Making the PDS Planetary Plasma Interactions (PPI) Node Data Accessible via the EPN-TAP Protocol, HAPI Server, and PDS API.

I. Moon[1], S. P. Joy[2], J. Faden[3], J. N. Mafi[4], R. Walker[5], B. Cecconi[6], S. Erard[7]

[1]University of California, Los Angeles, Los Angeles, CA 90095 USA (imoon@igpp.ucla.edu),

[2]University of California Los Angeles, Los Angeles, CA 90095 USA (sjoy@igpp.ucla.edu),

[3]The University of Iowa, Iowa City, IA, USA (faden@cottagesystems.com),

[4]University of California Los Angeles, Los Angeles, CA 90095 USA (jmafi@igpp.ucla.edu),

[5]University of California Los Angeles, Los Angeles, CA 90095 USA (rwalker@igpp.ucla.edu),

[6]Observatoire de Paris, Meudon, 92195 France (baptiste.cecconi@obspm.fr),

[7]Observatoire de Paris, Meudon, 92195 France (stephane.erard@obspm.fr)

Introduction: PDS Planetary Plasma Iteraction(PPI) Node is improving data access between data systems. In particular, we have developed support for the EuroPlaNet Table Access Protocol (EPN-TAP) and the Helophysics Applications Programmer's Interface (HAPI)

Data access between data systems within and across space science disciplines has long been a goal of NASA and many other national and international organizations. The EuroPlaNet Table Access Protocol (EPN-TAP) provides a mechanism for achieving this goal. EPN-TAP is directly derived from the International Virtual Observatory Alliance's (IVOA) TAP protocol which is designed to access metadata organized in relational database tables. The planetary adaption of the TAP protocol uses an extra characterization based on the Europlanet Data Model. Once data services are described in an IVOA registry they can be queried by any TAP client. The Virtual European Solar and Planetary Access(VESPA) and ESA's Planetary Science Archive (PSA) have already implemented or partially implemented the EPN-TAP protocol. The number of services available with EPN-TAP is done with 46 data collections.

HAPI is a RESTful API than has been implemented in JAVA to support the transfer of data within a user specified time range. At PDS-PPI, we've implemented the HAPI server to work with PDS4 data at the data collection level, combining files into one data stream for each data set. The HAPI server uses the PDS4 metadata to determine which files or partial files within a collection meet the user requested time interval, and the files are combined to serve the request.

The Planetary Data System (PDS) is also developing a RESTful API server to search and access PDS data server. The PDS API is a Java application based on SpringBoot and Swagger frameworks. This API standardizes data between different nodes in PDS and is being developed to work specifically with data having PDS4 metadata. This API is built on top of the Elastic-search, PDS Harvest, and PDS Registry Manager Tools.

Conclusion:
EPN-TAP and HAPI services are running. This will enable PPI to serve more of user community. The PDS API will make data use across PDS easier.

References:
[1] Stéphane Erard, Baptiste Cecconi, Pierre Le Sidaner, Markus Demleitner. (2020) *EPN-TAP:* The EPN-TAP protocol for the Planetary Science Virtual Observatory

[2] Robert Weigel, Jon Vandegriff, Jeremy Faden, Aaron Roberts, Todd King, Robert Candey, Bernard Harris. (2021) The Heliophysics Application Programmer's Interface Specification 3.0.0. https://github.com/hapi-server/data-specification/raw/master/hapi-3.0.0/HAPI-data-access-spec-3.0.0.pdf

[3] Jordan Padams, The PDS Application Programming Interface (API), https://github.com/NASA-PDS/pds-api/blob/main/docs/spec/pds-api-specification.md