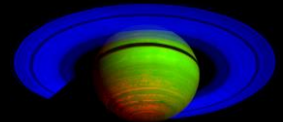




Accessing Cassini Saturn Data Made Easier

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- Cassini Research Issues**
- Future inaccessibility of Cassini science experts
- Cassini Data Highly Complex
- Cassini Data Not Easy to Find or Use
- Cassini Data in PDS not organized by Science Discipline
- Unanticipated Archive Responsibilities for Future Projects

Science Research Support (SRS) system houses unique support data that cannot be found anywhere else except within the PDS Help Pages:



<https://go.nasa.gov/2AU79O3>
 (Revamped Saturn PDS Help Page available in late 2018)

Cassini Saturn Planet and Atmosphere Science

On this page:

- Overview: Purpose of studying Saturn and instrument roles
- Saturn Data Resources: Links to find general Saturn data resources
- Saturn Formation and Evolution: Insights into the formation and evolution of Saturn
- In-situ Fundamentals: The shape, composition, magnetic field and rotation of Saturn
- Atmospheric Properties: Density, pressure and temperature structure, composition, zonal winds and haze, and their seasonal variabilities
- Global Circulation and Dynamics: Global cloud tracks and thermal zonal winds and their seasonal variability, vertical and latitudinal structures, and dynamical phenomena such as the polar vortices, the north pole hexagon and other planetary waves
- Auroral Observations: Insights into the origin and structure of Saturn's auroras, including spatial and temporal variabilities of temperature and UV emissions
- Ionosphere and Magnetic Fields: Diurnal variations and magnetic control of the ionosphere

- ### Science Themes
- Origin
 - Interior
 - Atmospheric Properties
 - Global Circulation and Dynamics
 - Auroral Observations
 - Magnetic Fields and Ionosphere

- ### Higher-Order Products
- Saturn Atmosphere Final Report
 - Fundamental Parameters: Mass, Gravity, Moments, Rotation Rate, Equatorial and Polar Radius
 - Upper Atmosphere Model
 - Tropospheric Atmospheric Model
 - Shape of Saturn at 0.1 bar and 1-bar
 - Zonal Winds
 - Thermal Maps
 - UVIS Aurora Guidebook
 - UVIS & VIMS Occultations
 - Saturn Target Working Team Story

- ### Engineering Products
- Saturn Segment Legacy Package
 - Jupiter Legacy Package
 - Saturn Observation Guide Spreadsheet
 - Graphical Timeline Plots
 - Cassini Legacy Graphics and Information Tool (Digit)
 - Cassini Information Management System (CIMS)
 - Segment Movies
 - Tour Atlas

- ### Finding Data Tools
- Event Calendar
 - Outer Planet Unified Search (OPUS)
 - PDS Image Atlas
 - SPICE

- ### Cassini / PDS Solutions
- Science Teams and Discipline Experts:** Generate and deliver most valuable research support data
 - Project:** Generate and deliver search & visualization tools to aid in science research
 - Project:** Develop Architecture to organize data by disciplines & science teams. House tools & data in Help Pages at the PDS.

Global Circulation and Dynamics

Sub-topics: Zonal Winds, Global Circulation and Convection, Seasonal Variation of Global Circulation and Convection

KEY REVIEW PUBLICATIONS

- In Saturn (Orlinin, T., Mathews, M. S., eds). Univ. Arizona Press, Tucson, (1994)
- Structure and dynamics of Saturn's atmosphere. pp. 199-238. Ingersoll, A. P., Beebe, R. F., Connell, B. J., and Hunt, G. E.
- In Saturn from Cassini-Huygens (M. K. Dougherty, L. W. Esposito, and S. M. Krimigis, Eds). Springer (2009)
- Saturn atmospheric structure and dynamics. pp. 113-159. Del Genio, A. D., Achterberg, R. K., Barnes, K. H., Flasar, F. M., Reed, P. L., Sánchez-Lavega, A., and Showman, A. P.
- In Saturn in the 21st Century (K. H. Barnes, F. M. Flasar, N. Krupp, T. Stallard, Eds). Cambridge University Press, in press, (2018)
- The global atmospheric circulation of Saturn. Showman, A. P., Ingersoll, A. P., Achterberg, R., and Kaspi, Y.

Zonal Winds

Determination of zonal wind speeds at various pressure levels in the atmosphere are included in this section. Key instruments that contributed to this topic are: CIS, VIMS and CIRS.

KEY PUBLICATIONS

- In Saturn from Cassini-Huygens (M. Dougherty, L. W. Esposito, and S. M. Krimigis, Eds). Springer (2009)
- Saturn Atmospheric Structure and Dynamics. pp. 113-159. Del Genio, A. D., Achterberg, R. K., Barnes, K. H., Flasar, F. M., Reed, P. L., Sánchez-Lavega, A., and Showman, A. P.
- Additional Publications [click to open]

WIND DATA

- Zonal Winds vs. Latitude (CIS)
- Additional wind data set at 5-microns (1.5-2.5 bars). Butcher, A., Liming, L., Jiang, X., Barnes, K. H., Fry, P. M., Morney, T. W., Dyudina, U. A. (2018).
- Saturn's global zonal winds explored by Cassini/VIMS 5-micron images. Geophy. Res. Lett. DOI: 10.1029/2018GL078159

Global Circulation and Convection

Global circulation and energy budget of Saturn's atmosphere are included in this section. Instruments contributing to this study are: CIRS, ISS, UVIS, VIMS.

KEY REVIEW PUBLICATIONS

- In Saturn from Cassini-Huygens (M. Dougherty, L. W. Esposito, and S. M. Krimigis, Eds). Springer (2009)
- Saturn Atmospheric Structure and Dynamics. pp. 113-159. Del Genio, A. D., Achterberg, R. K., Barnes, K. H., Flasar, F. M., Reed, P. L., Sánchez-Lavega, A., and Showman, A. P.
- Additional Publications [click to open]

Seasonal Variation of Global Circulation and Dynamics

Major changes in the visible atmosphere of Saturn can be traced back to seasonal variations. This section focuses on its attention on solar and seasonally driven phenomena. Instruments contributing to this study are: CIRS, ISS, UVIS, VIMS.

KEY PUBLICATIONS

- In Saturn from Cassini-Huygens (M. Dougherty, L. W. Esposito, and S. M. Krimigis, Eds). Springer (2009)
- Saturn Atmospheric Structure and Dynamics. pp. 113-159. Del Genio, A. D., Achterberg, R. K., Barnes, K. H., Flasar, F. M., Reed, P. L., Sánchez-Lavega, A., and Showman, A. P.

Polar Regions

Dynamics and phenomena occurring near the vicinity of both north and south poles of the planet are included in this section. Instruments contributing to this study are: CIRS, ISS, UVIS, VIMS.

KEY REVIEW PUBLICATIONS

- In Saturn in the 21st Century (K. H. Barnes, F. M. Flasar, N. Krupp, T. Stallard, Eds). Cambridge University Press, in press, (2018)
- Saturn's polar atmosphere. Sayanov, K. M., Barnes, K. H., Dyudina, U. A., Fedichev, L. N., Sánchez-Lavega, A., and West, R. A.
- Additional Publications [click to open]

Auroral Observations

Auroras on Saturn occur in a process similar to Earth's northern and southern lights. Particles from the solar wind are channeled by Saturn's magnetic field toward the planet's poles, where they interact with electrically charged gas (plasma) in the upper atmosphere and emit light. At Saturn, however, auroral features can also be caused by electromagnetic waves generated when the planet's moons move through the plasma that fills Saturn's magnetosphere. Here the focus is on contributions from optical remote sensing instruments: CIRS, ISS, UVIS, and VIMS.

KEY REVIEW PUBLICATIONS

- In Saturn from Cassini-Huygens (M. Dougherty, L. W. Esposito, and S. M. Krimigis, Eds). Springer (2009)
- Auroral Processes. pp. 333-374. Kuhn, W.S., Bunon, E.J., Clarke, J.T., Cray, J.J., Godwin, D.C., Ingersoll, A.P., Dyudina, U.A., Lamy, L., Mitchell, D.G., Pearson, A.M., Price, W.B., Sisco, J., and Stallard, T.
- In Saturn in the 21st Century (K. H. Barnes, F. M. Flasar, N. Krupp, T. Stallard, Eds). Cambridge University Press, (2018)
- Saturn's Aurora. Stallard, T., Soderstrom, S., Dyudina, U., Godwin, D., and Lamy, L.
- Additional Publications [click to open]

AURORAL DATA

Search Tools

- The Event Calendar is one way to find data associated with particular events such as auroral observations.
- OPUS is a tool used to search for CIRS, ISS, UVIS and VIMS data all in one place.

Auroral Observation Reference Tables

The Auroral Observation Table (AOT) [CSV download] has a list of all planned auroral observations and their time stamps.

- Preliminary Fields and Particles and Auroral Schedules to help find data for the planned observation dates
- Observed information and data from John Clarke's Visible Spectroscopy (VIST) Auroral Campaign (Jan 13 - 28 2007 and Jan 1 - Feb 16 2008) in comparison with Cassini data
- Download schedule for 2013 joint Cassini - ground-based auroral campaign (link, pdf)

Processed data

- UVIS Auroral Guidebook with images and movies
- Auroral Observation Data Book from UVIS

Table of Saturn Occurrence Time Periods

Segment	Start	End	Legacy Package	Download	View
SATURN_1_A	2004-121715:00:00	2004-288718:00:00	Link	Link	Link
SATURN_1_B	2004-288718:00:00	2004-345730:00:00	Link	Link	Link
SATURN_1_C	2004-345730:00:00	2004-411730:00:00	Link	Link	Link
SATURN_1_D	2004-411730:00:00	2004-501730:00:00	Link	Link	Link
SATURN_1_E	2004-501730:00:00	2004-581730:00:00	Link	Link	Link
SATURN_1_F	2004-581730:00:00	2004-661730:00:00	Link	Link	Link
SATURN_1_G	2004-661730:00:00	2004-741730:00:00	Link	Link	Link
SATURN_1_H	2004-741730:00:00	2004-821730:00:00	Link	Link	Link
SATURN_1_I	2004-821730:00:00	2004-901730:00:00	Link	Link	Link
SATURN_1_J	2004-901730:00:00	2004-981730:00:00	Link	Link	Link
SATURN_1_K	2004-981730:00:00	2004-1061730:00:00	Link	Link	Link
SATURN_1_L	2004-1061730:00:00	2004-1141730:00:00	Link	Link	Link
SATURN_1_M	2004-1141730:00:00	2004-1221730:00:00	Link	Link	Link
SATURN_1_N	2004-1221730:00:00	2004-1301730:00:00	Link	Link	Link
SATURN_1_O	2004-1301730:00:00	2004-1381730:00:00	Link	Link	Link

2010-2012 Great Storm

Overview: Once every 20-30 years, Saturn erupts with planet-wide storms. Cassini was there to see this rare event up-close and personal. Instruments contributing to this study are: CIRS, ISS, NACAM, SPICAM, UVIS, VIMS.

KEY PUBLICATIONS

- In Saturn in the 21st Century (K. H. Barnes, F. M. Flasar, N. Krupp, T. Stallard, Eds). Cambridge University Press, in press, (2018)
- The Great Storm of 2010-2011. Sánchez-Lavega, A., Fisher, G., Fedichev, L. N., García-Melendo, E., Heaman, B., Pérez-Hoyos, S., Sayanov, K. M., and Sromovsky, L. A.
- Additional Publications [click to open]