

Un-manned Satellites on Postage Stamps : 9

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9. The SPOT and IRS series

This is the ninth in a series of articles about un-manned satellites on postage stamps. With this article we start a sub-series on environmental-observing satellites, featuring this time the low-earth polar-orbiting satellites in the SPOT and IRS series operated by France and India respectively. (Article number two—in *Orbit* for October 2003 - already covered the U.S. polar-orbiting Landsat environmental-observing spacecraft, along with similar-looking Nimbus weather satellites.)

The SPOT (Satellite Pour l'Observation de la Terre) earth resources satellite program began in 1978. SPOT was the first commercial satellite remote sensing system, and SPOT Image corporation was established in 1982 to market SPOT data and products. SPOT-1 was launched on 22 February 1986 and to date there have been five SPOT launches, with the last one on 4 May 2002. Successive generations of SPOTs have increased their spectral and spatial resolution capabilities for a number of applications: land-use, agriculture, forestry, mineral and oil resources, and cartography.

SPOTs are three-axis stabilized spacecraft in circular near-polar sun-synchronous orbits, similar to those used by weather satellites. However the narrower swath viewed by the instruments aboard SPOT means that not all portions of the earth beneath are viewed each day. The cycle of orbits is repeated exactly every 26 days, but a given location is viewed on average every 2.4 days, with an interval ranging from a maximum of 4 days at the equator to a minimum of 1 day near the poles.

The instrumentation on SPOT-1 provided 20 m resolution images in the visible and near-infrared spectrum as well as 10 m resolution panchromatic, wide-spectral-band black-and-white images. With SPOT-4, an important innovation was the addition of a spectral channel in the shortwave infrared, a region of the earth's electromagnetic spectrum that is useful for determining characteristics of the ground, including the detection and monitoring of hot spots from forest and range fires. SPOT-5 obtains multispectral images at 10 m resolution and panchromatic visible images at 2.5 m resolution.

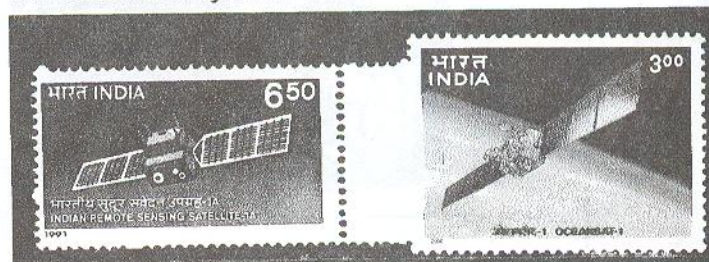
SPOTs are basically of two designs: the earlier design used by SPOT-1, 2, and 3; and the later design used by SPOT-4 and 5. Although the bodies of all five spacecraft are similar, the solar panels are quite different. The first design used a two-part rectangular solar panel 15.6 m in length. The latter design used a 5-sectioned solar panel with the sections placed in a



broad U-shape. Most of the postal items that show SPOT depict the first design, indicated as SPOT-1/2/3 in the table. One of the souvenir sheets, Guinea 1198a (above), specifically identifies the satellite as SPOT-2. For the latter design, only French Southern and Antarctic Territories C130 (below) shows the U-shaped solar panels. This solar panel design was also used by the French Helios, a scientific spacecraft that will be covered eventually in this series of articles.



The second environmental-observing satellite series discussed in this article is the IRS (Indian Remote Sensing) system. IRS is India's premier earth resources satellite program. The first launch of an IRS satellite, IRS-1A, took place on 17 March 1988. To date eight IRS spacecraft have been launched, with only one failure, that of IRS-1E. The most recent IRS launched was IRS-P4, also called Oceansat-1, with sensors designed primarily for viewing marine and coastal environments. More IRS variations are planned over the next several years.



Like SPOT, IRS satellites are 3-axis stabilized spacecraft operating in circular near-polar sun-synchronous orbits. The 22 to 24-day repeat cycle, shorter than that of SPOT, is a function of the higher altitude of the orbit, closer to 900 km than SPOT's 800 km altitude.



The spatial resolution of imagery from IRS varies from about 70 m for the first satellites to 5.8 m for imagery from IRS-1C. The instrumentation generally consists of multi-spectral visible and near-infrared sensors as well as panchromatic black-and-white imagers. In addition, Oceansat-1 contains both ocean-color instrumentation and multi-frequency microwave radiometers.

IRS spacecraft have box-shaped bodies, with two equal-and-opposite narrow solar panels. The IRS series has been featured on only two postal items known to the authors: IRS-1A on India 1352, and IRS-P4/Oceansat-1 on India 1847. This is a low number of philatelic items for a relatively long satellite series.

A table and images of several of the postal items showing these satellites are presented both here and in the Website developed by the authors: <http://www.cira.colostate.edu/ramm/hillger/satellites.htm>. E-mail correspondence with the authors is welcome. Don Hillger can be reached at hillger@cira.colostate.edu and Garry Toth at garry.toth@ec.gc.ca.



Checklist of Postal Items Showing SPOT and IRS

Country	Catalog Number*	Type of Item**	Year	Notes on Content
SPOT (France)				
Altai Republic	Local	Cuba 3023 overprinted on 4x Russia 5984	199?	SPOT-1/2/3
Altai Republic	Local	Cuba 3023 overprinted on 4x Russia 5726	199?	SPOT-1/2/3
Altai Republic	Local	Cuba 3023 overprinted on 4x Russia 5728	199?	SPOT-1/2/3
Altai Republic	Local	Cuba 3023 overprinted on 4x Russia 6067	199?	SPOT-1/2/3
Central Africa Republic	535		1982	SPOT-1/2/3
Central Africa Republic	BL203	SS1 (535)	1982	SPOT-1/2/3
Comoro Islands	386		1978	SPOT-1/2/3
Comoro Islands	BL184	SS1 (386)	1978	SPOT-1/2/3
Congo (People's Republic)	961A	In margin of SS1 (961)	1992	SPOT-1/2/3
Cuba	3023		1988	SPOT-1/2/3
Djibouti	702		1992	SPOT-1/2/3
Dominica	2240	In margin of SS1	2000	SPOT-1/2/3
France	None	Meter	2001	SPOT-4/5
French Polynesia	590	Imperforate SS1	1992	SPOT-1/2/3
French Southern and Antarctic Territories	C95		1986	SPOT-1/2/3
French Southern and Antarctic Territories	C130		1994	SPOT-4/5
Gabon	597		1986	SPOT-1/2/3
Guinea	1189a	In margin of SS1 (1189)	1992	SPOT-2
Malagasy Republic	1415h	One of MS9 (1415a-i)	1999	SPOT-1/2/3
Malagasy Republic	1415hSS1	SS1 (1415h)	1999	SPOT-1/2/3
Portugal (Madeira)	152a	One of SS4 (152 (2x(151, 152a)))	1991	SPOT-1/2/3
IRS / Oceansat (India)				
India	1352		1991	IRS-1A
India	1847		2000	IRS-P4 / Oceansat-1

* Scott catalog number, unless indicated with Mi or BL for *Michel*.

**SS# = souvenir sheet, MS# = miniature sheet, where # = number of stamps in sheet, and the numbers in parentheses are the catalog numbers of the stamps in the sheet.