PDS ANALYST'S NOTEBOOK FOR INSIGHT MARS LANDER. T. C. Stein[1], R. E. Arvidson[1], F. Zhou[1],

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Introduction: The Planetary Data System (PDS) Analyst's Notebook (AN) [1] for the InSight Mars Lander [2] is an interactive web application containing peer-reviewed, publicly available data delivered by the instrument teams, supported by documentation describing context for the observations, processing methodology, and data formats. The AN for InSight (https://an.rsl.wustl.edu/ins) joins the suite of Analyst's Notebooks for NASA landed missions, including Mars Science Laboratory Curiosity rover, Mars Exploration Rovers Spirit and Opportunity, Mars Phoenix Lander, and the lunar Apollo and LCROSS missions.

Populating the Notebook: The Analyst's Notebook for InSight contents are updated coincident with PDS data releases as defined in mission archive plans. Notebook functionality is enhanced by collaboration between data producers and PDS archivists that begins soon after mission selection with creation of the project data management and archive plans.

Data. The InSight AN contains, peer-reviewed PDS archives from all science instruments: the Auxiliary Payload Sensor Suite (APSS) (InSight Flux Gate (IFG), Pressure Sensor (PS), and Temperature and Winds for InSight (TWINS)); Heat Flow and Physical Properties Probe (HP3, RAD); the Instrument Deployment System (IDS) (Instrument Context Camera (ICC), Instrument Deployment Arm (IDA), and Instrument Deployment Camera (IDC)); Rotation and Interior Structure Experiment (RISE); and Seismic Experiment for Interior Structure (SEIS).

Documents. The InSight AN includes data archive documentation and sol (i.e., Mars day) documents. The sol documents include the mission manager reports that provide a view into science operations—insight into why and how particular observations were acquired. The reports have not been edited only for grammar and spelling, and removal of spacecraft and instrument sensitive materials.

Data archive documents contain detailed information regarding the mission, spacecraft, instruments, and data formats, including calibration information and errata provided by the InSight project.

Navigating through the Notebook: The AN content is divided into sections like a physical notebook as described below.

Mission Summaries. The mission summary tables provide an overview of surface operations. Information is derived from the mission science and instrument teams reports. The historical overview summarizes InSight surface operations with brief entries for each sol's activity and contains links to the data. In addition, a table of timekeeping values for each sol of surface operations is included in the Notebook. Both tables are sortable and can be downloaded.

Sol Summaries. The Sol Summaries provide a way to step through surface operations details on a sol-by-sol basis (Figure 1).

Data products are arranged in order of acquisition, and are grouped into logical sequences, such as a series of image data. Sequences, and the individual products that comprise them, may be viewed in detail and downloaded, either directly, or as part of a shopping cart style order.

Detailed data product views vary by instrument. Data set documents and PDS labels containing metadata about individual observations are available for all products. In some cases, graphs and derived data also are available. Image data may be presented in both browse and full-resolution versions, the latter supported by a custom viewer that supports zoom and pan operations and user-defined annotations.

Within the Sol Summaries, documents from the mission manager are viewable, along with a summary of observations for the sol.

Searching. The InSight AN includes facet-based data search. Data products may be searched by time (sol, spacecraft clock time, and solar longitude), instrument, command sequence, product type, and product ID. Results are updated as filter settings are changed, and searches can be bookmarked for later recall.

Resources. Mission and instrument documents are contained in the Resources, along with links to related web resources.

Online Help and Support. Guidance is provided through a series of searchable help pages. Topics include getting started, using the Notebook, about the missions and data, release notes, and deep dives for power users.

User support is available within the AN from the Help section's feedback form, by email to an@wunder.wustl.edu, or using the PDS Geosciences Node forum linked from the AN help section.

Additional Features: Several features are part of the InSight AN to enhance the user experience. Functionality of these features is based on user community feedback, as follows.

User accounts. An account is not required to use the Notebook. but using one provides a synchronized experience across machines and browsers. Viewing history, image annotations and measurements, personalized

bookmarks, and data orders are maintained between sessions.

A user's account name and password are the same for all Notebooks that support accounts. An account is not required for the cart order function.

Data Ordering via Cart. Data and documents may be ordered using a cart paradigm common to commerce web sites. Selected items may be added to the user's cart in the Sol Summaries and Search portions of the Notebook. At checkout, the user specifies whether to receive primary or derived products, sort order, and delivery mechanism. Presently, zip/gzip files and a web page of links to requested items are supported outputs.

Bookmarks. Users may create a personalized list of favorite data products and documents for later recall using the bookmark function. In addition, custom searches may be saved as bookmarks. User bookmarks are for individual use only and are not shared or made public.

Feedback. User comments and suggestions have sparked many aspects of the Analyst's Notebook. Such feedback can be submitted using a built-in form available on every Notebook page, alleviating the need to send email from a separate program.

Future Development: Notebook functions are based on previous user suggestions, and feedback continues to be sought. (User feedback should be submitted to an@wunder.wustl.edu or by using the online form.) Work continues to incorporate additional features, especially in the areas of related observations and visualization.

References:
[1] Stein, T.C. et al. (2010), LPS XLI, Abstract #1414.
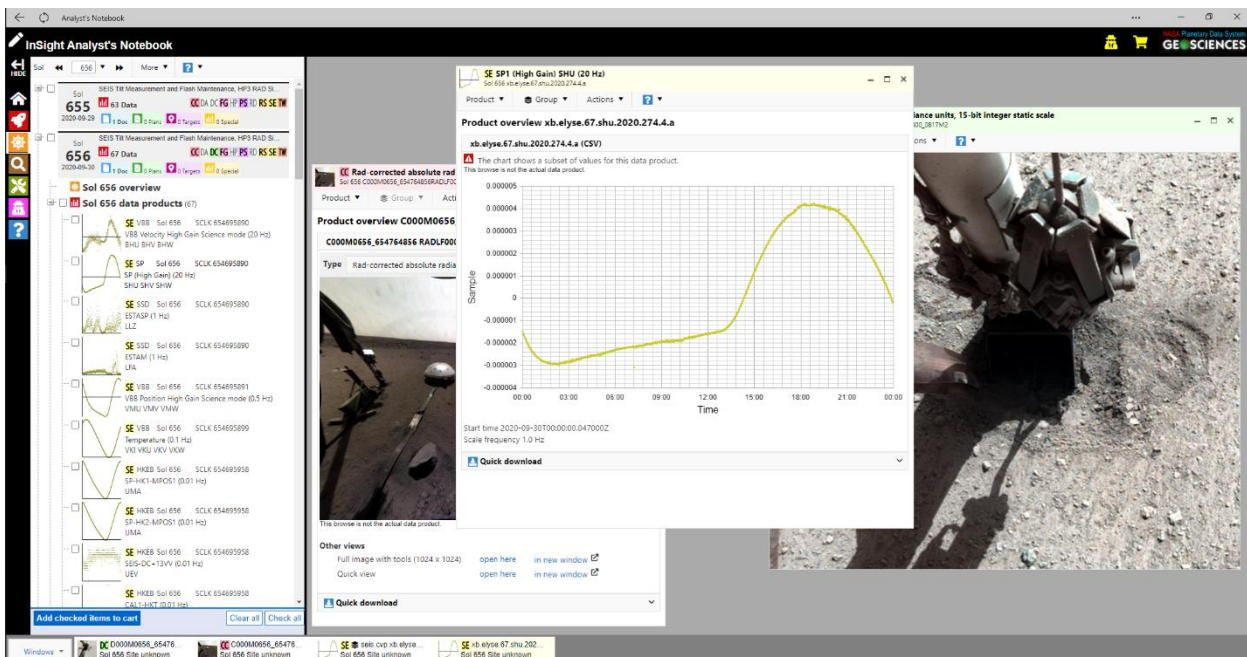[2] Banerdt, W.B. et al. (2018), LPS XLVIII, Abstract #1896.

Figure 1. Screen capture of the InSight Analyst's Notebook sol summaries section. Several data products are shown as popup windows in the workspace on the right side.