operations demonstration where the crew manually maneuvered Orion near the spent Interim Cryogenic Propulsion Stage (ICPS) rocket stage. On Flight Day 2, the spacecraft executed the critical Translunar Injection (TLI) burn, sending the crew toward the Moon for the first time in over 50 years. Flight Day 3 was marked by the cancellation of the first orbital trajectory correction (OTC-1) burn due to the precision of the TLI, allowing the crew to focus on medical drills and cabin setup. Flight Day 4 featured a manual piloting demonstration to test Orion's handling in deep space, while Flight Day 5 involved a comprehensive evaluation of the Orion Crew Survival System suits and the OTC-2 burn. The outbound phase culminated on Flight Day 6 with the historic lunar flyby, during which the crew swung 4,000 miles (6,437 kilometers) above the lunar far side, captured over 7,000 images, and observed a solar eclipse from space.

The return journey commenced on Flight Day 7 with the first return correction burn (RTC-1) and the release of "Earthset" photography. On Flight Day 8, the crew conducted a radiation shielding demonstration and held a live news conference from deep space, followed by Flight Day 9, which was dedicated to the RTC-2 burn and final cabin stowage for reentry. The mission concluded on Flight Day 10, on April 10, 2026, as Orion performed a final trajectory burn and a skip reentry maneuver to shed velocity. The spacecraft splashed down safely in the Pacific Ocean at 5:07 p.m. PDT (00:07 GMT), where the crew was recovered by the USS John P. Murtha. Having traveled a record-breaking 695,081 miles (1,118,624 km), the mission successfully validated Orion's life support and navigation systems, enabling future Artemis missions.

For a more complete summary of Mission events, see the following:

- <https://www.nasa.gov/news-release/nasa-welcomes-record-setting-artemis-ii-moonfarers-back-to-earth/>
- <https://www.nasa.gov/blogs/artemis/>

As it pertains to Artemis II Lunar Science Team activities, Flight Days 1-5 involved opportunistic imaging and final mission preparation of the Lunar Fly-by observations, Flight Day 6 involved the Lunar Fly-By with Flight Day 7 dedicated to final observations/debrief. Post-splashdown activities included a specific Lunar observations crew debrief. For a more complete breakdown of science activities, refer to the Artemis II Post-Mission Lunar Science Operations and Preliminary Science Mission Reports.

4.0 OPEN SCIENCE

This section describes plans used to ensure that the production and dissemination of mission scientific information following the open science principles of availability, transparency, reproducibility, and collaboration. Subsections summarize plans to share scientific data, software, publications, and materials from public scientific meetings.

4.1. ARTEMIS II LUNAR SCIENCE TEAM ROLES AND RESPONSIBILITIES

This section briefly describes the project roles that were responsible for implementing the elements of the OSDMP. These roles and responsibilities, as shown in Appendix D, were defined and established via the

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Artemis Internal Lunar Science Team with oversight from the ESSIO leadership. Detailed descriptions of roles and responsibilities for data repository are provided in Section 6.5.

The Artemis II Lunar Science Team (“Lunar Science Team”) consisted of NASA internal scientists and data scientists. Table D1-1 in Appendix D defines the Lunar Science Team data management roles and responsible personnel. The Lunar Science Team (LST) had the overall responsibility for ensuring that Artemis data are appropriately archived and for the generation and validation of PDS4-compliant derived data archives for delivery to the Planetary Data System (PDS). The Lunar Science Team was also responsible for the generation and dissemination of scientific results and information through publications and public and scientific meetings.

The following sections outline the entities and the roles and responsibilities for personnel involved in generation, validation, transfer, and distribution of Artemis II mission data.

4.2. ARTEMIS II MISSION INSTITUTIONAL PARTNERS

The Moon 2 Mars (M2M) mission operations apparatus consisted of many elements and functions. Whereas it pertains to the Artemis II Lunar Science Team, this broader apparatus ensured the Raw and/or Accountable Data Products produced from the spacecraft telemetry were downlinked via their appropriate mechanisms (e.g. Deep Space Network (DSN)). The data pathways were ultimately channeled through Johnson Space Center (JSC) Institutional Services which included raw source data products (including instrument and ancillary data and metadata), and any associated information needed to produce the calibrated and derived data products to the Artemis II Lunar Science Team. The key JSC institutional entities, which include Flight Operations Directorate (FOD) consoles, who provided the source mission data to the Artemis II Lunar Science Team, are summarized below:

- **JSC OCIO Mission Imagery Team:** Operating within the Office of the Chief Information Officer (OCIO), the Mission Imagery team was responsible for providing comprehensive mission imagery services and backroom console support to NASA’s M2M Office and various Artemis Programs. Based in the Johnson Space Center’s Building 8 (B8), the team managed the downlink, capture, recording, processing, cataloging, and distribution of human space flight (HSF) mission imagery. Serving as NASA’s official center of record for HSF imagery, JSC OCIO Mission Imagery supported a wide array of stakeholders, including Mission Control, international and commercial partners, and internal scientific teams, by managing shared imagery infrastructure, providing broad access to master copies for research and outreach, and preserving official records for submission to the National Archives and Records Administration (NARA).
- **Export Control Review (ECR) Team:** This team was responsible for reviewing mission data for appropriate application of export control labelling. This team worked in conjunction with the JSC OCIO Mission Imagery team and the Astronaut Office to fulfill export control review duties.
- **Orion Electronic Still Camera (OESC) team:** As an element within the overall JSC OCIO Mission Imagery team, OESC provided console-based support during flight operations, managing the receipt, documentation, archiving, and delivery of still imagery. OESC operators were trained in simulation support, console loop access, server operations, and imagery workflows, including coordination with the Imagery Science and Analysis Laboratory (ISAL). This ensured proper capture, processing, and archival handling of mission imagery in accordance with established

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NASA standards.

- **Building 8 Video Control Center (VCC):** As an element within the overall JSC OCIO Mission Imagery team, VCC was responsible for decoding, recording, distributing, and archiving motion imagery from Artemis missions. Serving as a backroom to the MCC-H Ground Controller (GC) console, the VCC provided critical mission motion imagery management.
- **Imagery Science and Analysis Laboratory (ISAL):** Provided critical scientific and engineering analysis of photographic and video data to quantify vehicle performance, structural integrity, and mission-critical dynamic events. Leveraging advanced photogrammetry, high-precision motion tracking, and 2-D/3-D visualization, the laboratory delivered real-time support for in-flight inspections to identify anomalies such as micrometeoroid orbital debris (MMOD) strikes or launch-related damage. Furthermore, ISAL integrated technical imagery acquisition planning with post-mission restoration and screening protocols to ensure high-fidelity visual data is available for engineering decision-making and long-term spacecraft health assessments.
- **FOD Command and Data Handling (CDH) console:** Responsible for the real-time monitoring and command of a spacecraft's onboard computer systems, data networks, and software health. Controllers at this station managed the integration of complex avionics suites, ensuring the integrity of data telemetry between the vehicle and ground control while troubleshooting anomalies in the Command and Control (C&C) processors. This role was critical to mission success as it oversees the digital "nervous system" of the spacecraft, coordinating the execution of flight software sequences and the distribution of power to essential computing hardware and downlinking data from the Portable Computing Devices (PCDs).
- **Orion Navigation Multi Organization Design Environment (MODE) Team:** Responsible for the full lifecycle of the onboard absolute navigation systems, from development and design to analysis, testing, verification, and flight. This engineering team within Orion Vehicle Integration Office (VIO) provided the Best Estimate Trajectory (BET), which is the best possible reconstruction of the trajectory that Artemis II flew.
- **FOD Flight Dynamics Officer (FDO) console:** Responsible for the comprehensive management of spacecraft trajectory, orbital mechanics, and navigational integrity throughout all mission phases. Flight controllers at this station performed real-time state vector determination and execute complex maneuver planning to ensure the vehicle adheres to precise orbital parameters and mission timelines. Additionally, FDO was responsible for calculating abort trajectories and coordinating atmospheric re-entry profiles to ensure accurate splashdown or landing site targeting under both nominal and contingency scenarios.
- **Exploration Software for Crew Operations (ESCO) team:** Exploration Software for Crew Operations (ESCO) was the FOD organization responsible for integrating software loads on NASA Government Furnished Equipment (GFE) portable computing devices for crew onboard support, currently for Orion and Gateway programs. ESCO developed software systems for the crew devices. The ESCO Lab, with flight-like computing devices, simulated vehicle networks and simulated MCC ground systems, was used to test integrated software loads on the computing devices.
- **M2M Exploration Operations Office:** The Exploration Operations Office (ExOps) served as the

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strategic lead for integrating cross-program mission requirements and production to maximize the capabilities of Artemis vehicles and systems. By defining mission-level priorities, managing payload and cargo dependencies, and coordinating resupply needs, the office ensured that all mission objectives are unified across flight programs. Ultimately, ExOps bridged the gap between high-level strategy and tactical execution, providing flight operations teams with the integrated products and plans necessary to conduct safe and successful missions.

- **Space Radiation Analysis Group:** The Space Radiation Analysis Group (SRAG) was responsible for ensuring that the radiation exposure received by astronauts remains below established safety limits by providing space weather analysis and prediction, which was used to analyze space radiation impacts to Orion's Flight Control Modules (CM). SRAG provided the standard hardware, HERA (Hybrid Electronic Radiation Assessor), which was hard mounted within the CM.

4.3. DATA MANAGEMENT

This section briefly summarizes the processes describing scientific data products to be shared openly through the project life cycle, which must include observation, auxiliary, calibration, and ground data. This section references appropriate sections of the more extensive data management plan in Section 5 and 6. A data product is defined as a processed collection of one or more parameters packaged with associated ancillary and labeling data.

All data outlined in this OSDMP was publicly released and made freely available by the Planetary Data System (PDS) within 6 months post-flight, aside from where exceptions are noted due to data processing being performed outside the preview of this document. The data was disseminated in the public domain under the default licensing for archive products in the PDS, which is [CC0 1.0 Universal](#). Data was reviewed for export control as part of the JSC OCIO Mission Imagery and ECR team mission data review process prior to being released, and once released by the PDS, there will be no restriction on access to or use of scientific data. Sensitive and non-science data and images of crew and hardware, such as medical-related data and views, were not part of the planned archive. The PDS will provide persistent identifiers (DOIs) for the archive, allowing for proper attribution and citation to the data sources archived.

Table 4 summarizes the major data types expected to be handled by the Artemis II Lunar Science Team and the expected delivery.

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TABLE 4: ARTEMIS II LUNAR SCIENCE TEAM DATA SUMMARY

Data Category	Data Description	Phase Data is Captured	Phase Data is Received	Data Delivery
Imagery (Motion and Still) Data	All still/videos of the Earth/Moon system from the handheld imagery systems, and Orion vehicle camera imagery	In Flight, Lunar Flyby	In-Flight, Post-Flight	Within 6 months Post-Flight
Audio Files	Flight team loop audio for Orion to Earth (O/E) and crew recorded observation audio	In Flight, Lunar Flyby	In-Flight, Post-Flight	Within 6 months Post-Flight
Audio Transcripts	Transcription of audio data	In Flight, Lunar Flyby	In-Flight, Post-Flight	Within 6 months Post-Flight
Navigation and Ancillary Data	Orion flight dynamics information such as trajectory and orientation (ephemeris) and other related data needed to determine observation geometry	In Flight, Post-Flight	In-Flight, Post-Flight	Within 6 months Post-Flight
Crew Written Observations	Crew Observations in the form of digital written notes	In Flight, Lunar Flyby	Post-Flight	Within 6 months Post-Flight
Radiation**	Radiation data from within Orion	In Flight	Post-Flight	N/A
Environmental Monitoring	Temperature, Humidity, Dew Point data from within the sample lockers D/E	In Flight	Post-Flight	Within 6 months Post-Flight
Lunar Science Team generated Flight Products and Procedures	Crew Lunar Observations Targeting Guide, A2 Science Traceability Matrix	Pre-Launch, In Flight, Lunar Flyby	Pre-Launch, In Flight, Post-Flight	Within 6 months Post-Flight
Mission Team Derived Data Products	Products made by the Lunar Science Team such as derived imagery products or combined observations with map information	In Flight, Post-Flight	In-Flight, Post-Flight	Within 6 months Post-Flight
Mission Reports	Lunar Science Team reports and publications	Post-Flight	Post-Flight	Within 6- & 12-months Post-Flight

** Radiation data will be disseminated to the PDS Planetary Plasma Interactions (PPI) Node on a separate timeline from the details outlined in this OSDMP and will be performed by SRAG personnel. We acknowledge in this OSDMP radiation related data will be available eventually in the PDS for use by the scientific community.

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4.3.1. The Planetary Data System (PDS)

The Planetary Data System (PDS) serves as the main public archive of Artemis II science data. The PDS is a distributed, peer-reviewed active NASA archive designed to ensure the long-term usability and accessibility of NASA’s planetary data for the global scientific community (see <https://pds.nasa.gov>). The PDS nodes closely collaborated with the Artemis II Lunar Science Team to support the archiving of PDS4-compliant archives and to ensure data preservation and usability for decades to come. The Artemis II Lunar Science Team was responsible for generating, validating, and delivering scientifically important data and metadata to the PDS. The PDS was responsible for providing typical mission consultation and support services tasks to the Artemis mission and Lunar Science Teams and to make the delivered scientifically relevant mission data accessible to the public.

Scientific data was archived via the PDS in strict accordance with the PDS4 Information Model (see <https://pds.nasa.gov/datastandards/about/>). Under the PDS4 standard, data products were organized into hierarchical collections and bundles. This architecture integrated observational data with essential calibration files, documentation, and software to facilitate independent use by future investigators. PDS worked directly with data providers to validate metadata and structure, ensuring adherence to established standards for data content and geometry.

The PDS operates through eight specialized nodes:

- Science Discipline Nodes: Atmospheres, Cartography and Imaging Sciences, Geosciences, Planetary Plasma Interactions, Ring-Moon Systems, and Small Bodies.
- Support Nodes: The Engineering Node (systems engineering) and the Navigation and Ancillary Information Facility (NAIF) (observational geometry).

For the Artemis II mission, NASA designated the Geosciences Node as the lead node. The Cartography and Imaging Sciences Node (Imaging Node, or IMG) and the NAIF Node served as the primary repositories for mission imagery and ancillary/geometric data, respectively.

4.3.2. Processing Levels

PDS data processing levels are defined in Table 5 and are mapped to processing levels defined in SPD-41a. When making such classification for a given science data product, data providers (in consultation with the cognizant PDS node) selected the most appropriate term and provided a detailed description of the processing in accompanying documentation. The mission does not plan to archive any Telemetry, i.e., SPD-41a Level 0 data products. The mission PDS4 bundles vary in their processing levels (Section 6.0).

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TABLE 5: PDS SCIENCE DATA PROCESSING LEVELS

Processing Level (PDS4)	Definition	SPD-41A Processing Level
Telemetry	An encoded byte stream used to transfer data from one or more instruments to temporary storage where the raw instrument data will be extracted. PDS does not archive telemetry data.	Level 0
Raw	Original data from an instrument. If compression, reformatting, packetization, or other translation has been applied to facilitate data transmission or storage, those processes will be reversed so that the archived data are in a PDS-approved archive format.	Level 1
Partially Processed	Data that have been processed beyond the raw level, but which have not yet reached calibrated status.	Level 2
Calibrated	Data is converted to physical units, which makes values independent of the instrument.	Level 2
Derived	Results that have been distilled from one or more calibrated data products (for example, maps, gravity or magnetic fields, or ring particle size distributions). Supplementary data used to interpret observational data, such as calibration tables, tables of viewing geometry, or SPICE kernels, should also be classified as derived data if not easily matched to one of the other categories.	Level 3 Level 4

4.3.3. Types of Scientific Data Products

The types of scientific data products that were produced during the Artemis II mission are described in this section. They include source data products, archival data products, supporting data products, and documentation that accompanies data as they are delivered to the PDS.

4.3.3.1. Source Data Products

Source Data Products were those generated by mission assets and delivered by institutional elements. These are data and metadata files that were available in their raw format from the instrument or hardware system but not necessarily in science archival format. These include source files for the generation of supporting and archival science data products. To the extent allowed by the PDS4 Information Model, Source Data Products will be included in their native formats within the PDS4 archive to preserve the original files for compatibility with the larger Artemis II repository of non-science mission data that are not within the PDS.

4.3.3.2. Archival Science Data Products

Archival Science Data Products were generated in a predefined way using well-understood procedures in an automated and/or manual processing “pipeline”. The systematic product generation will be carried out primarily by the Lunar Science Team. They included raw, partially processed, calibrated, and derived products (Section 6.1). Details on the generation, validation, and delivery of Archival Data Products are available in Section 6.5.

Archival Science Data Products were delivered to the PDS in PDS4-compliant formats. Each product includes an XML-formatted label. Products were organized into collections and bundles, and observational data were accompanied by appropriate documentation. The documentation included all

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information required to understand the data processing sequence quantitatively. The Archival Data Products for the Artemis data sources and investigations are summarized in Section 6.1.

4.3.3.3. Collaborative Data Products

Collaborative Data Products were generated by the Artemis Lunar Science Team to support cooperative and synergistic science along with mission planning. Collaborative Data Products were in a readily accessible format with appropriate tools provided, such that other Lunar Science Team members could use them for scientific purposes. Collaborative Data Products were not all delivered to the archive, or at “archive-ready” quality, but should be at a suitable quality for sharing internally to enable scientific investigations and preliminary discussion among the Lunar Science Team. Collaborative Data Products designated for PDS archiving were in a PDS4 compliant format, while such products intended for internal use by the Artemis Lunar Science Team used other scientific data formats as well. Collaborative Data Products include the following developed during the mission:

- Data and metadata inventory files.
- Partially processed data products to facilitate scientific analysis or data validation.
- Preliminary image mosaics and other preliminary derived products.
- Collections of crew and image observations summarized and assembled into Lunar Science Team reports.
- Lunar targeting plan and documentation on daily operations and science traceability.
- Other data products generated and stored to facilitate mission operations and scientific analysis.

4.3.3.4. NASA Public Affairs Office (PAO) Products

NASA Public Affairs Office (PAO) Products followed a different path from those delivered and generated by the Lunar Science Team, although some data received and processed by both PAO and the Lunar Science Team may be the same. Data delivered to and processed and released by the PAO team were for the purpose of public engagement and communication of mission activities and events. The PAO and Lunar Science Team collaborated on a subset of scientifically relevant data products that were released through NASA PAO communication channels for media engagement during and shortly after the mission. Products generated and released by PAO were not archived in PDS.

4.3.3.5. Supporting Data Products

Supporting Data Products, also referred to as ancillary data products, were data products that can be used or are required for the generation of calibrated and derived data products. These included SPICE kernels and engineering data products as described below.

SPICE is an acronym used to describe a suite of supporting data (commonly called kernels) that can be used with the SPICE software "toolkit" maintained by the Navigation and Ancillary Information Facility (NAIF) at the Jet Propulsion Laboratory. The letters in SPICE indicate the components of the SPICE system:

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- **S:** Spacecraft ephemerides or trajectory as a function of time
- **P:** Planetary and satellite ephemerides and associated physical and cartographic constants
- **I:** Instrument information, including field-of-view size, shape, and orientation
- **C:** Attitude information for a spacecraft, instrument, or other subsystem ("C" originally stood for camera pointing)
- **E:** Events, originally intended for spacecraft event information but not used in modern SPICE practice

Additional SPICE components include reference frame definitions, time conversion and clock correlation parameters, and natural body digital shape models. The source data for Artemis SPICE kernels were generated by the flight operations and engineering teams and provided to the Lunar Science Team. The Lunar Science Team were responsible for the generation of the SPICE kernels, and delivery of the SPICE kernels to the PDS for hosting in NAIF node.

4.4. SCIENTIFIC SOFTWARE MANAGEMENT

Not Relevant - No scientific software was developed as part of this OSDMP.

4.4.1. Process for Community Engagement

Not Relevant - No community engagement was developed as part of this OSDMP.

4.4.2. Restricted Scientific Software

Not Relevant - No scientific software was developed as part of this OSDMP.

4.5. PUBLICATIONS

The Artemis II mission delivered three reports, in addition to this OSDMP document, that are made available to the public through the NASA STI Repository: 1) Preliminary Science Report, 2) Mission Science Operations Plan and 3) an Archive Data User's Guide (See Table 6). Any additional publications (technical reports, peer reviewed manuscripts, etc.) will also be made publicly available through the NASA STI Repository and/or made available through an open access publication method. These publications will have persistent identifiers defined by the NASA STI repository.

TABLE 6: ARTEMIS II MISSION PUBLICATION PRODUCTS

Publication Type	Description	Publication Schedule	Repository
Preliminary Science Report	Integrated summary of completion of science relevant objectives for the mission	Within 6 months of the splashdown event	NASA STI Repository
Mission Operations Report	Integrated summary of how the Lunar Science Team supported Artemis II mission activities	Within 6 months of the splashdown event	NASA STI Repository
Archive Data User's Guide	Integrated outcomes of the entire set of mission objectives for the mission	Within 6 months of the splashdown event	NASA STI Repository

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4.6. PUBLIC SCIENTIFIC MEETINGS

Dissemination of publications to-date is summarized in Table 7, at relevant planetary science conferences/meetings such as but not limited to the Lunar and Planetary Science Conference (LPSC), American Geophysical Union (AGU) Annual Meeting, and NASA-hosted workshops like the Lunar Surface Science Workshops. Attendance and dissemination will correlate to mission execution and report writing activities. Abstracts submitted to such conferences/meetings are publicly available via the conference websites. No mission-sponsored scientific meetings are planned; However, a data summary town hall is planned once data is publicly available to announce and describe to the public what data exists and how to access it.

TABLE 7: ARTEMIS II CONFERENCE PUBLICATION SCHEDULE

Conference/Meeting	Intended Abstracts/Content	Publication Schedule
Lunar Surface Science Workshop (LSSW) 2023	- Young, K.E., Petro, N., (2023) Artemis II Update (Recording) - Young, K.E., (2023) Discussion: Crew Strategies for Observations (Recording) - For all Invited Talks: Program & YouTube reference	April 2023
Lunar and Planetary Science Conference (LPSC) 2025	Schmidt, S.E. et al. (2025) Enabling orbital crew lunar observations during Artemis missions. LPSC 56, abstract 2403.	March 2025
Lunar Exploration Analysis Group LEAG 2026	Young, K.E., Artemis II Updates (Recording)	January 2026
Lunar and Planetary Science Conference (LPSC) 2026	- Young, K.E. et al. (2026). Artemis II lunar science and operations overview. LPSC 57, abstract 1681. - Deutsch, A.N. et al. (2026). The Artemis II scientific targeting plan. LPSC 57, abstract 1602. - Evans, C.A. et al. (2026). Training the Artemis II astronauts for observing the Moon. LPSC 57, abstract 1547. - Baker, D.M.H. et al. (2026). Artemis II science data management and archive plan. LPSC 57, abstract 1583. - Boyer, C.M. et al. (2026). Artemis II lunar observations support software. LPSC 57, abstract 1765.	March 2026
Lunar Surface Science Workshop (LSSW) 2026	- Young, K.E. Artemis II: Copy, Moon joy (Presentation) - Miller, M., Artemis II Data Update (Presentation)	May 2026
NASA Exploration Science Forum	- Henderson, M., Artemis II Science (Invited Talk) - Deutsch, A., Artemis II Scientific Targeting Plan - Program details link (HERE)	July 2026

5.0 SCIENCE INSTRUMENTATION

Table 8 provides a summary of the specific instruments leveraged by the Artemis II Lunar Science Team. This mission entirely consisted of leveraging existing mission assets for data acquisition from the Orion program and depended on FOD and program partners for data relay and delivery. Leveraging these assets was coordinated via the SCIENCE officer console within FOD. NOTE: The usage of equipment is crew dependent. Multiple PCDs, headsets, and cameras were used concurrently if multiple crew members performed observations.

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TABLE 8: ARTEMIS II LUNAR SCIENCE TEAM INSTRUMENT LIST

Note: This table only consists of instrument systems that generated data handled by the Artemis 2 Lunar science team and data planned to be archived

Data Category	Instrument / System	Identifier (Quantity)	Brief Description	Governing Organization
Imagery (Still and Motion)	Crew Handheld Camera	Nikon D5 (2)	Handheld cameras to acquire still imagery of Earth, the lunar surface, and space during flight	Orion Program
		Nikon Z9 (1)	Handheld camera to acquire still imagery of Earth, the lunar surface, and space during flight	Orion Program
	Crew cell phone	iPhone 17 Pro Max (4)	Cell phone with camera to acquire crew choice still imagery, including of Earth, the lunar surface, and space during flight	Orion Program
Imagery (Still and Motion)	Orion Vehicle Cameras	SAW Cam= Solar Array Wing (SAW Cam 2, 3, 4)	SAW Cam 2-4, OpNav are externally mounted camera feeds to access captured imagery of the Earth, the lunar surface, and space during flight	Orion Program
		OpNav = Optical Navigation (1)		
		DCAM = Docking Camera	CAB Cam 2 and DCAM; In cabin-mounted camera feeds to capture imagery out the windows during flight out	
		CAB Cam 2 = Cabin 2		
Navigation and Ancillary Data	Orion Flight Dynamics	Orion Flight Dynamics (N/A)	Orion flight dynamics information such as trajectory and orientation (ephemeris) and other related data needed to determine observation geometry	FOD Flight Dynamics Office & Orion VIO (vehicle integration office)
Audio Files	Portable Computing Device and Peltor Headset	PCD (4)	Computing tablet device to record crew members' audio observations with provided audio recording headsets and associated crew annotations	Orion Program (specifically Avionics, Power, and Software)
			Review observation objectives contained in the lunar flyby targeting plan and supplemental lunar science documentation.	
Crew Written Observations			Digital written crew notes	
Audio Files	Houston Voice Loops	Houston Voice (N/A)	Recordings of the flight loops. O/E1, O/E2, SCI PLAN and COORD	Mission Control Center Houston Voice
Radiation	Hybrid Electronic Radiation Assessor	HERA (2)	Radiation data from within Orion	Orion Program (specifically Avionics, Power, and Software)
Environmental Monitoring	HOBO MX1101 Temp/RH Data Logger	HOBO (2)	Temperature, Humidity, Dew point data from within the sample lockers D/E	M2M ExOps

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5.1. NIKON D5 CAMERA

The primary objective of the Nikon D5 camera was to capture imagery of the Earth/Moon system, taken by crew members through the Orion windows. These instruments are stock, commercial cameras that have flight heritage on the International Space Station (ISS).

5.1.1. Nikon D5 Description

The Nikon D5 is a high-performance digital single-lens reflex (DSLR) camera utilizing a 20.8-megapixel FX-format (35.9 x 23.9 mm) CMOS sensor paired with an EXPEED 5 image-processing engine. This architecture is optimized for extreme low-light sensitivity, featuring a native ISO range of 100 to 102,400, expandable to an unprecedented ISO 3,280,000 (Hi-5), enabling high-fidelity imaging in environments with minimal ambient light. Due to its proven reliability and ability to withstand the ionizing radiation and thermal stresses of low Earth orbit, NASA has integrated unmodified D5 units into its standard flight kit for the International Space Station (ISS) and astronaut training at Johnson Space Center.

The camera's technical capabilities are further defined by the Multi-CAM 20K autofocus (AF) sensor module, which incorporates 153 focus points (including 99 cross-type sensors) with a central point detection range extending down to -4 EV. This precision allows for high-speed continuous acquisition at 12 frames per second (fps) with full autofocus and auto-exposure tracking, or up to 14 fps with the mirror locked. Additionally, the D5 supports 4K UHD (3840x2160) video recording and is housed in a ruggedized, weather-sealed magnesium alloy chassis. This combination of high-speed data throughput, mechanical durability, and advanced optical performance makes it an essential tool for both terrestrial technical photography and now planetary photograph documentation.

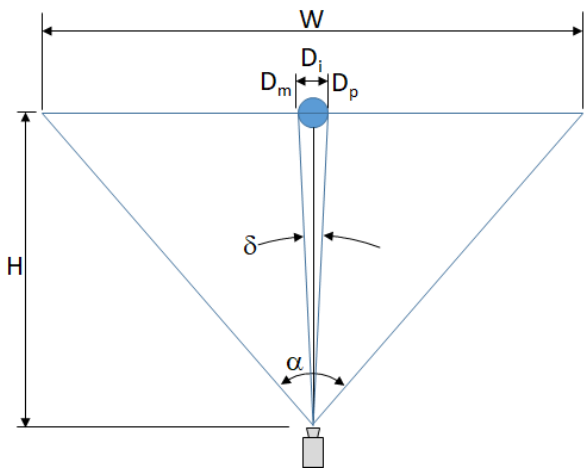
5.1.2. Nikon D5 Observation Capabilities

Table 9 and Figure 1 summarizes the handheld camera specifications and capabilities for the Artemis II mission. Each camera configuration was recorded and summarized as part of the standard operating procedure when in use. Crew also had freedom to adjust settings on-the-fly to achieve their desired photography. These procedures include lens selections and camera settings and are part of the recorded operations products which are found in the Artemis II Post-Mission Lunar Science Operations Report. Note that D5 Camera observations were performed with an optical viewfinder, not electronic, which kept the crew's color acuity. The crew reported that for visual lunar observations the D5 Camera was the best tool because it did not affect the way they saw the colors of the lunar surface.

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TABLE 9: NIKON D5 CAPABILITY

Feature	Specification
Sensor Type	35.9 x 23.9 mm CMOS (Full frame); 6.443 μ m pixel pitch (average)
Total Resolution (Processed)	5568 x 3712 pixels
Total Resolution (Raw Sensor)	5584 x 3728 pixels
Nominal ISO Range	100 – 102,400
Expanded ISO Range	Equivalent to ISO 50 – 3,280,000
Continuous Low (CL)	5 frames per second
Continuous High (CH)	12 frames per second
Storage Media	Dual CompactFlash (CF) Card Slots
Still Image Format	.NEF (RAW), JPG, TIFF
Still Image File Size	18 – 35 MB per image
Lens	Focal Length: • 14-24 mm • 35 mm • 80-400 mm
Focus Distance	Varies
Aperture	Varies
Audio File Format	.WAV (Separate file with matching filename)
Audio Specifications	~90 KB/sec; up to 60 seconds of recording per image



W = camera sensor width (pixels) (Nikon D5 = 5568)
 D_m = Target (planet) diameter (miles) (Earth = 7926, Moon = 2159)
 H = Distance to target (miles)
 α = Lens HFOV (degrees)
 δ = Target angular diameter (degrees) = $2(\tan^{-1}((D_m/2)/H))$
 D_p = Target dia. % of HFOV = δ/α
 D_i = Target dia. in image (pixels) = $D_p \cdot W$

Nikkor 80-400mm lens HFOV

- 80mm = 25.10 deg
- 100mm = 23.85 deg
- 400mm = 5.13 deg

14- 24mm lens FOV

- 14mm = 104x81 deg (114 deg diagonal)
- 24mm = 74x53 deg (84 deg diagonal)

FIGURE 1: CREW HANDHELD CAMERA NIKON D5 HORIZONTAL FIELD OF VIEW (HFOV) APPROXIMATE ESTIMATES

5.2. NIKON Z9

The primary objective of the Nikon Z9 camera was to capture imagery of the Earth/Moon system, taken

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by crew members through the Orion windows. These instruments are stock, commercial cameras and are being considered as part of future Artemis mission imagery acquisition systems. Artemis II provided the opportunity to baseline their performance capabilities in deep space.

5.2.1. Nikon Z9 Description

The Nikon Z9 is a mirrorless camera incorporating a 45.7-megapixel FX-format (35.9 x 23.9 mm) stacked BSI CMOS sensor paired with the high-speed EXPEED 7 image-processing engine. This advanced architecture enables a completely electronic shutter design, eliminating mechanical wear and vibration while achieving shutter speeds up to 1/32,000 of a second. The camera maintains a native ISO range of 64 to 25,600, expandable from ISO 32 to 102,400, ensuring high-fidelity imaging with professional-grade dynamic range. Continuing Nikon's legacy in space exploration, the Z9 serves as the technical core of the Handheld Universal Lunar Camera (HULC) for future Artemis missions, where its specialized firmware and hardware modifications manage the intense ionizing radiation and thermal fluctuations of the lunar environment.

The camera's performance is further defined by a 493-point phase-detection autofocus system that utilizes deep learning technology to recognize and track nine distinct subject categories, with a detection range reaching -8.5 EV in specialized Starlight Mode. This processing power supports continuous acquisition at 20 fps in RAW, 30 fps in full-resolution JPEG, or up to 120 fps at 11 megapixels, all provided through a blackout-free Real-Live Viewfinder. Beyond still photography, the Z9 offers professional video specifications including internal 8K/60p and 4K/120p recording in 12-bit N-RAW format. Constructed with a ruggedized, weather-sealed magnesium alloy frame and dual CFexpress Type B slots, the Z9 provides the extreme data throughput and mechanical resilience and was flown in Artemis II to support future application of the device to future Artemis missions.

5.2.2. Nikon Z9 Observation Capabilities

Table 10 summarizes the handheld camera specifications and capabilities for the Artemis II mission. Each camera configuration was recorded and summarized as part of the standard operating procedure when in use. Crew also had freedom to adjust settings on the fly to achieve their desired photography. These procedures included lens selections and camera settings and are part of the recorded operations products which are found in the Artemis II Post-Mission Lunar Science Operations Report.

TABLE 10: NIKON Z9 CAPABILITY

Feature	Specification
Sensor Type	35.9 x 23.9 mm Stacked BSI CMOS (Full frame); 4.345 µm pixel pitch (average)
Total Resolution (Processed)	8256 x 5504 pixels
Total Resolution (Raw Sensor)	8280 x 5520 pixels

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Nominal ISO Range	64 – 25,600
Expanded ISO Range	Equivalent to ISO 32 – 102,400
Continuous Low (CL)	1 – 10 frames per second
Continuous High (CH)	20 frames per second (up to 120 fps in High-Speed Frame Capture+)
Storage Media	Dual CFexpress (Type B) / XQD Card Slots
Still Image Format	.NEF (RAW), JPEG, HEIF
Still Image File Size	22 – 55 MB per image (RAW)
Lens	Focal Length: • 14-24 mm • 35 mm • 80-400 mm
Focus Distance	Varies
Aperture	Varies
Audio File Format	.WAV (Separate file with matching filename)
Audio Specifications	48 kHz, 24-bit Linear PCM; up to 60 seconds of recording per image

5.3. ORION VEHICLE CAMERAS

The Orion vehicle cameras to be leveraged by the Artemis II Lunar Science Team include four different sets of cameras orientated on the vehicle for various mission applications. These were hard mounted and fixed to the vehicle to provide images and video of the Earth/Moon system at various points throughout the Artemis II mission.

5.3.1. Orion Vehicle Cameras Description

Figure 2 shows the placement of each camera on Orion. The Artemis II Lunar Science Team leveraged 5 of these cameras. The SAW Cam 2-4 cameras are mounted to the solar arrays; CAB Cam 2 was mounted to the Orion Vehicle to provide views out of the cabin window from within the vehicle. DCAM and OpNAV cameras were GNC supporting cameras.

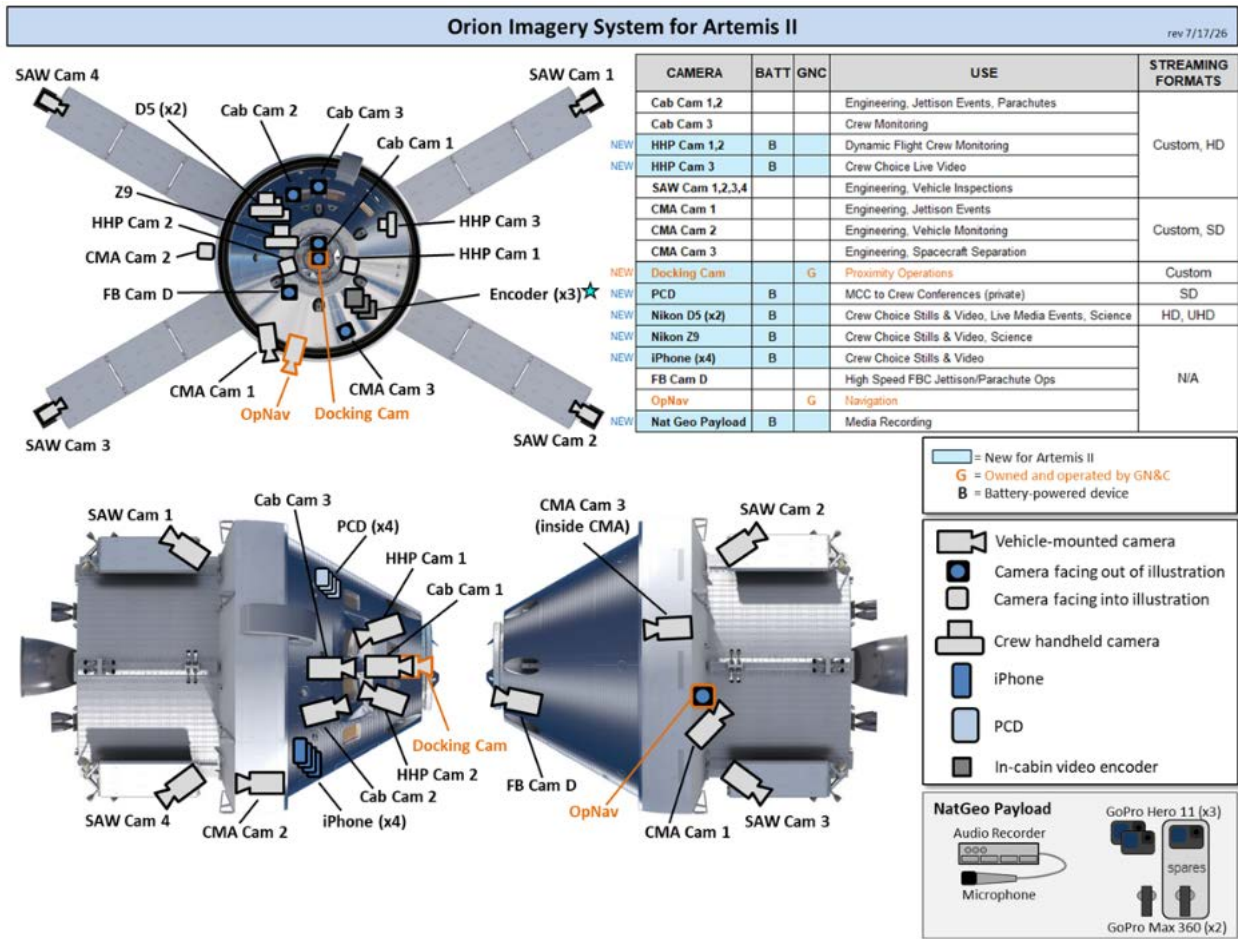


FIGURE 2: ORION VEHICLE CAMERA LOCATION SUMMARY

5.3.2. Orion Vehicle Cameras Observation Capabilities

Table 11 shows the technical specifications of the vehicle camera capabilities.

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TABLE 11: ORION VEHICLE CAMERA CAPABILITY

Feature	Specification for cameras that generated archival science data			
Orion Camera	CAB Cam 2	SAW Cam 2-4	DCAM*	OpNav
Camera Type	Modified GoPro Hero 4 Black	Modified GoPro Hero 4 Black	Malin Space Science Systems Custom Design (CMOS, Monochrome)	Pixelink Prometheus PL-D725MU (Monochrome)
Field of View (FOV)	Horizontal: 82° Vertical: 65°	Horizontal: 47° Vertical: 35.9°	Horizontal: 31.6° Vertical: 25.5°	Horizontal: 20.100° Vertical: 15.943 °
Focal Length	3.97 mm (Fixed)	7.24 mm (fixed)	22 mm (fixed)	35.1 mm
Sensor size	6.17 x 4.55 mm; 1.54 µm pixel	6.17 x 4.55 mm; 1.54 µm pixel	12.44 x 9.83 mm; 4.800 µm pixel	35.1 x 35.1 mm; 4.800 µm pixel
Focus Distance	15 ft	15 ft	16 m	defocused-infinity**
Aperture	f/2.8	f/2.4	f/3.5	f/2.8
Resolution	4000 x 3000 pixels	4000 x 3000 pixels	2592 x 2048 pixels	2592 x 2048 Pixels
Sensor Resolution	12 Megapixels	12 Megapixels	5.3 Megapixels	5.3 Megapixels
File Format	MP4/JPG	MP4/JPG	H.264 (with custom metadata)	TIF
Storage Media	Internal microSD card	Internal microSD card	None on camera; data stored on CFC	CMA Camera Controller
Data Transfer	File transfer to CMCC	File transfer to CMACC	File transfer to CFC to CMCC	File transfer to CMCC***
Video	Live: Yes / Recorded: Yes	Live: Yes / Recorded: Yes	Live: Yes / Recorded: Yes	N/A
Audio	Live: None / Recorded: Yes	Live: None / Recorded: Yes	N/A	N/A
Connectivity	WiFi enabled	WiFi enabled	Ethernet	USB3 to the CMA Camera Controller, Ethernet from Camera Controller to OUN switches

*DCAM reference: <https://www.msss.com/files/DCAM.pdf>

**OpNav does not generate a crisp image, the focus is intentionally soft for state vector calculations

***OpNav camera directly stores its files on the CMACC. The only “file transfers” are either for downlink or to copy CMACC contents over to the CMCC at the end of the mission.

5.4. ORION FLIGHT DYNAMICS

The Orion vehicle is a mission asset that establishes crew position and attitude which impacts all other

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sensing platforms described in this document. When, where, and in what orientation are critical aspects to contextualize science mission data. The Orion vehicle carries a suite of sensors used to reconstruct location and attitude information such three Orion Inertial Measurement Units (OIMUs), two Global Positioning System Receivers (GPSRs) with their associated antennae, and two Star Trackers (STs). The OIMUs provided the essential sensed accelerations and high-rate gyroscope data necessary for propagating translational and rotational states. The GPSRs furnished pseudorange data used for updating position and velocity state estimates during ascent, Earth orbit, and reentry. The Star Trackers were critical for characterizing the spacecraft's attitude profile, providing the orientation benchmark for the translational estimation.

5.4.1. Orion Flight Dynamics Description

The reconstruction of the Orion Best Estimated Trajectory (BET) involves a complex arrangement of post-processing and integration of multiple sensors. These results are crafted by the Orion MODE team, and they have published a series of papers describing their processes. Rather than attempting to recreate this information, those references are provided below:

- M.J. Gualdoni, K.C. Ward, D.A. Kelly, G. N. Holt and A. Brown, “Orion Artemis I (A-1) Best Estimated Trajectory Development,” Annual AAS Guidance and Control Conference, No. AAS 23-330, 2023.
- G. N. Holt and A. Brown, “Orion Exploration Flight Test 1 (EFT-1) Best Estimated Trajectory Development,” Annual AAS Guidance and Control Conference, No. AAS 16-117, 2016.

5.4.2. Orion Flight Dynamics Observation Capabilities

The BET file was generated by the Orion MODE team which was used by the PDS NAIF Node to create the appropriate SPICE information for archiving. We refer the reader to the detailed documentation associated with the archived products for a more detailed description of the data.

5.5. PORTABLE COMPUTING DEVICE (PCD)

The primary objectives of the PCD were 1) to record audio recordings of crew observations (as captured by the Peltor Headset described in Section 5.5.2.3), 2) record handwritten crew notes/observations, 3) serve as an imagery relay so that imagery can be downlinked during the mission to the flight control team and 4) provide the Lunar Targeting Plan (LTP) to support lunar observations.

5.5.1. Portable Computing Device (PCD) Description

The Microsoft Surface Pro 5 (Model 1796) was certified by the Orion program as the primary Portable Computing Device (PCD) for crew support. The hardware configuration features an Intel Core i5 processor, 8GB of RAM, and a 256GB internal SSD, supplemented by a pre-installed 256GB microSDXC card and an external 256GB thumb drive. The 12.3-inch PixelSense display provides a resolution of 2736 x 1824, powered by a 45-watt-hour lithium-ion polymer battery. To meet flight requirements, the units undergo physical hardening, including the application of Teflon or Kapton tape to sharp edges, the installation of screen protectors, and the addition of Velcro backing for modular mounting within the cabin. Power is maintained via a 120VDC Power Supply Assembly (PSA), known as the "Cobalt Brick,"

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which uses a trim resistor to regulate output to a constant 15VDC.

The system operated on a 64-bit Windows 10 environment with a specialized software load developed by the Exploration Software for Crew Operations (ESCO) team, supporting mission-critical tasks such as medical support, imagery management, and file telemetry. Connectivity is managed through a suite of accessories including a USB-to-Ethernet adapter, Bluetooth peripherals, and an Orion-specific Wireless Access Point (WAP) configured to 5GHz to optimize the cabin's radio frequency environment.

5.5.2. Portable Computing Device (PCD) Observation Capabilities

The primary capabilities of the PCD are summarized below.

5.5.2.1. Microsoft OneNote for written crew observations

Microsoft OneNote is a cross-platform, multi-user digital notebook application designed for the capture, organization, and synchronization of unstructured data. Unlike traditional word processors, OneNote utilizes a hierarchical "notebook-section-page" architecture and a free-form canvas that allows users to place text, ink, images, and embedded files at any coordinate within the interface. From a technical standpoint, the software acts as a local and cloud-integrated database that supports real-time collaborative editing through Differential Sync (only syncing changes rather than the entire file) and provides robust Optical Character Recognition (OCR) for both printed text and handwritten digital ink.

OneNote served as a primary tool for personal logs and shared mission notes. Its integration with the Microsoft Graph API allowed programmatic data retrieval and automation, while its offline-first architecture ensures that data remains accessible and editable even during loss-of-signal (LOS) periods.

5.5.2.2. Microsoft Audio Recorder for verbal crew observations

The built-in Voice Recorder (renamed to Sound Recorder in later Windows 10/11 iterations) on the Microsoft Surface Pro 5 is a Universal Windows Platform (UWP) application designed for high-fidelity audio capture via the device's integrated dual-microphone array. The application utilizes the Windows.Media.Capture namespace to interface with the hardware, providing a streamlined pipeline for recording, trimming, and cataloging audio data. It is specifically optimized for low-overhead operation, ensuring that audio acquisition does not compete for CPU resources during concurrent high-demand mission tasks.

From a technical perspective, the application records natively in the MPEG-4 Part 14 (.m4a) container, typically encoded using the Advanced Audio Coding (AAC) codec. This format provides an ideal balance between high-fidelity acoustic reproduction and storage efficiency, which is critical for long-duration recordings. The software includes "Marking" functionality, allowing users to insert timestamps into the metadata during live recording to facilitate rapid post-mission analysis. On the Surface Pro 5, the application leverages the system's digital signal processing (DSP) to minimize ambient noise and prioritize vocal frequencies, making it suitable for capturing crew logs or diagnostic acoustic data in the cabin environment. Table 12 shows the technical specifications of the recorder application on the PCD.

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TABLE 12: AUDIO RECORDING APPLICATION ON THE PCD

Feature	Specification
Application Type	Universal Windows Platform (UWP)
Default File Format	.m4a (MPEG-4 Part 14)
Audio Codec	AAC (Advanced Audio Coding)
Sampling Rate	44.1 kHz or 48 kHz (Hardware dependent)
Bitrate	Variable; typically, 128 kbps to 256 kbps
Channels	Stereo (via dual-microphone array)
Input Source	Integrated dual-microphone; 3.5 mm jack; Bluetooth
Key Features	Non-destructive trimming; Timestamping (Markers)
Storage Location	User Profile > Documents > Sound Recordings
Integration	Automated sync via OneDrive/OUN (if configured)

5.5.2.3. Peltor Headset for verbal crew observation

The Peltor headsets were primarily used to capture local crew audio descriptions of their observations. These devices were connected to the PCDs of the crew so that their conversations were recorded. These recorded observations were an important and complementary component of the camera imagery captured during observation sessions.

The 3M™ PELTOR™ ComTac™ VI NIB (Natural Interaction Behavior) is a specialized tactical communication and hearing protection system designed for high-noise, mission-critical environments. Its primary technical innovation is the NIB Technology, which enables short-range, full-duplex wireless communication. This feature utilizes an integrated magnetic induction field to automatically detect and connect up to four talkers and 60 listeners within a 10-meter radius, allowing for "face-to-face" digital communication without the need for an external radio or intercom system.

Beyond its wireless capabilities, the headset features Mission Audio Profiles (MAP), which allow the user to select from five localized environmental listening settings (Observation, Patrol, Conversation, Comfort, and Mic-off). These profiles utilize advanced digital signal processing (DSP) to enhance situational awareness by amplifying low-level ambient sounds while simultaneously providing instantaneous protection against impulse noises, such as percussive sounds or engine roar, by compressing them to a safe decibel level. The hardware is ruggedized to MIL-STD-810G standards and incorporates a noise-canceling boom microphone that is optimized for speech intelligibility in extreme acoustic environments. Table 13 shows the technical specifications and capabilities of the Peltor Headset.

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TABLE 13: AUDIO RECORDING HEADSET CONNECTED TO THE PCD

Feature	Technical Specification
Wireless Protocol	NIB (Natural Interaction Behavior); Full-duplex magnetic induction
NIB Range	~5 to 10 meters (optimized for 3 to 5 meters)
Communication Type	Voice-activated (VOX) or Push-to-Talk (PTT)
Hearing Protection	Environmental (Level-dependent) with Electronic Compression
Attenuation (NRR)	Typically 20–23 dB (depending on mounting/ear cushion type)
Audio Profiles (MAP)	5 Settings: Observation, Patrol, Conversation, Comfort, Mic-off
Microphone Type	MT73 Dynamic Noise-Canceling (Waterproof)
Durability Standard	MIL-STD-810G (Environmental) / MIL-STD-461G (EMI/EMC)
Power Source	2x AAA Batteries (Operating life: ~30 to 50 hours)

5.6. HOBO MX1101 SENSOR

The objective of capturing temperature, humidity, dew point data was to characterize the storage compartments (Lockers D/E) within Orion throughout the A2 trajectory. In doing so, this information provides baseline environmental data necessary for the samples of the lunar surface, which are to be returned in these same lockers for future Artemis missions.

5.6.1. HOBO MX1101 Description

The HOBO hardware with unique ID's 1104 and 1105 consisted of a self-contained, battery-operated logger (56g) featuring an integrated thermistor for temperature and a capacitive sensor for relative humidity. The instrument's primary function for Artemis II was autonomous data logging to its 128 KB internal memory, which can store over 84,000 measurements, sufficient for the duration of the 10-day mission. The loggers were mounted to the interior Lockers D and E. The units are powered by two user-replaceable AAA 1.5 V alkaline batteries, providing a self-sustaining power source independent of the Orion spacecraft. To meet mission requirements, the loggers were configured for "Wrap when full" memory modes (*i.e.*, if memory is full, overwrite beginning of data log) ensuring data preservation until the capsule is recovered. It is expected that the data loggers have memory of approximately 27 days of data, which is anticipated to meet the full length of start of data logging through recovery.

5.6.2. HOBO MX1101 Observation Capabilities

Table 14 summarizes the technical specifications and settings to be used during Artemis II.

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TABLE 14: HOBO MX1101 CAPABILITY

Category	Parameter	Specification Detail
Temperature Sensor	Range	-20° to 70°C (-4° to 158°F)
	Accuracy	±0.21°C from 0° to 50°C (±0.38°F from 32° to 122°F)
	Resolution	0.024°C at 25°C (0.04°F at 77°F)
	Drift	<0.1°C (0.18°F) per year
	Response Time	7:30 minutes in air moving 1 m/s (2.2 mph)
Relative Humidity (RH) Sensor	Range	1% to 90% (non-condensing)
	Accuracy	±2% from 20% to 80% typical; max ±4.5% (incl. hysteresis)
	Resolution	0.01%
	Drift	<1% per year typical
	Response Time	20 seconds to 90% in airflow of 1 m/s (2.2 mph)
Data & Memory	Memory Capacity	128 KB (approx. 84,650 measurements maximum)
	Logging Rate	1 minute interval
	Logging Modes	Fixed interval (normal, statistics)
	Memory Modes	Override oldest data until stopped
	Download Time	~60 seconds for full memory via Bluetooth
Physical	Dimensions	3.66 x 8.48 x 2.29 cm (1.44 x 3.34 x 0.9 in.)
	Weight	56 g (1.98 oz)
	LCD Display	Visible from 0° to 50°C (32° to 122°F)
	Rating	IP50 (Indoor use, limited dust protection)
Power	Battery Type	Two AAA 1.5 V alkaline batteries (user-replaceable)
	Battery Life	1 year (typical at 1-minute logging interval)
Operation	Start Modes	Immediate, Push Button, Date & Time, or Next Interval
	Stop Modes	Memory Full, Push Button, Date & Time, or Set Duration
	Time Accuracy	±1 minute per month at 25°C (77°F)

Figure 3 below shows the orientation of where the sensors were mounted. Data Logger SN 1104 was in Locker E Bag L_011 for the entire duration of the mission (circled in blue). Data Logger SN 1105 was in Locker D Bag L_022 for launch (circled in blue) and was moved to Locker F Bag R_027 (circled in red) on Flight Day 09 and remained there for the rest of the mission.

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FIGURE 3: HOBO DATA LOGGER LOCKER LOCATION SCHEMATIC WITHIN ORION

5.7. HYBRID ELECTRONIC RADIATION ASSESSOR (HERA)

The Hybrid Electronic Radiation Assessor (HERA) is the designated flight radiation detector for the Orion spacecraft, designed to serve as the primary ambient radiation monitoring instrument for exploration-class missions. Its primary objectives include the comprehensive characterization of the space radiation environment within the crew cabin and the provision of real-time telemetry—including science, display, and Caution & Warning (C&W) messages—to both the vehicle and mission control. This data is used to validate the Orion's shielding design for large solar-particle events and to ensure that astronaut exposure remains within the career limit of 600 mSv. By utilizing its distributed sensors, HERA allows for the comparison of radiation doses across differently shielded locations, such as the "storm shelter" and the general crew cabin, to inform future mission designs. For more technical details regarding the HERA instrument and its underlying technology the following documents are referenced below:

- Primary Technical Specification: Stoffle, N. N. et al. (2023). "HERA: a Timepix-based radiation detection system for Exploration-class space missions." *Life Sciences in Space Research*, 39, 59–65. <https://doi.org/10.1016/j.lssr.2023.03.004>
- Timepix Core Technology: Llopart, X., Ballabriga, R., Campbell, M., Tlustos, L., & Wong, W. (2007). "Timepix, a 65k programmable pixel readout chip for arrival time, energy and/or photon counting measurements." *Nuclear Instruments and Methods in Physics Research Section A*, 581, 485–494. <https://doi.org/10.1016/j.nima.2007.08.079>
- Detector Evolution: Ballabriga, R., Campbell, M., & Llopart, X. (2020). "An introduction to the Medipix family ASICS." *Radiation Measurements*, 136, 106271. <https://doi.org/10.1016/j.radmeas.2020.106271>
- Calibration Methodologies: Kroupa, M., Campbell-Ricketts, T., Bahadori, A., & Empl, A. (2017). "Techniques for precise energy calibration of particle pixel detectors." *Review of Scientific Instruments*, 88, 033301. <https://doi.org/10.1063/1.4978281>
- Stoffle, N. N., Gaza, R., Matthiä, D., Laramore, D., Lehti, J., Campbell-Ricketts, T., ... & Berger, T. (2023). HERA: A Timepix-based radiation detection system for Exploration-class space missions. *Life Sciences in Space Research*, 39, 59–65. <https://doi.org/10.1016/j.lssr.2023.03.004>
- George, S. P., Gaza, R., Matthiä, D., Laramore, D., Lehti, J., Campbell-Ricketts, T., ... & Berger, T. (2024). Space radiation measurements during the Artemis I lunar mission. *Nature*, 634, 48–52. <https://doi.org/10.1038/s41586-024-07927-7>

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5.7.1. HERA Description

The NASA Hybrid Electronic Radiation Assessor (HERA) is the primary flight radiation detection system integrated into the Orion spacecraft, consisting of a central Processing Unit (HPU) and two distributed Sensor Units (HSU1 and HSU2). At the technical core of each sensor is a Timepix hybrid pixel detector, which features a 256 x 256-pixel matrix with a 55- μm pitch, providing a total active sensing area of approximately 2 cm^2 . This architecture is unique in that each individual pixel contains a full electronic pulse processing chain—comprising a preamplifier, shaper, threshold discriminator, and analog-to-digital converter—enabling high-fidelity, per-particle tracking. The complete system is optimized for the rigorous constraints of deep-space flight, weighing approximately 1.5 kg and consuming only 8 W of power while delivering minute-by-minute telemetry and storing raw frame data on an internal 8-GB drive.

The HERA’s analytical capabilities are defined by its ability to resolve the complex composition of space radiation, measuring track geometry (including polar and pitch angles), track length, and deposited energy to calculate the specific stopping power (dE/dx) of traversing particles. The system is calibrated across an expansive energy spectrum, ranging from 5-keV X-rays to heavy ions reaching 500 $\text{keV } \mu\text{m}^{-1}$, and is acceptance-tested to maintain accuracy during high-dose-rate events, such as solar-particle flares, at rates up to 10 mGy min^{-1} . By distributing sensors across distinct shielding environments—including the heavily protected storm shelter (HSU1) and the crew cabin (HSU2)—HERA provides the critical data necessary to validate vehicle shielding designs and manage the 600 mSv astronaut career dose limit during Artemis lunar missions.

5.7.2. HERA Observation Capabilities

Table 15 shows the basic detection capability of the HERA system. This information is included for completeness and the data records from the HERA device will eventually be archived in the PDS. The Artemis LST, however, is not responsible for that specific data archival work.

TABLE 15: RADIATION CAPABILITY

Feature	Specification
Number of Detectors	3 sensors (1 Processing Unit [HPU], 2 Sensor Units [HSU1, HSU2])
Sensor Technology	Timepix hybrid silicon pixel detectors
Detector Resolution	65,536 pixels (256x256) per sensor unit
Detector Geometry	55- μm pixel pitch; 1.4x1.4 cm active area $\sim 2 \text{ cm}^2$
Measurement Capabilities	In situ dose, Linear Energy Transfer (LET) spectra, track geometry (polar/pitch angles), track length, deposited energy, and stopping power (dE/dx)
Detection Range (LET)	5-keV X-rays up to heavy ions of 500 $\text{keV } \mu\text{m}^{-1}$
Dose Rate Sensitivity	10 $\mu\text{Gy min}^{-1}$ to 10 mGy min^{-1} (acceptance tested range)
Time Resolution	1-minute (minute-wise) cadence for telemetry and processed spectra
Data Rate (Telemetry)	Minute-wise cadence transmitted to Orion vehicle and mission control
Data Rate (Maximum)	High-resolution raw frame data captured for post-mission analysis
Onboard Storage	8-GB internal storage drive
Power Consumption	8 W
Instrument Mass	$\sim 1.5 \text{ kg}$ total system weight

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6.0 DATA MANAGEMENT

This section provides a detailed description of the planned archival science data products, data flow, and the management processes during and post-mission. Relevant NASA Moon-to-Mars (M2M) governing documents describing parts of the overall Artemis mission data management processes relevant to Artemis II and science data archive include:

- During the Mission Data Flow: See M2M-40032-ANX04-Artemis II M2M Utilization Imagery plan for Artemis II Section 7.4 for how data during the mission flows to the Artemis II Lunar Science Team
- Post-Mission: For Distribution and Release of Utilization Imagery, see Section 8 of See M2M-40032-ANX04-Artemis II
- For Storage, Retention, and Archiving, see Section 9 of M2M-40032-ANX04-Artemis II

6.1. SCIENCE DATA PRODUCTS SUMMARY

This section provides summary tables of data products for each instrument and data level. The data levels used are defined in Section 4.3, Table 5.

6.1.1. Science Data Products Data Level Descriptions

The science data products produced by each instrument or system are summarized in Table 16. Where applicable, the data products included the original source data delivered to the Lunar Science Team from Mission Operations. Crew Handheld Camera products were archived as PDS4 “native” products, reserved for raw, original data files with formats that are not a standard PDS4 array or table. For Orion Vehicle Camera products, these source data were archived as either browse or supplemental products depending on format type and if they are not in standard PDS4 format. The standard PDS4 “observational product” was generated by reformatting from the native or source format to comply with the basic formats allowed by the PDS4 information model. Raw Audio files from the PCD and Houston voice loops were archived in their PDS4-compliant source format alongside derived transcript files. Crew annotations of science observations recorded on the PCD were archived as documents to crew observation files. Any calibration information available to the Lunar Science Team was collected and archived in a Calibration data collection and described in associated User Guides.

Derived data potentially included archival quality image mosaics and possible other products generated by the Lunar Science Team. Any Orion flight dynamics information such as spacecraft and instrument geometry information available to the Lunar Science Team were generated as SPICE kernels by the Lunar Science Team and delivered to the PDS NAIF node. No auxiliary data products are planned.

Except for radiation data, the Lunar Science Team was responsible for generating and delivering all products listed in Table 16 to the PDS for archiving and public release. The team delivered all science products to the appropriate PDS Nodes. Radiation data will be disseminated to the PDS Planetary Plasma Interactions (PPI) Node on a separate timeline from the details outlined in this OSDMP and will be performed by SRAG personnel. We acknowledge in this OSDMP radiation data will be available

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eventually in the PDS for use by the scientific community.

TABLE 16: SCIENCE DATA PRODUCT DATA LEVEL DESCRIPTIONS

Instrument / System	Data Level	Archived PDS Data Format	Brief Description	Source
Crew Handheld Camera	Raw (Source Product)	.nef	Source Data Files: Still images and Audio	NASA JSC OESC
		.wav		
Crew Handheld Camera	Raw (PDS Observational Product)	.tif	Reformatted to PDS standards: Still Images	Lunar Science Team
		.wav	Audio	Lunar Science Team
Crew Handheld Camera	Processed	.tif	Images Example: Processed data from uncalibrated images	Lunar Science Team
Orion Vehicle Cameras	Raw (Source Product)	.jpg (SAW Cam 1-4, CAB Cam 2)	Source Data Files: Still images and video	NASA JSC OESC
		.tif (OpNav)		
		.mp4 (SAW1-4 and CAB2)		
		.png (DCAM)		
Orion Vehicle Cameras	Raw (PDS Observational Product)	.tif (SAW Cam 1-4, CAB Cam 2, OpNav, DCAM)	Reformatted to PDS standards: Still Images and Video	Lunar Science Team
		.mp4 (SAW Cam 3)		
Orion Flight Dynamics	Derived	SPICE Kernels	Orion spacecraft trajectory and attitude (ephemeris); camera orientation, locations, and geometric parameters; and other related data needed to determine observation geometry	Orion MODE Team
Portable Computing Device	Raw	.m4a	Audio files from crew voice recordings	NASA JSC OESC
Portable Computing Device	Derived	.pdf	Digital written crew notes	NASA JSC OESC
Portable Computing Device	Derived	.txt, .srt	Corrected audio transcripts	Lunar Science Team
Houston Voice Loops	Raw	.mp3	Audio recordings from mission Orion to Earth loop, SCI Plan and SCI Coord Loops	Houston Voice, EMSS Talky Bot
Houston Voice Loops	Derived	.txt, .srt, .pdf	Corrected audio transcripts	Lunar Science Team
Radiation	Archive details to be shared by SRAG to the PDS PPI Node			
HOBO	Raw	.txt	Temperature , °C, Relative Humidity, %, Dew Point , °C measurements	M2M ExOps

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6.1.2. Science Data Parameters and Timeline

The product key parameters, including data level, time resolution, processing cadence and estimated volume of data are provided in Table 17. For all data in Table 17, This OSDMP establishes that data will be made publicly accessible no later than 6 months post-splashdown.

TABLE 17: SCIENCE DATA PRODUCT KEY PARAMETERS AND DATA RELEASE TIMELINE

Instrument / System	Data Level	Time Resolution	Mission Flight Day (FD)	Processing Cadence	Estimated Total Data Volume
Crew Handheld Camera	Raw (Source Product)	variable	FD 1 to 10	During Mission, Post-Mission	~210 GB
Crew Handheld Camera	Raw (PDS Observational Product)	variable	FD 1 to 10	Once Post-Mission	~500 GB
Crew Handheld Camera	Processed	variable	FD 1 to 10	During Mission, Post-Mission	~1,500 GB
Orion Vehicle Cameras	Raw (Source Product)	variable	FD 1 to 10	During Mission, Post-Mission	~1.2 GB (stills) ~600 GB (video)
Orion Vehicle Cameras	Raw (PDS Observational Product)	variable	FD 1 to 10	Post-Mission	>1 GB (stills) <600 GB (video)
Orion Flight Dynamics	Derived (SPICE Kernels)	variable	FD 1 to 10	Post-Mission	<1 GB
Portable Computing Device	Raw	variable	FD 1 to 10	During Mission, Post-Mission	0.7 GB
Portable Computing Device	Derived	variable	FD 1 to 10	During Mission, Post-Mission	<100 MB
Houston Voice Loops	Raw	variable	FD 1 to 10	During Mission, Post-Mission	~2 GB
Houston Voice Loops	Derived	variable	FD 1 to 10	During Mission, Post-Mission	<10 MB
Radiation	Archive details to be shared by the SRAG to the PDS PPI Node				
HOBO	Raw	1-minute intervals	FD 1 to 10	Post-Mission	<300 KB

6.1.3. Science Data Metadata

All data and metadata in the science archive follow PDS4 standards (see Section 6.5). Metadata are also described in accompanying User Guides provided in the archive.

Metadata includes information collected at data acquisition and extracted for the generation of PDS4 labels and those derived from other sources by the Lunar Science Team. Derived metadata for images may include (if applicable and available):

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- Mission elapsed time
- Any required time corrections or offsets
- Crew photographer or speaker
- Primary and secondary lunar or solar system target or feature
- Pointing and field of view and other geometric parameters determined from SPICE related information
- Notes or flags on data quality
- References to associated data files (e.g., mosaic image set or image-audio pairs)

6.1.4. Data Quality

Section 6.5 describes the plans and processes used by the Lunar Science Team for assessing data product quality, including how data quality information is conveyed to the data repository and users.

6.1.5. Other Data Products

Other data products that were archived in the PDS include Houston Voice loop audio loop recordings and transcripts that were relevant to science observations (Table 16). The PDS archive also contained mission level documentation and Lunar Science Team reports that are further described in Section 6.5.

6.2. GROUND SYSTEM

6.2.1. Deep Space Network (DSN)

The DSN consists of an international array of radio antennas and, among other functions, communicates with interplanetary spacecraft. The DSN is operated by JPL and consists of three facilities spaced at approximately equidistant longitudes around the world. These sites are located at Goldstone, near Barstow, California; near Madrid, Spain; and near Canberra, Australia. With the Near Space Network (NSN), it is the responsibility of the DSN to provide the uplink for commands sent from the Mission Control Center-Houston (MCC-H) at JSC (MSFC is backup MCC) to the spacecraft and downlink science and engineering data from the spacecraft to the ground for delivery to JSC Institutional Services.

6.2.2. Near Space Network (NSN)

The NSN, led by NASA's SCaN (Space Communications and Navigation) Program, provides missions within 1.25 million miles of Earth with communications and navigation services using space relays and a blend of government and commercial antennas. With the DSN, it is the responsibility of the NSN to provide the uplink for commands sent from the MCC-H to the spacecraft and downlink science and engineering data from the spacecraft to the ground for delivery to JSC Institutional Services.

6.2.3. Optical Ground Stations

The Artemis II mission tested optical communication systems between the Orion spacecraft, ground stations and then to the Mission Control Center. This capability supported data downlink capabilities during the mission as a test demonstration for future mission development.

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6.2.4. Mission Control Center

The Mission Control Center-Houston (MCC-H) at JSC hosts console positions to support real-time flight operations. The MCC-H functions that support science data flow and science target and command handling include the Flight Operations Directorate (FOD) Command and Data Handling (CDH) and Flight Dynamics Officer (FDO) teams. The Science Evaluation Room (SER) also sits within MCC-H.

6.2.5. JSC Institutional Services

JSC Institutional Services support the processing, hosting, and delivery of source data to the Lunar Science Team. They consist of systems and teams outside of but supporting the MCC-H, including OESC, VCC, and ISAL teams as described in Section 4.2.

6.2.6. Lunar Science Team

The Lunar Science Team involved in data handling and management during the mission consists of the Science Evaluation Room (SER) located within the MCC-H and the Science Mission Operations Room (SMOR) located at JSC in Building 36. The SMOR is the primary interface with JSC Institutional Services for science data management and processing, supporting the SER and larger teams. Post-mission the Lunar Science Teams operated at their respective NASA Centers. Data was accessed by the Lunar Science Team through a restricted Science Data Server. For Artemis II, the Lunar Science Team is leveraging the NASA Enterprise Box capabilities for data collaboration and management.

6.3. DATA FLOW

6.3.1. Overview of End-to-End Data Flow

The data flow to/from the spacecraft and the MCC-H, JSC Institutional Services, and Lunar Science Team and finally to NASA Archives is depicted in simplified form in Figure 4. The following sections provide a high-level description of each segment of the data flow.

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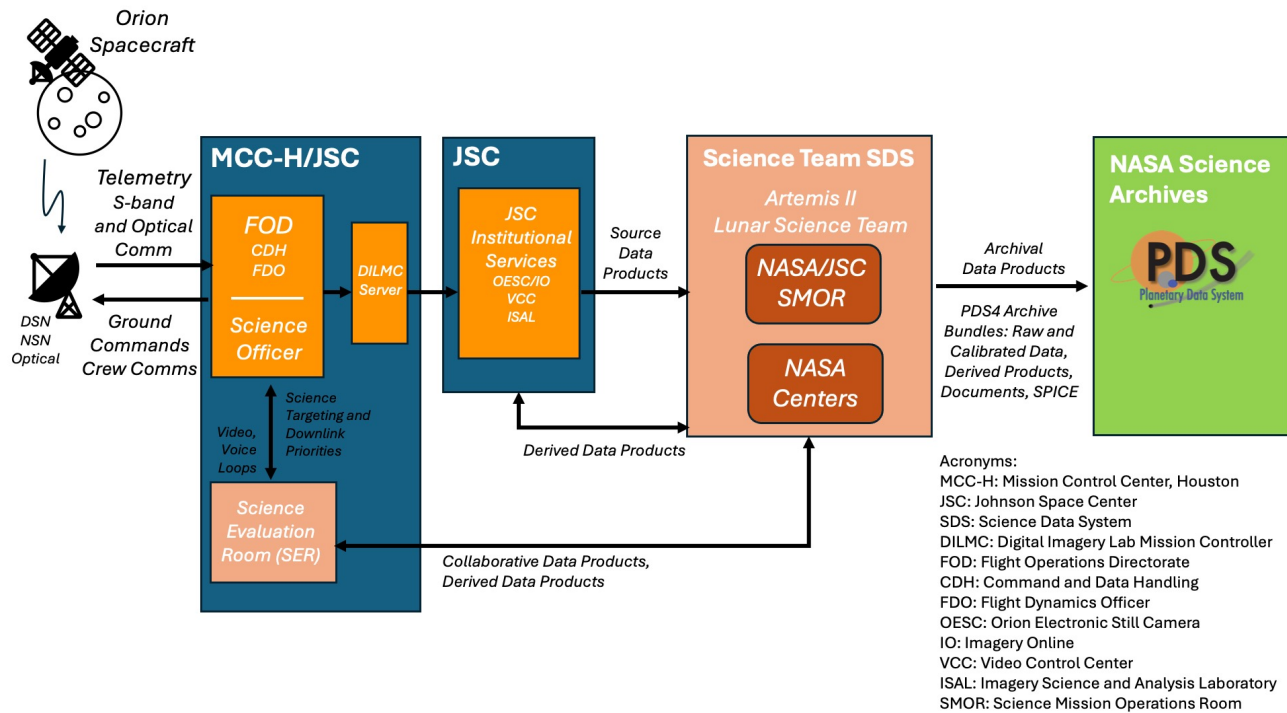


FIGURE 4: ARTEMIS II END-TO-END SCIENCE DATA FLOW

6.3.1.1. Data Flow to Spacecraft

Science observation and targeting plans, crew communication and instrument and spacecraft commands were coordinated and passed through the appropriate channels in the MCC-H to be uplinked to the spacecraft and instrument controllers. The main product from the Lunar Science Team that defined the lunar targets during lunar flyby is the Lunar Targeting Plan (LTP). The primary role of the LTP was to support the Artemis II crew during the lunar flyby to guide them in the acquisition of measurements and observations in support of the mission's lunar science objectives. The final LTP was a software package that was uplinked to the crew members and read on their PCDs while in flight and included an overview, timeline, geography review, target pages, annotation capabilities, and a user guide for their identified lunar flyby phase. A more complete description can be found in the Science Operations Plan.

During the mission, downlink priorities were assembled and communicated from the Lunar Science Team through appropriate channels in the Mission Control Center. Downlink priorities were provided as data request files to CDH, which determined the files to pull from the PCD and downlink from the spacecraft and camera controllers.

6.3.1.2. Data Flow from Spacecraft

Data packets flowing from the spacecraft were downlinked via S-band (DSN or NSN) or optical communications ground stations to the Mission Control Center. The data was then processed into raw

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source data products and hosted on the Digital Image Laboratory Mission Controller (DILMC) for access by JSC Institutional Services. JSC Institutional Services then distributes the data to the Lunar Science Team through an internal network to the Science Data Server (SDS), the Imagery Online interface, and restricted network servers. Data downlink, processing and transfer to JSC Institutional Services and the science data server were expected to take up to hours to days during the mission depending on data rates and bandwidths.

Data recorded and stored by the crew through handheld cameras and PCDs were also returned to Earth by the crew at the end of the mission on digital storage cards. These storage cards will be transferred to JSC Institutional Services for processing and were provided to the Lunar Science Team through their Science Data Server. Once on the Science Data Server, the Lunar Science Team ran their data processing pipelines within the NASA network and servers to produce archival data products that are then delivered to the Planetary Data System and other NASA archives via authenticated https or other agreed upon data transfer methods. The schedule for delivery to the PDS is described in Section 6.1.

A summary of the data handling, timeline, and transfer method from the spacecraft to the Lunar Science Team and public archives is provided in Table 18.

TABLE 18: DATA FLOW TIMELINE

Flow	Data Product	Timeline	Transfer Method
Spacecraft to MCC	Telemetry and data packets	During Mission	S-band and Optical Communication Ground Stations
MCC to JSC Institutional Services	Source Data Products	During Mission	Restricted Network
JSC Institutional Services to Lunar Science Team	Source Data Products (catalogued, reviewed, and renamed)	During Mission and Post-Mission	Restricted Network and Authenticated Science Data Server
Science Operations to PDS	Archival Data Products	Post-Mission	Authenticated Science Data Server or agreed upon transfer method

6.3.2. Artemis II Downlink Expectations

During the Artemis II mission, downlinked data occurred in one of two ways: via S-Band or via Optical Communications as summarized below:

- S-Band rates are a function of overall vehicle bandwidth
 - Ex: 2 Mbps allows for a downlink rate of ~1300 kbps (1.3 Mbps)
 - When in uncoded comm configurations, rates can be higher
- OpCom allows for downlink rates of up to 60 Mbps
 - Windows limited to ground stations and vehicle attitude constraints
 - When available can downlink ~25 GB in one hour

Post-splashdown, the memory cards from the crew handheld camera were relocated back to NASA JSC where institutional services processed and made available the full data captured during the mission to the Artemis II Lunar Science Team.

In-Flight Summary

Figure 5 summarizes the information flow for imagery and PCD data sources.

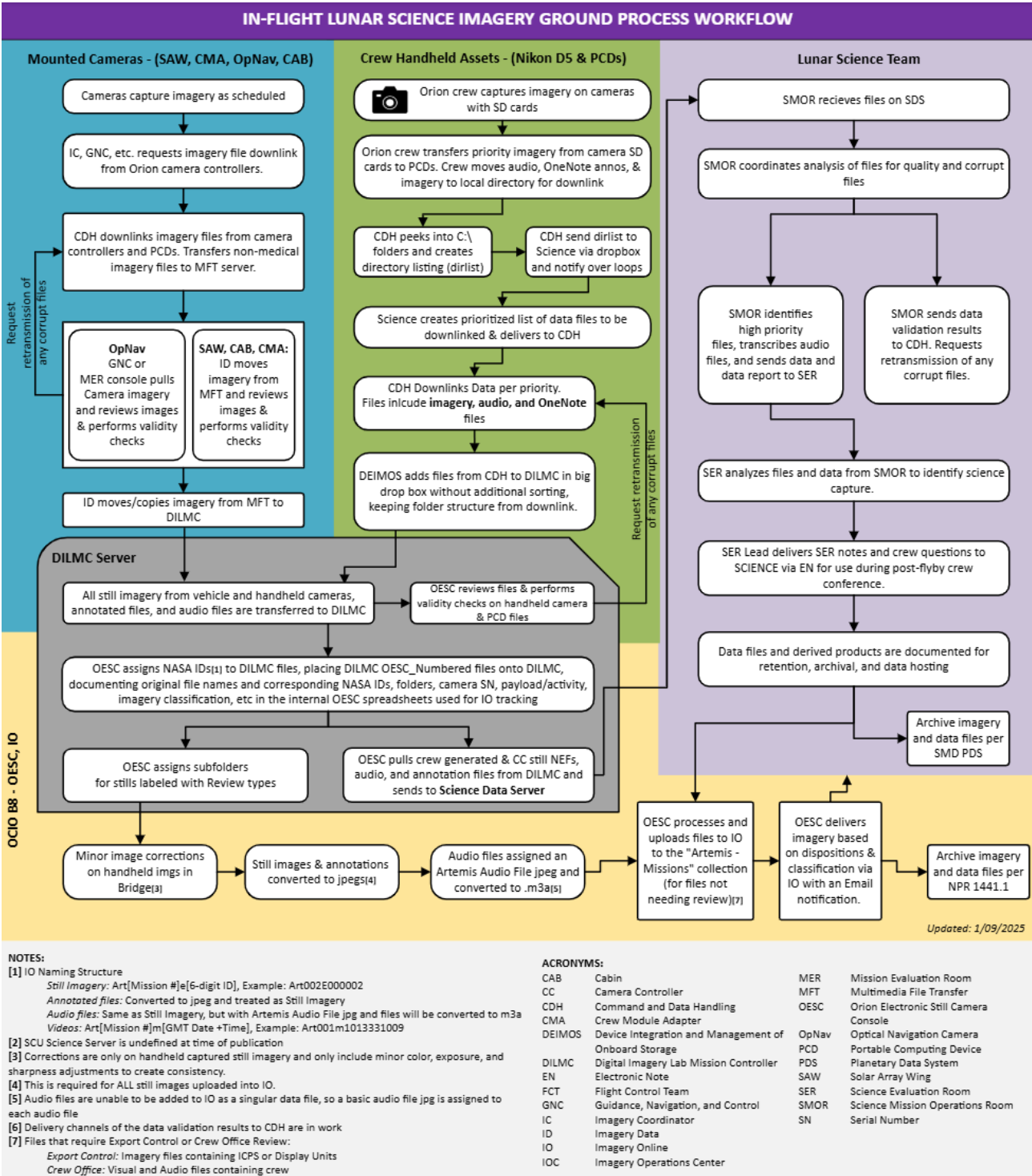


FIGURE 5: IN-FLIGHT DATA ACQUISITION AND ROUTING SUMMARY

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6.3.3. Post-Mission Summary

Images that were not downlinked during flight were processed post-mission once files were retrieved from the spacecraft. After retrieval, imagery hardware, such as the PCDs, handheld cameras, and memory cards, were delivered to JSC's Building 8 imagery team. Once OCIO Building 8 received the imagery hardware, the still imagery files and recorded audio were processed through OESC, assigned image IDs, and added to Imagery Online. All video files were delivered to Video Control Center (VCC) for processing. Imagery was processed, reviewed, and distributed as quickly as possible after receiving the imagery hardware.

Still imagery files received were tracked on a spreadsheet by the OESC lead called ARTXX Breakdown, stored on the Photo Operations SharePoint site. The sheet detailed the disposition of imagery and metadata collected to be used for cataloging. Motion imagery files received are handled by the Mission Video team using a similar spreadsheet and process.

Environmental data from the HOBO sensors were stored locally on the vehicle and returned post-splashdown. Radiation data was captured on board and managed via SRAG.

6.3.4. Naming Conventions for NASA IDs for Imagery and Video

This section describes the naming conventions applied to the NASA data upon receipt of the data and what the Lunar Science Team will receive. IO Naming Structure will be the following:

- Still Imagery: art[Mission #]e[6-digit ID], Example: art002e000002
- Annotated files: Converted to jpeg and treated as Still Imagery
- Audio files: Same as Still Imagery, but with an "a" separator" and Artemis audio files will be converted to m3a
- Videos: Art[Mission #]m[GMT Date +Time], Example: art001m1013331009

6.4. DATA PROCESSING

Data processing was conducted primarily by the Lunar Science Team after receiving the source data. Processing was conducted on local machines and the Science Data Server, which was behind the mission and NASA firewall and restricted to the Lunar Science Team. Data processing on these machines and servers involved the software pipelines for generation of any calibrated and derived data products. These systems and pipelines were also used to generate archival data products (as described in Section 6.5) to be delivered to the PDS.

6.5. DATA ARCHIVING AND ACCESS

This section describes the process for archiving data and how those data repositories may be accessed. This section describes each of the locations/repositories for science data products, any mirroring locations, and roles and responsibilities. This includes which data repository is responsible for data stewardship, storage, and dissemination during and after a mission's operation. As described in Section 1.1, this archive exists for the scientific community and broader public for freely available use and application of Artemis II mission data.

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6.5.1. Data Repository Roles and Responsibilities

The Artemis Lunar Science Team was responsible for the generation, validation, and delivery of science data and PDS4 products to the Planetary Data System. They also transferred to the Science Data Server all archives processed by the Lunar Science Team, including raw, partially processed, calibrated, and derived data, along with associated files and information for the relevant investigation, and higher-order data products as appropriate. Finally, the Lunar Science Team archived archival science data products and User Guides, describing these products and the calibration algorithms used to generate, and copies of these products will be kept in the Science Data Server for use by the team. In short, the Artemis II Lunar Science Team was responsible for the following activities:

- Produce data products in acceptable PDS format.
- Produce PDS labels with assistance from the PDS.
- Write supporting documentation.
- Organize data, labels, documentation into PDS collections and bundles.
- Validate labels using PDS-provided tools
- Participate in peer review (may be done either face-to-face or via web, email and phone).
- Make updates to the products, as necessary, based on peer review recommendations.
- Participate in delta review (if needed).
- Deliver archive packages to PDS on a pre-determined schedule.

Implementation of this data management and archive plan according to the schedule in Table 17 was coordinated through the Artemis Science Data and Archive Working Group (Artemis Sci DAWG, or DAWG). The DAWG is chaired by the Project Archive Lead who works with the investigation teams and PDS representatives, establishes and maintains an online collaboration site for the DAWG and archive tracking, coordinates timely delivery of data archives by the investigation teams to the PDS, and reports to the Project Scientist, or their designee, on archiving matters.

6.5.1.1. Planetary Data System (PDS)

The PDS was the designated point of contact for the Artemis II mission on science archive-related issues. The PDS Geosciences Node was designated as the Lead Node and was responsible for assisting the coordination of PDS activities along with the Cartography and Imaging Node and NAIF Node. The PDS worked with Artemis Lunar Science Team personnel through the DAWG to ensure that the Artemis archives are compliant with PDS4 standards and formats.

The PDS accepted validated, PDS4-compliant archives from the Artemis mission or its designees. PDS made those archives publicly available to the science, exploration and general public following the release schedule shown in Table 17. The PDS distributed Artemis archives using one or more online interfaces that allow users to access the archives by time, orbit, location, instrument(s), data type, and other relevant parameters. The PDS will ensure that the Artemis archives are protected against catastrophic loss by employing suitable backup procedures and developing and implementing a disaster recovery plan for the archive. The PDS is required to ensure the long-term preservation of the data and maintain their usability

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by following U.S. federal regulations and NASA cybersecurity requirements for secure preservation and management. The PDS develops and implements procedures for periodically ensuring the integrity of the data and for periodically updating the underlying storage technology. Further, the PDS is required to maintain one primary copy of the data with at least one backup and a copy provided for deep archiving on physical media with the National Space Science Data Coordinated Archive (NSSDCA). These efforts are in compliance with [NPD 1440.6](#), NASA Records Management, [NPR 1441.1](#), NASA Records Management Program Requirements, and [NRRS 1440.1](#), NASA Records Retention Schedules.

In short, the PDS was responsible for the following activities:

- Provide advice on PDS standards and requirements.
- Assist in designing PDS labels, if needed.
- Help to create context products.
- Provide available PDS tools and guidance on use.
- Accept the archive packages and deliveries to PDS.
- Set up and conduct a peer review (and any delta reviews, if needed).
- Verify compliance of the data archive with PDS standards and support the science team in meeting these standards.
- Integrate data into the PDS archive, including making it available on the Node website.

6.5.2. Data Storage Requirements

An estimate of instrument data storage requirements over the nominal life of the mission is provided in Table 17.

6.5.3. Data Archiving Process

This section describes the overall process and the requirements for the creation of Archival Data Products and compliance with PDS4 data standards. Radiation and Temperature/Humidity data may follow a different archiving process depending on the destination archive. The Artemis Science DAWG provided oversight on implementation of the data archiving process and ensure timely generation, validation, and delivery of archives to the PDS and other archives, where applicable.

6.5.3.1. Archive Generation

The Lunar Science Team accessed source data from JSC Institutional Services from a server that was managed by the Lunar Science Team. This server was used to generate, organize, and store archival data products. The data archive, including structure, formats and metadata labels, followed PDS4 data standards. Data archive pipeline software was developed by the Lunar Science Team and used to generate data products and labels from source data products that were compliant with PDS4 standards. Source metadata files will be formatted into PDS4 XML labels using templates that follow PDS4 Information Model XML schema. The PDS was responsible for assisting the team in PDS4 template design and reserving and assigning DOIs to the delivered and released archive.

The archive consists of multiple PDS4 bundles with collections, along with all the documentation and

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ancillary information needed to understand the data. PDS4 bundles are organized by instrument platforms (Crew and Orion bundles) or mission (mission bundles). Each bundle consists of multiple collections containing the related science raw data, calibration information, documentation, and higher order processed and derived data. The SPICE bundle complied with the standard PDS4 SPICE archive structure and was prepared using the NAIF-PDS4-BUNDLER (NPB) tool.

The PDS4 Bundles and Collections are organized as follows:

1. Crew Camera Data Bundle (Nikon D5, Z9)
 - a. Collections for Source Data, Raw, Processed Products with PDS4 labels
 - b. Sub-directories arranged by flight day
 - c. File names indicate instrument and data type
2. Orion Camera Data Bundle (SAW2,3,4, OpNav, CAB2, DCAM)
 - a. Collections for Raw and Derived Products with PDS4 labels
 - b. Sub-directories arranged by flight day
 - c. File names indicate instrument and data type
3. Mission Audio Data Bundle (PCD, Houston Voice)
 - a. Collections for Raw and Derived Products with PDS4 Labels
 - b. Sub-directories arranged by flight day
 - c. File names indicate type
4. SPICE Bundle (Navigation and Ancillary Data)
 - a. Consists of relevant SPICE kernels and required auxiliary files arranged in the standard PDS4 SPICE archive structure produced by the NPB tool
5. Mission Data Bundle
 - a. Collection for Orion Environment Data (temp/humidity) from HOBO data loggers.
 - b. Document Collection for mission and instrument descriptions, mission timeline, schedule. Documentation of processing steps, including supporting data (e.g., calibration files & information), algorithms and/or equations sufficient to understand and/or reproduce how higher-level or derived products were created. Documents include:
 - i. Open Science and Data Management Plan (this document)
 - ii. Data User Guide(s)
 - iii. Mission science and operations reports.
 - iv. Other supplemental mission and science documentation, as needed
6. Optional extra miscellaneous information
 - a. Quick-look or browse versions of data

To ensure that data products, collections, and bundles are consistent across the Artemis II archive, the following rules are established:

1. The logical identifiers (LIDs) for products, collections and bundles shall follow the convention detailed in Appendix E.
2. File names for archive products shall follow the convention detailed in Appendix C.
3. All timestamps within the data products shall include Coordinated Universal Time (UTC) (or Greenwich Mean Time, GMT) date and time with a precision required for analysis of the data.
4. All product labels shall include originally assigned NASA IDs for traceability to NASA repositories.

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6.5.3.2. Validation

Once assembled, the archival data products will undergo a validation process that will be completed by the Lunar Science Team prior to being released by the PDS. Validation is accomplished in three parts: 1) initial validation of source data by JSC institutional services, 2) validation for scientific integrity and 3) validation for compliance with PDS4 standards and data usability. An initial validation of source data products will occur by MCC-H and JSC Institutional Services according to NASA standard processes.

The Lunar Science Team process includes validation of source data products and processed archival data products for scientific integrity, file integrity, and compliance with PDS4 standards. Scientific integrity checks will involve scientific quality checks and scientific analyses using data products. To reduce sources of errors in the archived data products, it is expected that the Lunar Science Team archive data products will be used and validated through scientific analysis rather than through dedicated processing for sole purpose of archive generation.

Validation for compliance with PDS4 standards and data usability will be the responsibility of the Lunar Science Team with assistance from the PDS node that will receive the data products. The PDS will provide software tools, examples, and advice to help make data validation as efficient as possible. Validation should occur with generation of the data products and within the period between receipt of data and delivery to the PDS. The process of validation will involve: a check for missing files and file structures (e.g., to determine whether the files conform to formats described in the User Guide documents), directory structures, compliance with PDS4 standards, and integrity of the electronic transfer of the data products utilizing validation software supplied by the PDS.

The validation process also includes a peer review of the design and labeling of data products as laid out in the data product User Guide documents, and validation of the PDS4 XML labels. The review committee will be assembled by the PDS node with the Lunar Science Team and consists of a small group of scientists who represent typical users of the data. The Lunar Science Team and the relevant PDS node will also be represented on the review committee. The review period will last approximately one month and will be conducted mostly by email, culminating in a virtual meeting, if needed. The result of the review will be a list of liens, or problems, that the team must resolve before the product can pass the review, be submitted to the PDS archive, and distributed to the public. Another month (or more depending on the nature of the liens) may be needed for the Lunar Science Team to address the liens. All reviews will be completed and liens resolved by the Lunar Science Team with assistance from the PDS prior to release. Each individual product will be validated by the Lunar Science Team to verify that it conforms to the design specified in the User Guide. Validation of individual products will be automated as much as possible. The PDS will be responsible for the final validation and confirmation that all liens have been satisfactorily resolved.

6.5.3.3. Transfer

Transfer of source data to the Lunar Science Team will be the responsibility of JSC Institutional Services.

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The main servers providing science data storage and the processing environment will be provided by JSC Institutional Services with restricted access by the Lunar Science Team for staging of source data and generation, assembly, and validation of Archival Data Products. Assembled and validated Archival Data Products will be delivered to the relevant PDS Node using mutually agreed upon protocols from the secured servers.

6.5.4. Data Access

Access to original source data products is restricted to NASA personnel, which includes the Lunar Science Team, and will remain on restricted NASA networks. Access to publicly released archival data products is available through the PDS and its web interfaces and tools. The PDS Imaging Node will ingest the data into its browse web directory structures and Planetary Image Atlas web search tool (<https://pds-imaging.jpl.nasa.gov/search/>). Geosciences Node will provide mission level bundles and links to other node archive holdings through a designated Artemis mission web interface on <https://pds-geosciences.wustl.edu/>. NAIF Node will provide access on its browse web interface (https://naif.jpl.nasa.gov/naif/data_archived.html) and WebGeocalc GUI and API (<https://naif.jpl.nasa.gov/naif/webgeocalc.html>). The PDS allows users to conduct high-level searches through its website (<https://pds.nasa.gov/>) and to programmatically access the entire PDS4 archive through its Application Programming Interface (API). Documentation on using the API is available from the PDS at: <https://nasa-pds.github.io/pds-api/>.

6.5.5. Documentation

The Archival Data Products will follow PDS4 data standards, which are available online at: <https://pds.nasa.gov/datastandards/about/>

The format and content of data products are described in data User Guides created by the Lunar Science Team. Separate User Guide documents are developed for each PDS archive bundle; however, a single User Guide for the mission is also provided. This User Guide describes each type of data product, including raw, partially processed, calibrated, derived, and ancillary products.

As part of the process of designing the PDS4 archive bundles and collections, the lead PDS Node will develop a PDS4 bundle that includes all mission documents in PDS-compliant formats. This is a single, centralized bundle that includes a high-level summary (as a readme.txt) of the mission documents with a set of collections containing documents for the mission (e.g., this OSDMP), each instrument (e.g., inventory table, User Guides, release notes, user manuals, etc.). Some collections are secondary members of the document bundle, and they typically reside with the bundle where they are primary members (i.e., with instrument archives). Each document and data product in this bundle is described by a PDS4 label in a separate file with the same name but with an “XML” extension. PDS4 labels are XML files that conform to the PDS4 Information Model XML schema.

7.0 SCIENTIFIC SOFTWARE MANAGEMENT

Not Relevant - No scientific software will be developed as part of this OSDMP.

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7.1. SOFTWARE LIFECYCLE

Not Relevant - No scientific software will be developed as part of this OSDMP.

7.1.1. Software Identification

Not Relevant - No scientific software will be developed as part of this OSDMP.

7.1.2. Software Design Process

Not Relevant - No scientific software will be developed as part of this OSDMP.

7.1.3. Software Development Process

Not Relevant - No scientific software will be developed as part of this OSDMP.

7.1.4. Verification and Validation

Not Relevant - No scientific software will be developed as part of this OSDMP.

7.1.5. Release of Software

Not Relevant - No scientific software will be developed as part of this OSDMP.

7.1.6. Archiving Software

Not Relevant - No scientific software will be developed as part of this OSDMP.

7.2. DESCRIPTION OF SCIENTIFIC ALGORITHMS

Not Relevant - No scientific software will be developed as part of this OSDMP.

7.3. SCIENTIFIC SOFTWARE TABLE

Not Relevant - No scientific software will be developed as part of this OSDMP.

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8.0 APPENDIX A ACRONYMS AND ABBREVIATIONS

TABLE A1-1 ACRONYMS

ACRONYM	MEANING
AAC	Advanced Audio Coding
ACD	Artemis Campaign Development
AGU	American Geophysical Union
AIST	Artemis Internal Science Team
AOS	Acquisition of Signal
API	Application Programming Interface
ARD	Artemis Requirements Document
ASCII	American Standard Code for Information Interchange
BET	Best Estimate Trajectory
BLE	Bluetooth Low Energy
C&C	Command And Control
CAB	Cabin
CB	Control Board
CCO	Creative Commons Zero (<i>Note: text standard for CC0</i>)
CDH	Command And Data Handling
CLO	Crew Lunar Observations
CM	Crew Module
CMA	Crew Module Adapter
CMOS	Complementary Metal-Oxide-Semiconductor
CNT	Communications Network Tracking
CPADD	Communications Network Tracking Positioning Navigation Timing Architecture Description Document
CPU	Central Processing Unit
CR	Change Request
CSA	Canadian Space Agency
DAWG	Artemis Science Data And Archive Working Group
DILMC	Digital Imagery Lab Mission Controller
DOI	Digital Object Identifier
DOY	Date of Year
DSLR	Digital Single-Lens Reflex
DSN	Deep Space Network
DSP	Digital Signal Processing
ECLSS	Environmental Control And Life Support Systems
EMI/EMC	Electromagnetic Interference / Electromagnetic Compatibility
EMSS	EVA Mission System Software
ESA	European Space Agency
ESCO	Exploration Software For Crew Operations
ESSIO	Exploration Science Strategy Integration Office
EXOPS / ExOps	Exploration Operations Office
FAIR	Findable, Accessible, Interoperable, And Reusable
FDO	Flight Dynamics Officer
FOD	Flight Operations Directorate

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FOV	Field of View
GC	Ground Controller
GFE	Government Furnished Equipment
GMT	Greenwich Mean Time
GSFC	Goddard Space Flight Center
GUI	Graphical User Interface
HEO	High Earth Orbit
HERA	Hybrid Electronic Radiation Assessor
HFOV	Horizontal Field Of View
HHP	Human Health And Performance
HPU	HERA Processing Unit
HSF	Human Space Flight
HSU	HERA Sensor Unit
ICPS	Interim Cryogenic Propulsion Stage
IO	Imagery Online
ISAL	Imagery Science And Analysis Laboratory
ISS	International Space Station
IVA	Intra-Vehicular Activity
JPL	Jet Propulsion Laboratory
JSC	Johnson Space Center
LEO	Low Earth Orbit
LET	Linear Energy Transfer
LID	Logical Identifier
LOS	Loss-Of-Signal
LPSC	Lunar and Planetary Science Conference
LSSW	Lunar Surface Science Workshop
LST	Lunar Science Team
LTP	Lunar Targeting Plan
M2M	Moon To Mars
MAP	Mission Audio Profiles
MCC-H	Mission Control Center-Houston
MFT	Multimedia File Transfer
MMOD	Micrometeoroid Orbital Debris
MOC	Mission Operations Center
MODE	Multi-Organization Design Environment
MSFC	Marshall Space Flight Center
NAIF	Navigation And Ancillary Information Facility
NARA	National Archives and Records Administration
NDC	Nasa Domain Control
NEF	Nikon Electronic Format
NIB	Natural Interaction Behavior
NPD	NASA Policy Directive
NPR	NASA Procedural Requirements
NRRS	NASA Records Retention Schedule
NSN	Near Space Network

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NTRS	Nasa Science And Technical Information Repository
OCIO	Office of the Chief Information Officer
OCSDO	Office Of The Chief Science Data Officer
OESC	Orion Electronic Still Camera
OPNAV / OpNav	Optical Navigation
OPR	Office Of Primary Responsibility
OSDMP	Open Science And Data Management Plan
OTC	Orbital Trajectory Correction
PAO	Public Affairs Office
PCD	Portable Computing Device
PDT	Pacific Daylight Time / Pacific Time
PDS	Planetary Data System
PLRA	Program Level Requirements Appendix
PNT	Positioning Navigation Timing
PSA	Power Supply Assembly
PTT	Push-To-Talk
RH	Relative Humidity
RTC	Return Correction burn
SAW	Solar Array Wing
SCAN / SCaN	Space Communications And Navigation
SDS	Science Data Server
SER	Science Evaluation Room
SHE	SMD Science in Human Exploration
SLS	Space Launch System
SMD	Science Mission Directorate
SME	Subject Matter Expert
SMOR	Science Mission Operations Room
SN	Serial Number
SOC	Science Operations Center
SPD-41A / SPD-41a	Scientific Information Policy for the Science Mission Directorate
SPICE	Spacecraft, Planetary, Instrument, C-Matrix, Events
SRAG	Space Radiation Analysis Group
STI	Scientific And Technical Information
STM	Science Traceability Matrix
TBD	To Be Decided
TBR	To Be Required
TLI	Translunar Injection
TPS	Thermal Protection System
UTC	Coordinated Universal Time
UWP	Universal Windows Platform
UX/UI	User Experience / User Interface
VCC	Video Control Center
VIO	Vehicle Integration Office
VOX	Voice-Activated
WAP	Wireless Access Point

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XML	Extensible Markup Language
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9.0 APPENDIX B OSDMP COMPLIANCE MATRIX

TABLE B1-1 OSDMP COMPLIANCE MATRIX

Number	Requirement	Source	Justification	Approval
1	The project shall develop an OSDMP.	PLRA	This document	
2	The OSDMP shall include a table of tailored requirements.	OSDMP Template	No Tailored Requirements.	
3	The OSDMP shall include a section providing an overview of the mission.	OSDMP Template	Section 3.0	
4	The OSDMP shall include a section providing an overview of the project's implementation of Open Science practices.	OSDMP Template	Section 4.0	
5	The OSDMP shall include a section providing roles and responsibilities for implementation of Open Science.	OSDMP Template	Section 4.1	
6	The OSDMP shall include a section providing an overview of the open science processes for Data Management.	OSDMP Template	Section 4.3	
7	Mission data including observation, auxiliary, calibration, and ground data are made publicly available.	SPD-41a	Sections 4.3, 6.1	
8	Data that are Level 1 or above are made freely available.	SPD-41a	Section 4.3, data archived in NASA PDS.	
9	Any limitations in the availability of data are described in the Data Management section of the OSDMP.	SPD-41a	Sections 4.3, 6.0, public data release schedule	
10	Publicly available data for the mission is made available with a Creative Commons Zero license.	SPD-41a	Section 4.3, CC0 is default in PDS.	
11	The mission data will be findable.	SPD-41a	Sections 4.3, 6.0 by the PDS	
12	Publicly available datasets are made citable.	SPD-41a	Sections 4.3, 6.0 by the PDS	
13	The OSDMP includes a table summarizing the data products produced by the mission and when they will become publicly available.	OSDMP template	Section 4.3, Table 2	
14	There shall be no period of exclusive access to mission data. A period after the data has been obtained may be allowed for activities such as calibration and validation of the data. This period shall be as short as possible and shall not exceed six months.	SPD-41a	Section 4.3, Table 2, data release is within 6 months post-launch.	
15	The OSDMP shall include a section providing an overview of the open science processes for Software.	OSDMP template	Sections 4.4, 7.0, no open scientific software will be developed.	
16	Unrestricted mission scientific software is developed openly.	SPD-41a	Not applicable, no open scientific	

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			software will be developed.	
17	The project uses a publicly accessible, version-controlled platform for development of unrestricted scientific software.	SPD-41a	Not applicable, no open scientific software will be developed.	
18	If there are no other restrictions, publicly available SMD-funded software is released under a permissive license that has broad acceptance in the community.	SPD-41a	Not applicable, no open scientific software will be developed.	
19	The OSDMP shall include a section on community engagement for software development.	OSDMP template	Not applicable, no open scientific software will be developed.	
20	The mission software development process includes a code of conduct and guidelines for how to make contributions.	SPD-41a	Not applicable, no open scientific software will be developed.	
21	The project describes the process for using and contributing to open-source software projects.	M-16-21	Not applicable, no open scientific software will be developed.	
22	The OSDMP shall include a section describing the handling of restricted software.	OSDMP template / NPR 7150.2	Not applicable, no open scientific software will be developed.	
23	The OSDMP shall include a section on publications.	OSDMP template	Section 4.5	
24	Publications shall be made available via the NASA STI Repository.	NPD 2200.1	Section 4.5, Table 4	
25	Peer reviewed publications that describe the mission shall be published as open access.	SPD-41a	Section 4.5	
27	Publicly available publications produced by the project shall be citable via a persistent identifier.	SPD-41a	Section 4.5	
27	The OSDMP shall include a table describing the publications produced by the project and how they will be made available.	OSDMP template	Section 4.5, Table 4	
28	The OSDMP shall include a section on public scientific meetings.	OSDMP template	Section 4.6	
29	The OSDMP shall include a section that summarizes each instrument or investigation to which the OSDMP applies. There will be one subsection for each instrument.	OSDMP template	Section 5, each instrument or system has section descriptions	
30	For each instrument, the OSDMP shall include a section describing the instrument.	OSDMP template	Sections 5.1 thru 5.7	
31	For each instrument, the OSDMP shall include a section describing the observing requirements.	OSDMP template	Sections 5.1 thru 5.7	

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32	For each instrument, the OSDMP shall include a section describing the observing capabilities.	OSDMP template	Sections 5.1 thru 5.7	
33	For each instrument, the OSDMP shall describe the data rate.	OSDMP template	Sections 5.1 thru 5.7 and 6.3.2	
34	For each instrument, the OSDMP shall include a section describing the on board data acquisition and processing.	OSDMP template	Sections 5.1 thru 5.7 and 6.3.3	
35	The OSDMP shall include a section describing data management.	OSDMP template	Section 6.0	
36	The OSDMP includes a table of data products mapped by level and instrument.	OSDMP template	Section 6.1.1, Table 14	
37	For each instrument, the OSDMP includes a section on the data product functional description.	OSDMP template	Section 6.1.1, Table 14, instrument data descriptions in one table	
38	Data must be released in non-proprietary, machine readable, modifiable, and open formats.	SPD-41a	Section 6.1.1, PDS data standards	
39	For each instrument, the OSDMP includes a section on the science data products.	OSDMP template	Section 6.1.2, Table 15, instrument data descriptions in one table	
40	The OSDMP includes a section on data quality.	OSDMP template	Sections 6.1.5 and 6.5	
41	Mission data shall include robust, standards-compliant metadata that clearly and explicitly describe the data.	SPD-41a	Section 6.5, PDS data standards	
42	The OSDMP includes a section describing the Ground System and each of its components.	OSDMP template	Section 6.2	
43	The OSDMP includes a section describing the data flow between flight and ground mission elements.	OSDMP template	Section 6.3	
44	The OSDMP includes a table summarizing the flow of data and timeline of delivery for each element.	OSDMP template	Section 6.3, Table 16	
45	The OSDMP includes a section describing data archiving and access.	OSDMP template	Section 6.5	
46	The OSDMP includes a table with instrument data storage requirements over the nominal life of the mission.	OSDMP template	Section 6.5.2, 6.1, Table 15	
47	The OSDMP includes a section describing the data repositories where the data will be archived	OSDMP template	Section 6.5	
48	Mission data will be made available in a SMD data repository.	SPD-41a	Section 6.5, the NASA PDS	
49	The OSDMP describes a description of the interface between the mission and the data repository.	OSDMP	Section 6.5	

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50	Mission data will be made citable using a persistent identifier such as a Digital Object Identifier	SPD-41a	Sections 4.3, 6.0 by the PDS	
51	The OSDMP includes a section describing the data accessibility.	OSDMP template	Section 6.5.4	
52	The OSDMP includes a section describing the data documentation.	OSDMP template	Section 6.5.5	
53	The OSDMP shall include a section describing scientific software management.	OSDMP template	Section 7.0, no open scientific software will be developed.	
54	The OSDMP section on scientific software management does not describe any restricted software.	OSDMP template	No restricted software is described.	
55	The OSDMP shall include a section describing the scientific software lifecycle.	OSDMP template	Not applicable, no open scientific software will be developed.	
56	The OSDMP shall include a section describing the identification of scientific software.	OSDMP template	Not applicable, no open scientific software will be developed.	
57	The OSDMP shall include a section describing the design of scientific software.	OSDMP template	Not applicable, no open scientific software will be developed.	
58	The OSDMP shall include a section describing the development of scientific software.	OSDMP template	Not applicable, no open scientific software will be developed.	
59	The OSDMP shall include a section describing the verification and validation of scientific software.	OSDMP template	Not applicable, no open scientific software will be developed.	
60	The OSDMP shall include a section describing the release of scientific software.	OSDMP template	Not applicable, no open scientific software will be developed.	
61	The OSDMP shall include a section describing the archiving of scientific software.	OSDMP template	Not applicable, no open scientific software will be developed.	
62	Software must be made available in publicly accessible repository.	SPD-41a	Not applicable, no open scientific software will be developed.	
63	Software packages developed by the project are made citable via a persistent identifier.	SPD-41a	Not applicable, no open scientific software will be developed.	
64	Newly developed software packages are submitted to inventions.nasa.gov.	NPD 2091.1	Not applicable, no open scientific	

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			software will be developed.	
65	The OSDMP shall include a section describing the scientific algorithms.	OSDMP template	Not applicable, no open scientific software will be developed.	
66	The OSDMP shall include a table of scientific software or a reference to a list of software that includes scientific software.	OSDMP template / NPR 7150.2	Not applicable, no open scientific software will be developed.	
67	The OSDMP does not include any restricted information that would prevent its public release.	OSDMP template	Completed necessary STRIVES and export control Reviews	

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10.0 APPENDIX C FILE NAMING CONVENTIONS

Every PDS4 Archive Data Product produced by the mission that has an assigned NASA ID will have a file name that follows the convention specified below. The primary goals of this naming convention are:

- Ensure uniqueness for every single archive data product across all instruments, all venues, and for the life of the mission.
- Provide consistency in structure to ease parsing of the various fields.
- Provide both machine and human readability of file names.

In section 6C.1.1 of the PDS Standards Reference, the PDS identifies the rules governing selection of file names. The following subset of those rules pertains to this convention:

- The file name must be unique within a directory.
- The file name must be no longer than 255 characters.
- The file name must be case-insensitive.
- The file name must be constructed from the character set.
 - A-Z ASCII 0x41 through 0x5A,
 - a-z ASCII 0x61 through 0x7A,
 - 0-9 ASCII 0x30 through 0x39,
 - dash “-” ASCII 0x2D
 - underscore “_” ASCII 0x5F and
 - period “.” ASCII 0x2E
- The file name must not begin or end with a dash, underscore, or period.
- The file name must include at least one period followed by an extension.

The fields that make up the file name are depicted as follows (*for data with NASA IDs*):

<NASA ID>_<instrument ID>_<product type>_<version>.<extension>

TABLE C1-1: DESCRIPTION OF FILE NAME FIELDS

Field	Description	Format
NASA ID	NASA ID assigned by NASA Johnson Space Center Imagery Online to data from NASA managed systems.	Still Images: art002ennnnnnn Audio: art002annnnnnn Video: art002mnnnnnnnnnn Where <i>nnnnnn</i> is the sequential six-digit number for stills and audio, and <i>nnnnnnnnnn</i> for video is video

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	This is a permanent identifier for Artemis II data products across NASA data-serving systems.	channel (first three digits) followed by UTC DOYhhmm (last seven digits), Example: 1013331009 *Note: The sequential numbering of the NASA ID for images and audio is the order in which the files are received and catalogued, not necessarily in time-order sequence.
Instrument ID	Instrument identifier	nkd5nnn = crew Nikon D5 with last three digits of camera serial number specified (<i>nnn</i>) nkz9nnn = crew Nikon Z9 with last three digits of camera serial number specified (<i>nnn</i>) sawn = Orion solar array wing (SAW) camera with camera number specified (<i>n</i>) cabn = cabin camera with camera number specified onav = OpNav camera dcam = Docking Camera iph17 = iPhone 17 pcdn = portable computing device with number specified oe1 = O/E-1 Voice loop oe2 = O/E-2 Voice loop hobonnnnn = HOBO data logger with <i>nnnn</i> specifying ID number
Product Type	Processing level or type of product	src = original source data raw = raw data; converted from original to PDS4 compliant product (if required) prc = processed vid = video trn-csv = transcript csv trn-srt = transcript srt ann = annotation Other as specified by instrument
Version	Version number	vmm mm = two digit major version number A change in data warrants a major version change, while a change in metadata would be a minor change
Extension	Product extension type	Based on source file and PDS4 compliant file type. Still images: .tif for image files (PDS4) with .jpg and .png for original source files (vehicle images) or .nef (source Nikon images), and .png for browse.

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		Crew Audio: .m4a/.mp4 for audio files (PDS4) and original files (PCD and voice loops) Video: .mp4 for video files (PDS4) Crew Audio Transcripts: .csv and .srt for audio transcripts (PDS4) Crew Annotations: .pdf for crew annotation files Documentation: .pdf for mission reports and other documentation (PDS4)
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Examples:

Nikon D5 camera (SN 3500015), NASA ID art002e024481, version 1, nef (source), tif (raw and processed) and png (browse from processed tif)

art002e024481_nkd5015_src_v01.nef
art002e024481_nkd5015_raw_v01.tif
art002e024481_nkd5015_prc_v01.tif
art002e024481_nkd5015_prc_v01.png

Nikon D5 camera (SN 3500017), NASA ID art002e026016, version 1, nef (source), tif (raw and processed), and png (browse from processed tif)

art002e026016_nkd5017_src_v01.nef
art002e026016_nkd5017_raw_v01.tif
art002e026016_nkd5017_prc_v01.tif
art002e026016_nkd5017_prc_v01.png

Nikon camera 3 (Z9 camera SN 3920019), NASA ID art002e027742, version 1, nef (source), tif (raw and processed), and png (browse from processed tif)

art002e027742_nkz9019_src_v01.nef
art002e027742_nkz9019_raw_v01.tif
art002e027742_nkz9019_prc_v01.tif
art002e027742_nkz9019_prc_v01.png

iPhone 17 Pro Max, NASA ID art002e041867, tif (raw), png (browse)

art002e041867_iph17_raw_v01.tif
art002e041867_iph17_raw_v01.png

PCD 2 audio file, NASA ID art002a000034, version 1, m4a (raw audio) and txt and src (transcript) files

art002a000034_pcd2_raw_v01.m4a
art002a000034_pcd2_trn-csv_v01.csv
art002a000034_pcd2_trn-srt_v01.srt

PCD1,2,3 annotation files, using NASA ID taken from first jpeg in sequence and with an appended “-eXXXXXX” to indicate the NASA ID of the last page in the document

art002e009303-e009388_pcd1_ann_v01.pdf
art002e009389-e009474_pcd2_ann_v01.pdf
art002e009475-e009560_pcd3_ann_v01.pdf

Orion SAW camera 3 Still, (browse_source and raw), version 1, jpeg (browse_source) and tif (raw) files

art002e031160_saw3_src_v01.jpg
art002e031160_saw3_raw_v01.tif

Orion SAW camera 3 Video, version 1, mp4 (converted from high res)

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art002m1010961940_saw3_vid_v01.mp4

Orion CAB camera 2, version 1, jpg (browse_source), tif (raw) file

art002e041314_cab2_src_v01.jpg

art002e041314_cab2_raw_v01.tif

Orion OpNav camera, version 1, tif file (browse_source and raw)

art002e000156_onav_raw_v01.png

art002e000198_onav_raw_v01.tif

Orion Docking Camera, NASA ID art002e018386, version 1, png file (browse_source), and tif (raw) file

art002e018386_dcam_src_v01.png

art002e018386_dcam_raw_v01.tif

Convention for files *without* NASA IDs:

Voice Loop Format

art002_<UTC Date in YYYY-MM-DD>_<instrument ID>_<data type>_<version>.<extension>

Orion to Earth 1 and 2 Voice Loops and Transcripts

art002_2026-04-06_oe1_raw_v01.mp4

art002_2026-04-06_oe1_trn-csv_v01.csv

art002_2026-04-06_oe1_trn-srt_v01.srt

art002_2026-04-07_oe2_raw_v01.mp4

art002_2026-04-07_oe2_trn-csv_v01.csv

art002_2026-04-07_oe2_trn-srt_v01.srt

HOBO data loggers (SN 1104 and SN 1105)

art002_<UTC Start Date in DOY-hhmmss>_<UTC End Date in DOY-hhmmss>_<instrument ID>_<data type>_<version>.<extension>

art002_086-162546_111-205046_hobo1104_raw_v01.csv

art002_086-162926_111-203826_hobo1105_raw_v01.csv

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11.0 APPENDIX D LUNAR SCIENCE TEAM ROLES AND RESPONSIBILITIES

TABLE D1-1: LUNAR SCIENCE TEAM ROLES AND RESPONSIBILITIES

First Name	Last Name	Role	Responsibility
Kelsey	Young	Artemis Internal Lunar Science Team - Science Operations Lead; Lead Artemis II Science Officer; Artemis II Lunar Science Lead	Led Artemis II Lunar Science Team, including team meetings, day-to-day operations, etc.
			Guided all A2 Lunar Science Team product development
			Coordinated all team publication activities
			Ensured A2 Lunar Science Team resources are adequate to support mission
			Responsible for the scientific integrity and the overall scientific success of the mission, including overseeing and ensuring successful and timely delivery of data to the PDS
Marie	Henderson	Deputy Artemis II Lunar Science Lead	Managed process development for science data collection and downlink of science data
			Managed the Science Evaluation Room (SER) for the Lunar Flyby and Post- Flyby Analysis
			Science Lead for imaging operations
			Participated in accomplishing mission science deliverables (conference abstracts, peer-reviewed manuscripts, preliminary science reporting, data archiving) post flyby and after splash down
			Provided other SME support to the A2 Lunar Science Lead, as requested
Jacob	Richardson	Deputy Artemis II Lunar Science Lead	Managed process development for generating the Artemis II Lunar Flyby Science Plan
			Managed the Science Evaluation Room (SER) for preparatory activities to support the flyby and post-flyby crew conference during the Artemis II mission
			Participated in accomplishing mission science deliverables (conference abstracts, peer-reviewed manuscripts, preliminary science reporting, data archiving) post flyby and after splash down
			Provided other SME support to the A2 Lunar Science Lead, as requested
Noah	Petro	Artemis II Science Team Member; Artemis III Project Scientist; Artemis Internal Science Team: Spatial Planning and Data Lead	Supported definition of lunar science targets and target rationale
			Provided SME support to science team
			Supported NASA Artemis communications team
			Fed forward to Artemis III
Matthew	Miller	Artemis Internal Lunar Science Team - Data and Software Lead	Primary interface between NASA mission systems infrastructure and A2 Lunar Science Team
			Ensured mission data was available to A2 Lunar Science Team

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			Supported science mission data archiving activities
David	Hollibaugh Baker	Artemis II Lunar Science Team Data Curation Lead; Planetary Data System Project Office	Primary interface between A2 Lunar Science Team and PDS elements
			Ensured PDS resources were adequate to support science data archiving
Sara	Schmidt	Crew Lunar Observations (CLO) Team Lead	Guided and coordinated software development used by the A2 crew members
			Managed support and certification of the crew-developed in-flight software tools
			Primary interface between the generation of trajectory dependent data and the A2 Lunar Science Team
Maria	Banks	Vehicle Camera Science Lead	Primary interface between the A2 Lunar Science team and the vehicle camera team
			Led vehicle camera video data for the SER that complemented crew data from the initial downlink after the flyby and identified highest priority vehicle camera images for subsequent downlink
			Participated in mission science deliverables post flyby and after splash down
			Provided SME support to the A2 Lunar Science Lead
Ariel	Deutsch	Scrum Lead	Coordinated consensus amongst science theme leads, including in development of Lunar Flyby Science Plan
			Supported generation of scientific questions for the post-flyby crew conference
			Participated in mission science deliverables
			Provided SME support to the Lunar Science Team
Marco	Lozano	Asset Manager Lead for the XI Division	Served as Asset Manager Lead for the XI Division, overseeing mission-critical communications and technology infrastructure across multiple labs and operations centers
			Ensured seamless interconnectivity between the Image Science and Analysis Lab (ISAL), Imagery Operations Center (IOC), Science Evaluation Room (SER), Science Mission Operations Room (SMOR), and MER
			Supported the Lunar Science Team by enabling reliable communication, situational awareness, and real-time mission data accessibility
			Coordinated and oversaw downlinking, routing, and distribution of mission data from multiple centers and spacecraft platforms
			Developed and implemented system engineering plans for division-wide video routing and communications architecture
Cherie	Achilles	Tools and Mission Timeline Lead	Facilitated the design and implementation of software tools for the Science Team

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			Established science operations shift schedules and maintained the science mission timeline for each launch window
Ryan	Bieber	Lead SER/SMOR Asset Manager	Ensured Science Mission Operations Room (SMOR) and Science Evaluation Room (SER) video feeds were available and in view for Lunar Science Team based on current needs
Samuel	Lawrence	Artemis Internal Science Team, Mission Planning and Science Implementation Lead; ESDMD/SMD Artemis Geospatial Data Team Lead; Artemis II Science Team member	Supported definition of lunar science targets and aided with rationale
			Lunar geology and LRO data SME support to science team, assisted in writing the preliminary report, and integrated science outcomes with existing data
			Supported NASA Artemis communications team
			Fed forward lessons learned to first landed missions, particularly SMOR activities and spatial data infrastructure
Luke	McSherry	SER Asset Manager	Ensured Science Evaluation Room (SER) displays and technology contained up-to-date and useful information to keep the rest of the Lunar Science Team informed on the state of the mission and opportunities to collect science
Ryan	Watkins	Observation Planner, Crew Data Analyst	Developed the flight ready prompts for crew in the Lunar Targeting Plan (LTP)
			Assisted the SCRUM in locating and analyzing crew observation data files (photos, videos, annotations)
			During flyby, listened to crew observations and record the time of observation compared to what is listed in the LTP
			Recorded all information of communication over loops during flyby
Amber	Turner	Crew Trainer, Observation Planning Lead, Crew Data Analyst	Crew Trainer: Developed retention-focused training products for orbital observation science. Participated as an instructor in crew integrated simulations
			Observation Planning Lead: Led sub-team responsible for developing flight-ready crew guidance, providing navigational cues and observation instructions, and ensuring continuity of information from training through the final science plan
			Crew Data Analyst: Supported preliminary and post-mission science analysis of crew-collected data, contributing to real-time and post-mission milestones
Alexandra	Constantinou	Crew Data Analyst; SMOR Documentarian	Reviewed and tagged relevant data fields for downlinked imagery, audio, transcripts
			Polished and highlighted transcripts for science content
			Documented discussions and decisions amongst SMOR team
			Drafted reports for SMOR leads

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Jennifer	Heldmann	Artemis II Science Team Member; Artemis II Science Theme Lead; Artemis Geology Team; Artemis IV/V Associate Project Scientist; Artemis VI Deputy Project Scientist; Artemis Science Crew Training Team	Developed science objectives and implementation goals for Science Theme Lead areas (Dust & Exosphere, Impact Flashes, Terminator & Limb, Earth from Space)
			Delivered science content for Lunar Targeting Plan (LTP) for lunar flyby science plan
			Supported generation of content for pre-flyby crew conference and scientific questions for the post-flyby crew conference
			Supported lunar flyby operations and responded to crew questions and observations
			Conducted science review and initial analysis for Preliminary Science Report
			Supported A2 communications team
David	Charney	UX/UI Designer, CLO and EMSS Teams	Created UX/UI designs for the Lunar Targeting Plan (LTP) for the Crew Lunar Observations (CLO), as well as the CODA, Talky Bot, and Maestro applications for the EMSS team
			Conducted software testing, review, and crew training.
			Defined initial software solutions for crew geology eLearning training
Ernie	Wright	A2LST Visualization Lead	Produced photorealistic animations and still images of the lunar flyby used for astronaut training, observation planning, simulations, and PAO
			Produced visualizations of general lunar phenomena for training
			Generated synthetic spacecraft ephemerides used by CLO to create Lunar Targeting Packages for science team simulations
			Eclipse SME advising the science team, astronauts, and flight surgeons
Juliane	Gross	Artemis II Science Theme Lead for Impact History, Landing site, and Poles; Artemis II Crew Trainer	Delivered science content for Lunar Targeting Plan (LTP) and content development of Lunar Flyby Science Plan including timeline
			Developed science objectives and implementation goals for Science Theme Lead areas (Impact History, Landing sites, Poles)
			Supported generation of content for pre-flyby crew conference and generated scientific questions for the post-flyby crew conference
			Supported lunar flyby operations and respond to crew questions and observations in real time
			Conducted science review and initial analysis for Preliminary Science Report during and post mission and participate in mission science deliverables
			Crew Trainer: helped develop retention-focused training products for orbital observation science; Participated as an instructor in one-on-one crew mentoring and feedback for observation science

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			Provided SME support to the Lunar Science Team
			Supported A2 public outreach communications team
Cynthia	Evans	Artemis Internal Lunar Science Team: Artemis Geology Training Lead; Artemis II Geology Training Lead; Artemis II Science Team Member; Artemis II Observation Planner; Artemis II Mission Data Analyst	Led Geology Training Team for development and delivery of crew training for lunar observations
			Developed and edited science content for Lunar Targeting Plan (LTP) that was used to create Lunar Flyby Science Plan
			Provided rapid scientific analysis of downlinked lunar data (audio files and imagery) to support post flyby crew conference
			Conducted science review and initial analysis for Preliminary Science Report during and post mission and participate in mission science deliverables
			Provided SME support to the Lunar Science Team
			Supported A2 public outreach communications team
Kiarre	Dumes	Artemis II Science Team Member; Artemis Geology Training Coordination; SERCOM; Science Officer Instructor	Supported real-time science operations and analysis during mission-timed activities
			Coordinated and scheduled geology training flows
			Relayed timely, accurate information between SCIENCE, SER, and SMOR and logged mission-relevant comm
			Ensured Science Officer proficiency in simulation processes and science-operations interfaces
Jose	Hurtado	Artemis II Science Team Member; Artemis Geology Team; SERCOM	Supported real-time science operations and analysis during mission-timed activities
			Relayed timely, accurate information between SCIENCE, SER, and SMOR and log mission-relevant comm
Debra	Needham	Artemis II Volcanics and Tectonics Science Theme Lead	Delivered science content for Lunar Targeting Plan (LTP) and development of Lunar Flyby Science Plan including timeline
			Developed science objectives and implementation goals for Science Theme Lead areas (Volcanics, Tectonics)
			Supported generation of content for pre-flyby crew conference and generate scientific questions for the post-flyby crew conference
			Supported lunar flyby operations and respond to crew questions and observations in real time
			Conducted science review and initial analysis for Preliminary Science Report during and post mission and participate in mission science deliverables
			Provided SME support to the Lunar Science Team
			Supported A2 public outreach communications team.
Alex	Stoken	CLO Developer; Artemis II Science Data Team	Development of Lunar Targeting Plan (LTP) and additional mission visualizations
			Development of transcription, localization, and other science support tools
			Development and in-mission execution of data analysis scripts and processes

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			Led development of CLO observation target determination software
Cody	Boyer	CLO Developer; Artemis II Science Data Team	Led the development and documentation of the Lunar Targeting Plan (LTP), and assisted in building the processes for generating the LTP
			Assisted in post flyby lunar data downlinking sessions
Wilfredo	Garcia Lopez	CLO Operator	Assisted with visualizations and tools used during the mission
			Supported with CLO mission operations efforts through orbital dynamic software
Jared	Ralleta	CLO Developer; Artemis II Science Data Team	Development of Live Encounters Guide, and assisted in building LTP generation processes
			Facilitated data transfer and accessibility to and from the Lunar Science team
			Development of scripts and pipelines for data analysis and ingestion
			Development of Transcript Readout Tool Launcher
Allegra	LeGrande	Data Wrangler	Reversed engineered the data from proprietary commercial cameras of Artemis II to be compliant with PDS, such that they may be preserved and accessible for decades to come
Ever	Guandique	Data Archiver	Created PDS labels for data products
			Developed pipeline to create PDS ready bundles

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12.0 APPENDIX E PDS4 LOGICAL IDENTIFIER CONVENTIONS FOR PDS ARCHIVE

Generally, the Product LID is composed of the Collection LID plus a colon plus the product label file name, minus the XML extension.

TABLE E1-1. PDS4 BUNDLE AND COLLECTION LOGICAL IDENTIFIERS.

Bundles

Bundle	Bundle LIDs
artemis2_crew_camera	urn:nasa:pds:artemis2_crew_camera
artemis2_mission_audio	urn:nasa:pds:artemis2_mission_audio
artemis2_orion_camera	urn:nasa:pds:artemis2_orion_camera
artemis2_mission	urn:nasa:pds:artemis2_mission
artemis2_spice	urn:nasa:pds:artemis2_spice

Collections

Bundle	Collection LIDs
artemis2_crew_camera	urn:nasa:pds:artemis2_crew_camera:data_source
	urn:nasa:pds:artemis2_crew_camera:browse
	urn:nasa:pds:artemis2_crew_camera:data_raw
	urn:nasa:pds:artemis2_crew_camera:data_processed
artemis2_mission_audio	urn:nasa:pds:artemis2_mission_audio:data_audio_pcd
	urn:nasa:pds:artemis2_mission_audio:data_audio_loops
	urn:nasa:pds:artemis2_mission_audio:data_transcripts_pcd
	urn:nasa:pds:artemis2_mission_audio:data_transcripts_loops
	urn:nasa:pds:artemis2_mission_audio:annotations
artemis2_orion_camera	urn:nasa:pds:artemis2_orion_camera:browse_source
	urn:nasa:pds:artemis2_orion_camera:data_raw_image
	urn:nasa:pds:artemis2_orion_camera:data_video
artemis2_mission	urn:nasa:pds:artemis2_mission:document
	urn:nasa:pds:artemis2_mission:data_orion_environment
artemis2_spice	urn:nasa:pds:artemis2.spice:spice_kernels
	urn:nasa:pds:artemis2.spice:document
	urn:nasa:pds:artemis2.spice:miscellaneous