

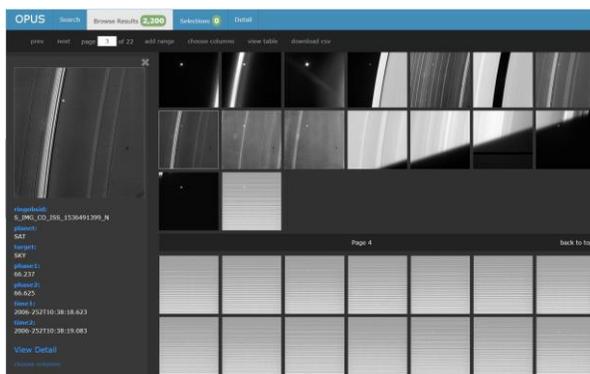
OPUS: A Comprehensive Search Tool for Remote Sensing Observations of the Outer Planets. Now with Enhanced Geometric Metadata for Cassini and New Horizons Optical Remote Sensing Instruments. M. K. Gordon¹, M. R. Showalter¹, L. Ballard¹, M. Tiscareno¹, R. S. French¹, D. Olson¹. ¹Carl Sagan Center, SETI Institute, Mountain View, CA (mgordon@seti.org),

Introduction: The PDS Ring-Moon Systems Node hosts OPUS – an accurate, comprehensive search tool for spacecraft remote sensing observations beyond the asteroid belt. OPUS supports Cassini (CIRS, ISS, UVIS, VIMS), New Horizons (LORRI, MVIC), Galileo (SSI), Voyager (ISS), and Hubble (ACS, STIS, WFC3, WFPC2). OPUS results include calibrated images for both Cassini ISS and Voyager ISS.

OPUS provides a large suite of searchable parameters. The basic parameters – spacecraft, instrument, start and stop time, target, are available of course, but we include many more. Select an instrument, say Cassini ISS, and new menus become available with parameters specific in this case to images, to Cassini, and to Cassini ISS. Now you can search for a specific filter, or an orbit number, or more than two dozen additional parameters.

At any point during your search you can select “Browse” and see a gallery view of the search results in the form of thumbnails tailored for each specific observation type.

Just for fun, start by selecting Cassini ISS – there are more than 400,000 hits. Want to know how many of those images are associated with occultations? Type “occ” in the field “Observation Name” under mission constraints; the answer is 2,200. Here is one page of the gallery view of the results:



The thumbnails are of images obtained by ISS during a 2006 occultation of Alpha Scorpius which also was observed by Cassini VIMS.

Enhanced geometric metadata. We produce and incorporate into OPUS detailed geometric metadata for every object in the instrument field of view for the Cassini ISS, UVIS, and VIMS Jupiter and Saturn en-

counters, and for the New Horizons LORRI Jupiter and Pluto encounters. This enables highly accurate searches based on latitude, longitude, illumination parameters, and much more.

Want to find high resolution images of the Enceladus plumes? No problem. Select Enceladus from the Surface Geometry “Target Name” menu, then use the Enceladus Surface Geometry menu to request high resolution, high phase angle, and latitudes near the south pole. The result is a set of images including the three, obtained through different filters, which were combined to make this image:



Just as easily, you can find specific volcanoes on Io, the Great Storm of 2010/2011 on Saturn, or Tombaugh Regio on Pluto.

Ongoing developments. We are constantly improving the OPUS interface and the underlying database.

Geometry. This year, we will begin developing enhanced geometric metadata to support Cassini CIRS, New Horizons MVIC, and the complete set of Voyager ISS observations.

Expanded HST data. Through a recently awarded external grant, over the next three years we will expand our interface with the HST archives in order to add support for all solar system observations by all HST instruments, including the generation of enhanced geometric metadata for every product.

Improved Cassini ISS pointing. Through another external grant, we are developing a system to dramatically improve the camera pointing metadata for each Cassini ISS image. We will then provide backplanes containing geometric parameters at every pixel for each object in the field of view of every Cassini ISS image. [See R. S. French et al., this workshop].

OPUS: <https://pds-rings.seti.org/search>
RMS Node: <https://pds-rings.seti.org>