Introduction: In 15 years of service, the Wide Field Planetary Camera 2 (WFPC2) onboard the Hubble Space Telescope (HST) obtained over 10,000 frames of Solar System images. Since standard data reduction pipelines are typically not optimized for moving-target data, our “planet pipeline” uniformly reprocesses and catalogs this WFPC2 image collection to make it more immediately science-ready. We intend to include images from Hubble’s other cameras later. Some of our processing steps engage citizen scientists to perform visual inspections. Our corresponding database enables robust queries which are more specific to planetary science, helping archival researchers quickly find and utilize the prepared images within our collection for a wide range of scientific analyses. Our processed images and associated catalogs will be made available as High Level Science Products (HLSP) in the Mikulski Archive for Space Telescopes (MAST).

Special data processing: Our processing includes additional steps, beyond the basic calibrations performed by the standard pipelines, which are idiosyncratic enough that they can be a significant barrier to faster and deeper analyses by scientists unfamiliar with HST data. Cleaning up moving target images requires an ability to distinguish real objects from artifacts in single images. For the initial rejection of bad pixels, cosmic rays, and star trails, we use single-image rejection techniques based on Laplacian edge detection [1]. Then each image is visually inspected to identify missed rejections of artifacts, and also unintentional rejections of real objects or features. The inspections can also record secondary and serendipitous objects and features in each image, to form a comprehensive catalog. Overlayed finder charts are used to help verify which satellites were detected in each frame, and possibly help reveal the presence of any other objects (Figure 1).

Engaging citizen scientists: Many moving-target image processing and analysis steps still rely on visual verification and acuity. Since our data set is large, we can now rely on the fast-growing population of citizen scientists for several of the tasks described above. Our “Planet Investigators” website (Figure 2) will allow people to assist us in verifying our artifact rejections and object catalogs [3]. It is now easily possible to have each image inspected multiple times. Also, most Solar System objects fit on the higher-resolution Planetary Camera (PC), which means that the much larger adjacent Wide Field (WF) data was in many cases ignored, and may have never been fully inspected by human eyes. The possibility of citizens discovering Solar System objects in these often unexamined “bonus” fields is also tantalizing.

Enhanced database: We created a database which provides access to our High Level Science Products (HLSP), and resolves issues that make standard MAST queries of planetary data prone to incompleteness. Our web-accessible interface allows robust queries which are more specific to planetary science, utilizing our standardized target names and meta-data (Figure 3). Our database will allow archival researchers to mine this large data collection more effectively.