PDS4 DATA ARCHIVE FOR CHANDRAYAAN-2 MISSION PAYLOADS (TMC2, OHRC and IIRS)

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Introduction: Chandrayaan-2 (CH-2), India's second mission to the Moon was launched by GSLVMK-III in July 2019. TMC2, IIRS and OHRC are the optical payloads hosted on the Orbiter which is presently orbiting moon under 100km x 100 km circular orbit. The data collected from the instruments from the orbiter are being received, processed and archived in as PDS4 compliance products under ISRO Science Data Archive (ISDA) at Indian Space Science Data Center (ISSDC) for dissemination and use by scientific community in India and abroad. Planetary Data System (PDS4) is the de facto international standard for long term archival of planetary science data.

Archive Process Development: Archiving any planetary data in PDS4 involves technical activity. Data needs to be re-engineered by following well defined archive process model. The process model contains well defined sequence of steps that needs to be followed during development of an archive. PDS4 has defined the various phases to be followed for development of PDS4 data archive. Figure 1 shows the PDS4 Data Archive Process model.

Archive Planning Phase: PDS4 is next generation archive standard. Lots of efforts are envisaged during planning phase for CH-2 mission. The mission has many payloads and teams are located across different ISRO's centers around the country. In order to bring all the teams (project, mission, payload, Principal Investigators (PIs), data processing and archival, operations team at ISSDC) under one umbrella, CH-2 PDS4 Archive Working Group was formed. PDS4 Archive Process for CH-2 mission was tailored as per ISRO's current and future planetary mission requirements.

Definition & Design Phase: In Definition Phase, archive plan and conventions were defined. The Archive Plan consists of deciding what to archive, when, and generally how. Archive conventions consist of common attributes defined and should be followed across the teams when generating label products of their instruments. As part of archive plan, PDS4 data products types were identified for CH-2 instruments hosted on the orbiter. In design phase, archive structure was design at various levels, mission level (CH-2) design structure, instruments level design structure and finally data products design structure.

Production Phase: In the production phase Data Processing and Archival software was designed, developed and tested based on the planning and design phase mentioned above at ISSDC. Figure 4 shows Operational Data Processing (DP) software at ISSDC.

At present mission is in production phase and software is operationalized at ISSDC. The active archive for TMC2 and IIRS is getting generated as per mission payload operations plan.

Distribution & Maintenance Phase: This phase comes once instrument lock-in period is over. In this phase long term archive preparation will start by taking active archive as input and other PDS4 components - calibration, document, context, miscellaneous and xml_schema will get assembled with active archive. Once long term archives are ready for validation and verification, peer review process will be carried out.

Planetary Data Access Protocol (PDAP) needs to be implemented in the form of user interface defined as per PDAP specifications for PDS4 data archive of Chandrayaan-2 mission.

References: [1] Chandrayaan-2 Science data management and Archive plan (Chandryaan2/DP/SAC/SIPG/HRDPD/TR-06/July 2018), [2] Chandrayaan-2 SAC DP – ISSDC Interface for Archival (Chandrayaan 2/DP/SAC/SIPG/HRDPD/TR13/Dec. 2018), [3] PDS4 Concepts Data Design Working Group October 1, 2018 version 1.11.0, [4] Planetary Data System Standards Reference Version 1.11.0 October 1, 2018, Jet Propulsion Laboratory, [5] The PDS4 Data Provider's Handbook Guide to Archiving Planetary Data Using the PDS4 Standard Version 1.11.0 October 1, 2018, [6] PDS4 Data Dictionary Abridged – Version 1.11.0.0