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In This Issue

Planetary Environments, Part 9: Saturn

by Garry Toth and Don Hillger (Un-manned Satellite Philately)

This is the ninth article in the *Astrofax* series on planetary environments. The first seven in the series appeared in the previous seven issues of *Astrofax*:

1. *Planetary Environments, Part 1: Introduction* (Volume 31, Issue 2, Summer 2023)
2. *Planetary Environments, Part 2: The Moon* (Volume 31, Issue 3, Fall 2023)
3. *Planetary Environments, Part 3: Mercury* (Volume 31, Issue 4, Winter 2023)
4. *Planetary Environments, Part 4: Venus* (Volume 32, Issue 1, Spring 2024)
5. *Planetary Environments, Part 5: Mars, Part 1* (Volume 32, Issue 2, Summer 2024)
6. *Planetary Environments, Part 6: Mars, Part 2* (Volume 32, Issue 3, Fall 2024)
7. *Planetary Environments, Part 7: Jupiter* (Volume 32, Issue 4, Winter 2024)
8. *Planetary Environments, Part 8: Jupiter's Galilean Moons* (Volume 33, Issue 1, Spring 2025)

This article will concentrate on the planet Saturn. Some of its rings and moons are mentioned, but with few details. The next article in this series, Part 10, will be devoted to Saturn's principal moons.

Introduction and History

Saturn is one of two gas giants in the solar system (the other is Jupiter, with which it shares certain characteristics, though its dazzling rings put it in a class by itself). It is the farthest planet from Earth that is easily visible to the naked eye and was known to all the ancient peoples. The oldest written records about the planet, from around 700 BC, are attributed to the Assyrians (reference). Around 400 BC, the Greeks named this "wandering star" in honor of Kronos, a son of Gaia (Earth) and Ouranos (sky). Kronos was the Greek god of agriculture, and in modern Greek the planet retains that name (Κρόνος); the Roman equivalent, Saturn, is the name that most of us use today (Fig 1).

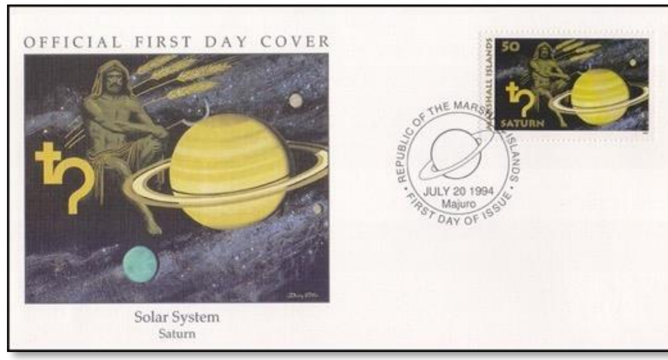

Figure 1. Marshall Islands, FDC, Sc582i, 1994

The earliest telescopic observations of the planet were made by Galileo (Fig 11) in July 1610. Fig 2 depicts "Galileo's telescopes" in the context of Saturn. He saw two "projections" (*ansae* in Latin) on either side of the disk. Worse yet, with time they disappeared, making him wonder if Saturn had swallowed his children, but they later reappeared! He was mystified. We now know that his telescope was unable to resolve the rings, and the *ansae* vanished when the rings were edge-on to Earth. Some of his sketches of Saturn are found here.

Figure 2. Liberia, No Cat.#, 2024

Figure 3. Romania, Sc3135a, 1983

Johannes Kepler (Fig 3 depicts both him and Saturn) believed that the planets could influence Earth's atmosphere. For example, he thought that the conjunction of Saturn and the Sun would produce cold weather. He published astrometeorological calendars that included weather predictions (reference). As an aside, "the best conjunction ever" of Saturn and Jupiter took place on 21 December 2020 (Ref 1 and online).

Subsequent work (reference) built on Galileo's studies. The Dutch astronomer Christiaan Huygens (Figs 4 and 26) constructed a refracting telescope with which he discovered Saturn's largest moon Titan in 1655. At that time the rings were again edge-on to Earth and so were invisible to him. In the following years, though, he saw that the *ansae* were in fact a large ring around the planet, and published that discovery in his *Systema Saturnium* in 1659. Observations by the English polymath Robert Hooke in 1666 (Fig 5, a cancel from a Great Britain FDC) and the first Astronomer Royal John Flamsteed in 1671 (Fig 6) refined Huygens' work. The stage was thus set for the astronomer Jean-Dominique Cassini (Figs 7, 26 and 28), who in 1675 discovered a dark gap (the "Cassini Division") between what are now called rings A and B. This proved that the whole ring was not a single, rigid disk. Cassini also discovered the moons Iapetus, Rhea, Tethys and Dione. Cassini and his Saturnian discoveries are featured in a new Italian stamp (issued on 8 June 2025). It is illustrated in the New Issues section below.

Figure 4. Grenada, Sc2932h, 2000

Figure 5. Great Britain, Sc1285-8, 1989, Cotswold Covers

Figure 6. Guinea, Mi7610, 2010

Most later astronomers thought that Saturn was encircled by several solid rings. Was that even possible? In one of the earliest theoretical studies of the ringed planet, the Scottish physicist James Clerk Maxwell (Fig 8) demonstrated in 1859 that "the only system of rings which can exist is one composed of an indefinite number of unconnected particles, revolving around the planet with different velocities according to their respective distances" (reference). In 1895, the American astronomer James Edward Keeler observed that the rings' inner edges moved faster than their outer edges, thus confirming Maxwell's calculations (reference). In 1947 the astronomer Gerard Kuiper predicted that the rings are composed of particles of water ice. We now know that they are 90-95% water ice mixed with bits of rock: billions of particles that "range in size from a grain of sugar to the size of a house [and] are believed to be debris left over from comets, asteroids or shattered moons" (reference). The rings are very thin compared to their horizontal extent. Various estimates range from as little as 10 m to around 1 km thick.

Figure 7. Cameroun, No Cat.#, 2017

Figure 8. San Marino, Sc1242, 1991

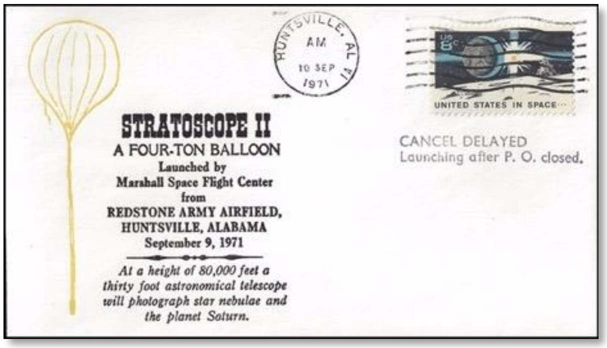

Figure 9. Stratoscope-2 Launch Cover, Centennial Cachet, 1971

Ground-based telescopic observations continued in the 20th and 21st centuries. In a few experiments, telescopes were carried aloft (e.g. Fig 9, a launch cover for the Stratoscope-2 balloon which carried a telescope designed to photograph Saturn and other celestial objects at 24 km altitude). Ongoing improvements in ground-based telescopes and techniques led to their making many useful studies of the Saturnian system. For example, IR (infrared) spectroscopy was used with the 5.1 m Hale telescope at Mt. Palomar to measure the altitudes and scattering properties of Saturn's clouds and haze (Ref 3). The VLA (Very Large Array) has also been used to study Saturn's atmosphere (Ref 4).

The Space Age revolutionized planetary science. Space telescopes brought the solar system "closer" to Earth. For example, Fig 10 depicts Saturn in glorious false colors in a composite of three IR (infrared) images taken in January 1998 by the HST (Hubble Space Telescope). "Different colors indicate varying heights and compositions of cloud layers generally thought to consist of ammonia ice crystals" (original image with description). Fig 11 contrasts the huge difference between HST and the first telescope of Galileo. In the OPAL (Outer Planet Atmospheres Legacy) program, HST observes the four giant planets. The program's observations of Saturn started in 2018. "The main goal of OPAL is to study long-term trends tied to seasonal or other evolutionary cycles (including storm activity, wind field variability, and changes in aerosols) in the highly dynamic atmospheres of the giant planets" (reference). Since its beginnings about 10 years ago, OPAL has documented some significant changes (e.g. see here). Its observations will provide a baseline for other programs. The James Webb Space Telescope (JWST) has also made IR images of all four giant planets. Saturn was the last of the four that it observed, on 25 June 2023 (reference). Fig 12, an MS4 (minisheet of four stamps) issued for the first anniversary of the JWST, also features Saturn in its right margin. In 2009, the SST

Figure 10. Great Britain, Sc1870, 1999

Figure 11. Morocco, Sc1086, 2009

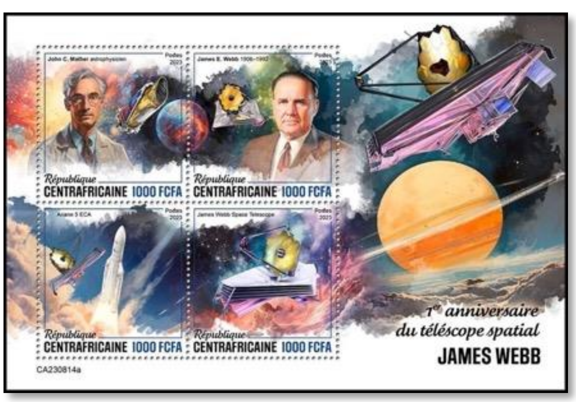

Figure 12. Central Africa, Mi16171-6174, 2023

(Spitzer Space Telescope, Fig 13) discovered a huge, low-density ring associated with Saturn's distant and small moon Phoebe (reference).

Figure 13. Sierra Leone, Sc2931a, 2009

Interplanetary spacecraft with scientific instruments that could observe planets "up close" were developed during the Space Age. Four have visited the ringed planet: Pioneer-11 (but not its twin, Pioneer-10), Voyager-1 and -2, and Cassini-Huygens.

Pioneer-11

Pioneer-11 was launched on 6 Apr 1973, flew by Jupiter on 12 Feb 1974, and first sighted Saturn on 20 November 1975 (Fig 14). The spacecraft detected Saturn's bow shock on 31 Aug 1979 at around 1.5 million km from the planet. This was the first conclusive evidence that Saturn does have a magnetosphere. With its IR radiometer, Pioneer-11 found that the planet emits 2.8 +/- 0.9 times more energy than it receives from the Sun.

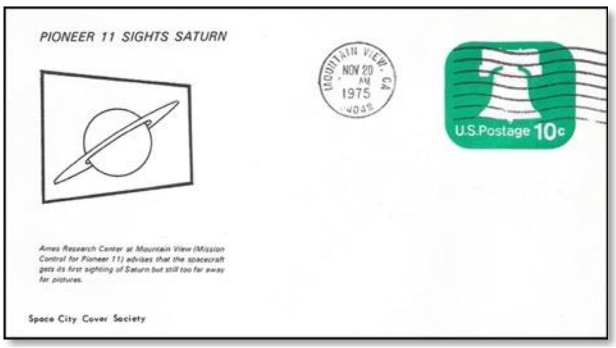

Figure 14. Pioneer-11 Event Cover, SCCS Cachet, 1975

The spacecraft took 440 images of the planetary system. It flew by Saturn at around 21,000 km above the cloud tops on 1 Sep 1979 (Figs 15 and 16). Some of its images showed that Saturn has latitudinal cloud bands, like those of Jupiter but subdued in comparison—fainter and less colorful. The planet's overall average cloud-top temperature was measured to be around -180 °C. Pioneer-11 also discovered a new ring, the F-ring, and confirmed that the moon Titan has a significant atmosphere. The spacecraft's main scientific results in the Saturnian system are summarized here and here.

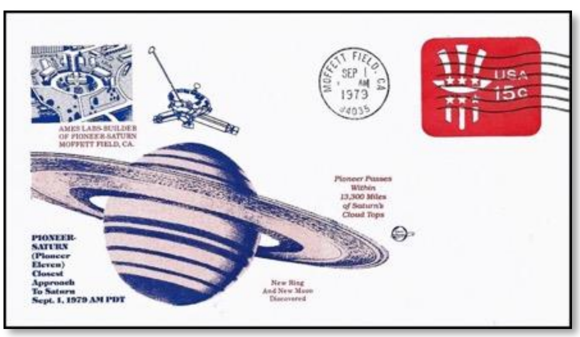

Figure 15. Pioneer-11 Cover, Space Voyage Cachet, 1979

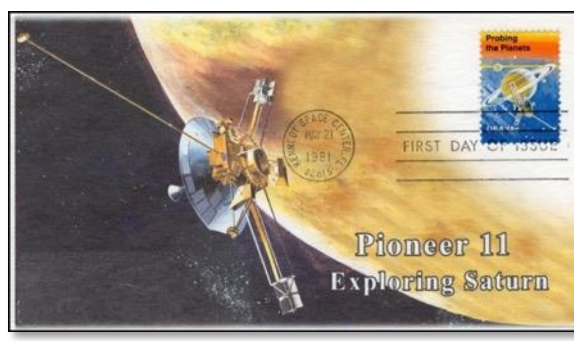

Figure 16. US, Sc1916, FDC, 1981

Voyager-1 and Voyager-2

Voyager-1 (launched 5 Sep 1977) and Voyager-2 (20 Aug 1977 launch) were designed to explore Jupiter and Saturn in more detail than the Pioneers that preceded them.

Voyager-1 (reference and Fig 17) began its Saturn encounter period on 22 Aug 1980. The Palau stamp of Fig 18 presents "the first photographic images of Saturn taken by Voyager-1."

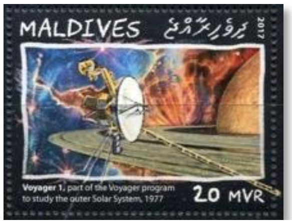

Figure 17. Maldives, Sc3941c, 2017

That depiction comes from an artist's rendering of a montage of images of the Saturnian system taken by Voyager-1 in Nov 1980. The original, and some information about it, are available here and here. The same image, rotated 70 degrees to the left, is found in a recent stamp from Togo (Fig 19). Voyager-1 provided around 19,000 photos of the Saturnian system in total.

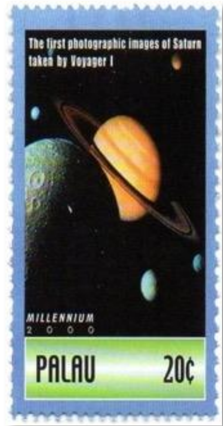

Figure 18. Palau, Sc539b, 2000

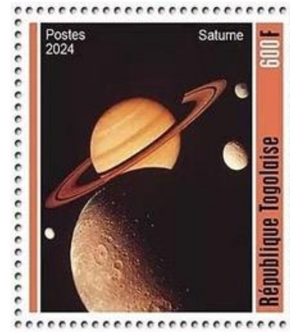

Figure 19. Togo, No Cat.#, 2024

Because of Pioneer-11's tantalizing observations of the Titanian atmosphere, mission planners sent Voyager-1 close to Titan even though the required trajectory would flip it out of the ecliptic so that it could not go on to Uranus and Neptune as Voyager-2 eventually would.

Voyager-1 flew within 6500 km of Titan on 11 Nov 1980. Its closest approach to Saturn, at 126,000 km above the cloud tops, took place around 18 hours later (Fig 20). Voyager-1 provided spectacular images of Saturn and its rings, which were seen to be composed of thousands of individual ringlets. It observed a dynamic Saturnian atmosphere with storms in the form of eddies and/or ovals embedded in the planetary-scale latitudinal cloud bands. It found that about 7% of Saturn's upper atmosphere is composed of helium, while almost all the rest is hydrogen. Those light elements mean that Saturn is the only planet in the solar system whose mean density is less than that of water.

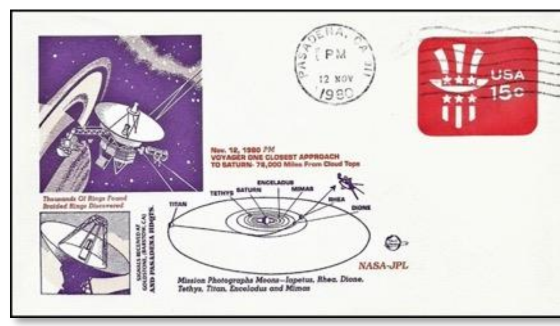

Figure 20. Voyager-1 Cover, Space Voyage Cachet, 1980

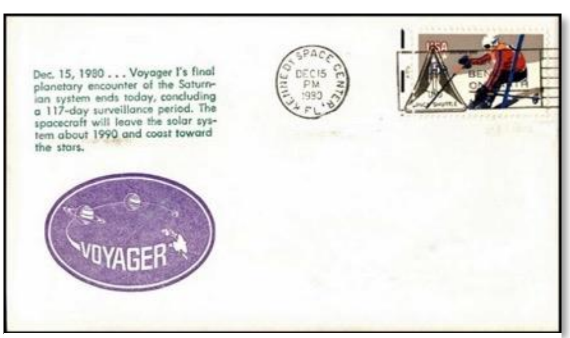

Figure 21. Voyager-1 Cover, Boudwin Cachet[?], 1980

The spacecraft confirmed Saturn's fast rotation when it measured a day length of 10 hours 39 minutes 24 seconds. This rapid rotation, acting on electric currents in the core, generates a strong magnetic field and a large magnetosphere. Voyager-1 also observed eastbound equatorial winds howling in the upper atmosphere at up to 1800 km/h. We now know that in the solar system only Neptune has stronger winds.

Analysis of those observations led to the conclusion that "the winds are not confined to the top cloud layer but must extend at least 2000 km downward into the atmosphere" (Ref 2). The winds decrease with increasing latitude and the first westward flows are found at around 40° N or S. Voyager-1's Saturn encounter period ended on 15 Dec 1980 (Fig 21).

Figure 22. US, Booklet, 1991

Voyager-2 followed about 9 months later (Fig 22). It continued Voyager-1's work with further observations of Saturn and its rings and moons in Saturn's northern winter. On 5 Jun 1981, the spacecraft began its Saturn encounter with its first photos of the ringed planet (Fig 23). Its planned trajectory through the Saturnian system took advantage of a rare alignment of the giant planets that permitted it to "slingshot" from Saturn to Uranus to Neptune with a minimal use of fuel. Voyager-2's closest encounter with Saturn took place on 25 Aug 1981 at 101,000 km above the clouds (Fig 24). On 26 Aug, the spacecraft conducted a radio occultation of Saturn's upper atmosphere. The data were subsequently reduced to give profiles of temperature and pressure as a function of height in the atmosphere and to infer magnetic field orientations in the upper ionosphere (reference). For example, a minimum temperature of -191 °C was found at the 70 hPa level (around the cloud tops). The temperature increased to -130 °C at the deepest levels probed (1200 hPa; Earth's surface pressure is close to 1000 hPa). Voyager-2's Saturn encounter period ended on 28 Sep 1981 (Fig 25).

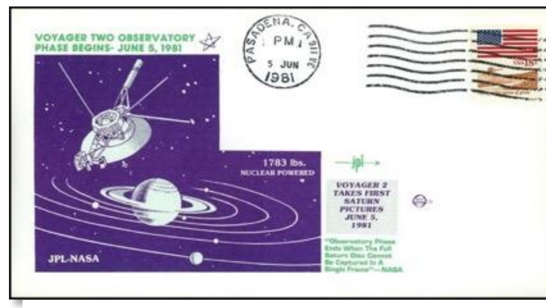

Figure 23. Voyager-2 Cover, Space Voyage Cachet, 1981

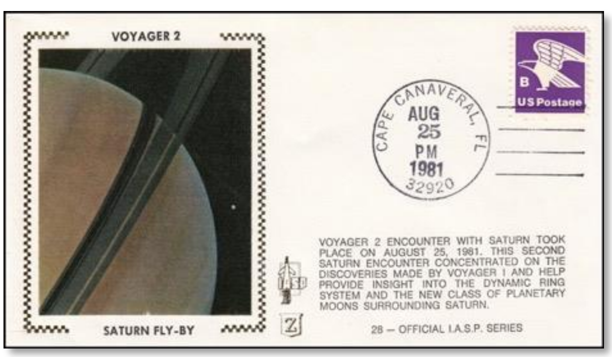

Figure 24. Voyager-2 Cover, ZASO-IASP Cachet, 1981

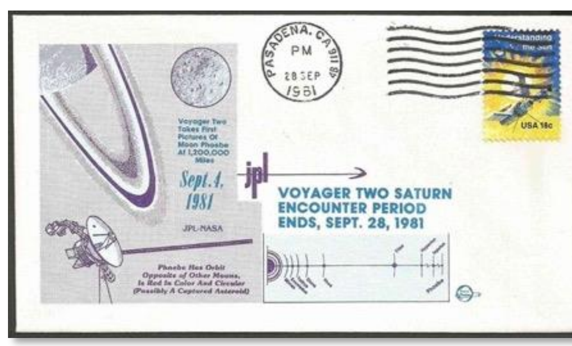

Figure 25. Voyager-2 Cover, Space Voyage Cachet, 1981

Cassini-Huygens

Saturn and Titan continued to beckon, and the ambitious Cassini-Huygens (C-H) mission eventually came to fruition. C-H was a Saturn orbiter ("Cassini") with a Titan lander ("Huygens"). It lifted off from Earth on 15 Oct 1997. The launch cover of Fig 26 depicts the spacecraft as well as the two astronomers for which it was named. After a complicated series of gravity assists at Venus, Earth and Jupiter, C-H finally entered orbit around Saturn on 30 Jun 2004 (Fig 27).

Figure 26. C-H Launch Cover. Space Voyage Cachet, 1997

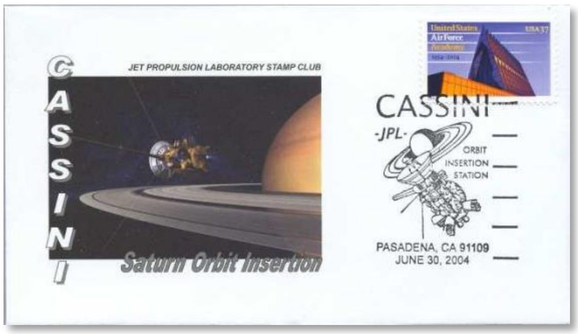

Figure 27. C-H Event Cover. JPL Cachet, 2004

The souvenir sheet of one stamp (SS1) of Fig 28 was issued for the 10th anniversary of that event and depicts both Cassini and the C-H spacecraft, whose illustration in the upper margin nicely shows how the Huygens lander (in bronze) was attached to the much larger Cassini orbiter. The mission's science objectives are summarized here. For Saturn itself, the orbiter would "study cloud properties and atmospheric composition, winds and temperatures, internal structure and rotation, ionosphere, origin and evolution." Cassini was to make similar studies of Titan and release the Huygens lander into Titan's atmosphere. There were also objectives for observing Saturn's rings, magnetosphere, and icy moons.

Figure 28. Guinea, BL246, 2014

A section on Saturn's magnetosphere and auroras is found below. Titan and some other moons of Saturn will be discussed in the next article in this series. In this article the rings are mentioned only in passing (extensive online information about them is available). They are a powerful symbol of the planet and are featured in many philatelic items. One example is a stamp which depicts "Saturn, the gas giant, and its sunlit rings seen by the Cassini satellite" (Fig 29).

Figure 29. Great Britain, Sc3117, 2012

Cassini orbited Saturn 293 times. It studied the Saturnian system for 13 years, almost half the ringed planet's year, from its late northern winter through its early northern summer. Cassini studied Saturn from the hazy top of its atmosphere to its interior. It observed the planet's jet streams and the clouds and storms embedded within its circulation bands as well as its unusual cloud patterns at the poles. It also observed Saturn's auroras and lightning. In total, the spacecraft provided 453,048 images (reference).

Saturn's Atmosphere and Principal Circulations
Saturn's atmosphere is almost entirely made up of hydrogen (~71 % by mass) and helium (~28 %). The principal trace components are methane and ammonia. In the vertical, a synthesis of Saturn's atmospheric temperature and cloud layers is presented in a diagram found here. The high haze layer and the upper deck of ammonia clouds have been directly observed while the middle layer (ammonium hydrosulfide crystals) and the lowest layer (water ice crystals/aqueous ammonia droplets) are "obtained indirectly by constructing chemical models of the behavior of compounds expected to be present in a gas of near solar composition following the temperature-pressure profile of Saturn's atmosphere" (reference). In the horizontal, Cassini confirmed various earlier observations that "Saturn [mostly] resembles a blander and less active Jupiter" with "many small-scale features such as red, brown and white spots, bands, eddies and vortices, that vary over a fairly short time" (reference) and are embedded in the larger-scale latitudinal bands.

There are exceptions to that general pattern, though. In Sep-Nov of 1990, the HST observed a giant whitish storm (a "Great White Spot") near the equator which stretched out around the planet before fading. The evolution of a similar storm, but in Saturn's northern mid-latitudes, is shown in the cachet of the stamped envelope in Fig 30. The series of six Cassini images starts on 5 Dec 2010 (upper left) and ends on 12 Aug 2011 (lower right). They show that the storm stretched out in its latitude band and eventually caught up to its own "tail" before weakening. Such storms can be full of lightning. The physics of their formation is poorly understood. One hypothesis is found here. Details of the event are found here. A much larger version of the cachet's upper-right image, taken on 25 Feb 2011, is available here (where it is numbered as Fig. 7).

Figure 30. Spain, Envelope, 2013.

Saturn also has other types of circulation. In 1987, Voyager-2's flyby views were re-mapped and pieced together over the north polar areas and a giant hexagonal storm centered on the pole became apparent (Ref 5). Starting in 2006, Cassini images of the polar area confirmed the storm's existence. How it forms is a subject of ongoing research (e.g. here). The JPL cachet of Fig 31 includes one of Cassini's images of the polar hexagon along with the information that "the spacecraft's Composite Infrared Spectrometer (CIRS) mapped the temperature and composition of Saturn's north polar vortex." The JPL cachet of Fig 31 includes one of Cassini's images of the polar hexagon along with the information that "the spacecraft's

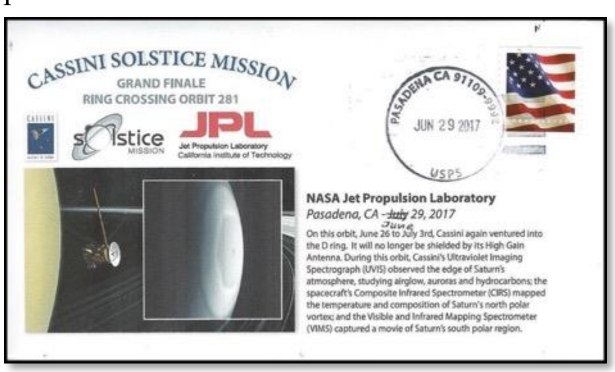

Figure 31. C-H Cover, JPL Cachet, 2017

Composite Infrared Spectrometer (CIRS) mapped the temperature and composition of Saturn's north polar vortex." The hexagon is also nicely depicted in the 190 value stamp from a Swiss set of 10 issued on 6 Mar 2025 for the solar system (all 10 are illustrated in the New Issues section below). Cassini also observed a corresponding storm at Saturn's south pole (reference). It is round rather than hexagonal and looks like a gigantic hurricane. The central "eye" is relatively cloud-free which implies subsidence and therefore warming. On 4 Feb 2004 the LWS (Long Wavelength Spectrometer) at the Keck Observatory in Hawaii measured an unexpectedly warm -122 °C) at the pole (reference). On 11 Oct 2006, Cassini's IR spectrometer measured an even higher value of -108 °C in that "hole at the pole" (reference), which is the warmest known point in Saturn's atmosphere.

Those Saturnian polar storms are reminiscent of the polar storms found on Jupiter. That and other similarities between Saturn and Jupiter suggest that some of their atmospheric dynamics may be similar as well. Various studies have attempted to model the relationship between the formation of the two planets' storms and their rotation and internal heat transfers and deep convection (e.g. here). A complication for Saturn is its relatively large axial tilt (25.3°, versus only 3.1° for Jupiter), which means that the resulting seasonal effects must be important, as they are on Earth, whose axial tilt is 23.5° (Fig 32 depicts Earth's axial tilt, its orbit and its "solstices and equinoxes"). "Saturn's atmosphere is affected by seasonal changes just like Earth's is, but perhaps even more so, because the poles spend nearly 15 Earth-years in winter darkness and the next 15 years in sunlight. On top of that, the cooling shadow of the rings causes differences in heating and sunlight-driven chemistry between the shaded and sunlit parts of Saturn's atmosphere" (reference). Yet another complication is the recent discovery from the Cassini dataset that there is a significant seasonal variation in Saturn's heat balance, related to the eccentricity of its orbit (see here and here). Disentangling all those competing effects to understand Saturn's meteorology and climate and how they change with time will be no mean feat.

Figure 32. Grenada, Sc490, 1973

Saturn's Magnetosphere and Auroras

The Pioneer-11 and Voyager flybys provided the earliest fragmentary information about Saturn's magnetosphere. Cassini provided a much more detailed look "by mapping the magnetic field, studying the flow of excited gases under its influence and observing how it affects Saturn's auroras." This reference summarizes Cassini's magnetospheric measurements. The remainder of this section will briefly discuss Saturn's polar auroras.

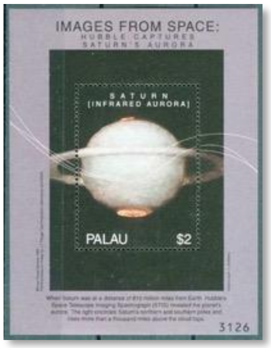

Figure 33. Palau, Sc528, 1999

Earth's auroras, emitted by oxygen and nitrogen, are in the visible spectrum, while Saturn's, emitted by hydrogen, are in the ultraviolet (UV) range. Saturn's auroras at first were thought of as an intermediate case between solar wind-triggered auroras, like those of Earth, and internally triggered auroras (like those of Jupiter), but Cassini's measurements indicate that the reality is more complicated (reference). Saturn's UV auroras are blocked by Earth's atmosphere so we can see them only from space. Pioneer-11 provided the first hint of their existence when it detected a UV brightening over Saturn's poles. The two Voyager spacecraft confirmed the UV emissions from those areas. Saturn's UV polar auroras are seen in an SS1 issued in 1999 (Fig 33). It reproduces the first image of those auroras obtained by the HST's STIS (Space Telescope Imaging Spectrograph) in October 1997. The original image and related discussion are found here. The stamp's text says "infrared" but should say "ultraviolet". Saturn's south polar UV auroras are featured in the stamp in Fig 34. The image is a composite of HST visible and UV images with a blue tint for the auroras. A similar image and some related information are found here.

Figure 34. Grenada, Sc3701c, 2009

Cassini's Grand Finale

From April to September of 2017, Cassini made 22 orbital "dives" between Saturn and its rings (several of them are illustrated in the cachet of Fig 35). This was the spacecraft's Grand Finale, in which it "provided the highest-resolution observations of Saturn's atmosphere including our closest-ever views of Saturn's polar cyclones, aurora, hexagon and clouds, as well as *in situ* measurements of Saturn's ionosphere and auroral regions." Moreover, "Saturn's ring particle composition was directly sampled for the first time from different parts of the main rings" (reference). Cassini's final orbits were so close to Saturn that it dipped into the planet's upper atmosphere, which it directly sampled with its INMS (Ion and Neutral Mass Spectrometer). Fig 36, canceled on 27 Aug 2017, is an event cover issued by JPL after the spacecraft completed its lowest Saturn orbit (orbit 290). The cachet shows a "black hole" in the cloud deck in an image from a close pass on 26 April 2017 (this reference includes that image and some information about it). Around 2000 km in diameter, the "hole" is a swirling storm that has been called a

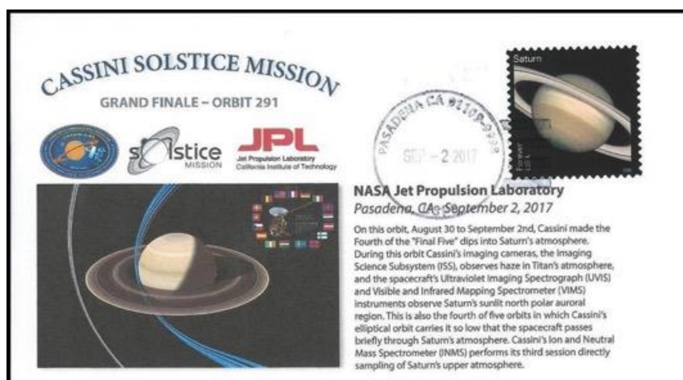

Figure 35. C-H Cover, JPL Cachet, 2017

Figure 36. C-H Cover, JPL Cachet, 2017

"giant hurricane." It is located above Saturn's north pole and is just visible as a black dot in Fig 31 in the center of the polar hexagon. Another image of the storm, along with the similar one at the south pole, is found here.

After its last full orbit the spacecraft, nearly out of fuel, was directed into Saturn's atmosphere on 15 Sep. "Cassini's final images were sent to Earth several hours before its final plunge, but even as the spacecraft made its fateful dive into the planet's atmosphere it was sending home new data in real time. Key measurements came from its mass spectrometer, which sampled Saturn's atmosphere, telling us about its composition until contact was lost" (reference). Those ultimate observations completed Cassini's vast scientific legacy.

Various philatelic items commemorate that dramatic plunge. Fig 37 is an SS1 that depicts the "Cassini spacecraft burning up in Saturn's atmosphere". The cancel in Fig 38, dated 14 Sep 2017, commemorates "Cassini's Grand Finale – Mission to explore Saturn – Twenty Years of Science" ("20" is the 7 years it took to get there plus 13 years in orbit around Saturn). The colorful event cover of Fig 39 is our final example. It includes the fateful date 15 Sep 2017 in the cancel, the cachet and the Zazzle.com postage stamp, whose design is reproduced in the cachet.

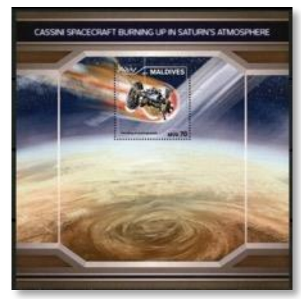

Figure 37. Maldives, Sc4028, 2018

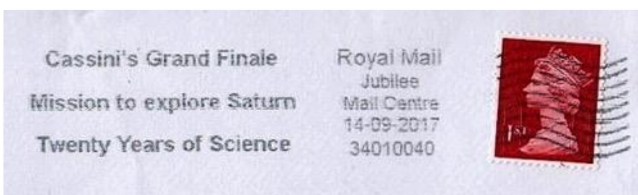

Figure 38. Great Britain, Cassini Cancel, 2017

Figure 39. C-H Cover, Lollini Cachet, 2017

The forthcoming generation of Saturnian system spacecraft will be dedicated to some of its moons rather than Saturn itself. The next article in this series will feature the ringed planet's principal moons.

Other References

Ref. 1: Berman, Bob. "The best conjunction ever."*Astronomy* magazine, December 2020, p. 14.

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Ref. 4: Li, Cheng et al, 2023. "Long-lasting, deep effect of Saturn's giant storms." *Science Advances* **9** (32).

Ref. 5: Godfrey, D. A., 1988. "A hexagonal feature around Saturn's north pole." *Icarus* **76** (2), 335-356.

Some readers may also wish to refer to the authors' extensive online lists of philatelic items for Planetary Environments and Un-manned Spacecraft.

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We have researched and written extensively about weather, climate, and un-manned spacecraft on stamps and covers, as well as some other topics. All our philatelic publications are available online.

Hubble's 35th Anniversary: HST Images on Stamps

By Gene R. Major

For 35 years the Hubble Space Telescope (US, 2000, Sc3409a) has been in continuous operation in orbit around the Earth. Hubble is still producing spectacular imagery and

new discoveries today. Over the years, Hubble images have been depicted on postage stamps from around the world. Hubble, unlike its new companion, the James Webb Space Telescope, has instruments sensitive to visible and ultraviolet light, which makes for amazing images. Here are a few of those images captured on stamps.

Planetary Nebula

Hubble has imaged some spectacular planetary nebula in our galaxy. Planetary nebula are gas and dust rings or shells expelled by a dying star (or stars), often in a nova event. The two planetary nebula shown in the stamps on the right (US, 2000, Sc3385 and Sc3387) are the Ring Nebula in Lyra, also known as M57—a favorite view in a small telescope, and the so-called called "Egg Nebula"—a protoplanetary nebula about 3000 light years away.

New Issues

Ireland—Jocelyn Bell Burnell

On 6 March 2025, Ireland Post [An Post] released a set of two stamps commemorating Women in STEM. One of the stamps celebrates the long overdue recognition of Northern Ireland astrophysicist Jocelyn Bell Burnell (Scott 2789). As a postgraduate student, Bell Burnell discovered the first radio pulsars in 1967—one of the most significant astrophysical discoveries of the 20th century. Her advisor, Anthony Hewish, received the Nobel Prize for this work in 1974 and Bell Burnell's contribution was largely ignored. Astronomer Fred Hoyle was highly critical of the decision of the omission. She has since received numerous awards and recognition. She was president of the Royal Astronomical Society (2002–2004) and president of the Institute of Physics (2008–2010). In 2018, she was awarded the Breakthrough Prize in Fundamental Physics and used the £2.3 million prize money to establish a fund to help female, minority and refugee students to become research physicists. The stamp was designed by Steve Doogan and measures 51 x 30 mm. It has no face value. The second stamp in the STEM set honors geneticist Aoife McLysaght, currently Head of the Genetics Department at Trinity University, researching molecular evolution.

Switzerland—Our Solar System

On 6 March 2025, Swiss Post released a set of 10 stamps highlighting the Solar System Each stamp depicts a planet in the solar system including the Earth, Earth's moon, and the Sun. The stamps are available separately or as a set of all ten designs together on a special sheet almost one meter wide. According to the Swiss Post, there are only 12,742 sheets available, which equals the average diameter of the Earth in kilometers. Other scientific facts about each celestial body can be found on the back of the special sheet. The set was created in collaboration with the Department of Astronomy at the University of Geneva and the University of Bern. The stamps were designed by Stefan Scherrer and each measure 32 x 28 mm and have various values.

Australia Antarctic Territory—Aurora Australis (Southern Lights)

Australia Post released a set of four stamps depicting the Aurora Australis (or Southern Lights) from the Australian Antarctic Territory (AAT) on 22 April 2025. The images capture the spectacular green, red and violet lights of the southern aurora. The stamps measure 26 x 37.5 mm and the minisheet 170 x 80 mm. The stamps were designed by Jo Muré. According to the Australia Post, the images on the stamps were taken from Casey Research Station in 2017 by meteorologist Barend (Barry) Becker using time-lapse photography. The minisheet photograph was taken at Casey Research Station on 30/05/2022 at dawn, 7.48 am, with a Nikon Z7ii, 20mm, f/1.8 lens, ISO 320, exp. 10s. AA016 DSC_3509-Enhanced-NR

Italy – Astronomer Giovanni Domenico Cassini

On 8 June 2025, Poste Italiane released a stamp celebrating the 400th anniversary of the birth of Italian-French astronomer Giovanni Domenico Cassini (1675). The stamp is printed by the Istituto Poligrafico e Zecca dello Stato S.p.A., in rotogravure, on white, neutral coated, self-adhesive paper with optical brightener, based on a sketch by Giustina Milite. It measure 48 x 40mm and has a "B" face value, equivalent to about €1.30. The stamp shows a portrait of Cassini, flanked by the planet Saturn, the four satellites discovered by him and its rings with his well-known Cassini Division. At the top, superimposed on a section of the Basilica of San Petronio in Bologna, is the scheme of the large solar sundial for astronomical studies created by Cassini in 1655.

Chile—40th Anniversary of Santiago University Planetarium

Chile Post (Correos) released a stamp on 11 April 2025 commemorating the 40th anniversary of the planetarium at Santiago University. The planetarium is a popular attraction for visitors and students. Architect Oscar Mac-Clure (1922-2024) designed the building, which was inspired by a Mayan temple. The planetarium houses a Carl Zeiss VI Projector. The stamp was designed by Mauricio. Navarro González and measures 36 x 48mm. It has a face value of 1,000 Chilean peso. The First Day Cover shows a special 40th anniversary of the planetarium cancellation.