Subject: Re: one more item
From: Martin Burgdorf <burgdorf@ipac.caltech.edu>
Date: Thu, 9 Jan 2003 11:28:27 -0800 (PST)
To: chris@ipac.caltech.edu

Hello Chris,

I send you now my abstract as plain ASCII in the following. The previous e-mail with the complete paper seemed to cause a problem.

Martin

ISO FAR-INFRARED SPECTROSCOPIC OBSERVATIONS OF SATURN AND ITS RING
We present far-infrared spectra of the Saturn system that were measured with the Long Wavelength Spectrometer (LWS) aboard the Infrared Space Observatory between 43 and 197~μm. The spectra were taken at medium (about 150 to 200) spectral resolving power and with a beam size of some 80~arcsec (full width at half maximum). These observations cover the period between 14-Dec-1995 and 14-Dec-1997, corresponding to inclination angles of the ring of +2.4 and -11.6 degrees, respectively. \\
We found that at wavelengths between 43 and 100~μm the overall emission of Saturn and its ring increases with i, the absolute value of the inclination of the ring system as seen from Earth, whereas at longer wavelengths this relationship is inverted or not existent. Extrapolating to i = 0 we could remove Saturn's contribution to our observations and obtain the far infrared spectrum of the ring system only. We discuss some basic parameters of the ring that could be derived from these measurements in an hitherto unexplored wavelength region, like temperature, emissivity etc., and describe their dependence on wavelength.

The title of the poster I want to present is:
Solar System Observing With the Space Infrared Telescope

Solar System Observing With the Space Infrared Telescope Facility

V. S. Meadows (SIRTF Science Center/JPL/Caltech), M. Burgdorf,
D. Hoard, A. P. Marston, B. McCollum, L. M. Rebull, N. Silbermann, G. Squires (SSC/Caltech)

What is SIRTF?

SIRTF is NASA's Space Infrared Telescope Facility. Currently planned for launch on 9 Jan 2003, it is the final element in NASA's Great Observatories Program.

SIRTF has an 85 cm diameter f/12 lightweight beryllium telescope, cooled to <5.5K. It is diffraction-limited at 6.5 μm, and has wavelength coverage from 3–180 μm. Its estimated lifetime (limited by cryogen) is 2.5 years at minimum, with a goal of 5+ years.

SIRTF has three instruments, IRAC, IRS, and MIPS. IRAC (InfraRed Array Camera) provides simultaneous images at wavelengths of 3.6, 4.5, 5.8, and 8.0 μm. IRS (InfraRed Spectrograph) has 4 modules providing low-resolution (R=60–120) spectra from 5.3 to 40 μm, and high-resolution (R=600) spectra from 10 to 37 μm. MIPS (Multiband Imaging Photometer for SIRTF) does imaging photometry at 24, 70, and 160 μm and low-resolution (R=15–25) spectroscopy between 55 and 96 μm.

SIRTF Instrumentation Summary

Timeline

- 8 Nov 2002: **Cycle 1 General Observer (GO) Call for Proposals** issued, along with updated documentation and software
- 9 Jan 2003: SIRTF Launch; In-Orbit Checkout (IOC) begins
- Launch+60d (Mar 2003): end of IOC, beginning of Science Validation (SV)
- Launch+90d (Apr 2003): end of SV, First-Look Survey conducted, GTO & Legacy Science Observations begin.
- **Jun 2003: Cycle 1 GO proposals due**
- **Dec 2003: Cycle 2 GO Call for Proposals**

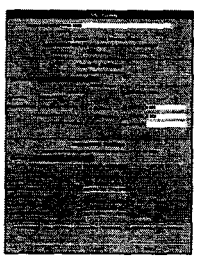
What is SPOT?

- SPOT, The SIRTF Planning Observations Tool, is a Java-based software tool for planning, creating, modifying and submitting SIRTF Astronomical Observing Requests (AORs).
- The SPOT software and User's Guide can be downloaded from the SIRTF Science Center Website: (http://sirtf.caltech.edu/SSC/)
- SPOT is supported on Sun Solaris (2.8), Linux (Red Hat 7.0+) and Windows (95, 98, NT 4.0, 2000, ME, XP). At least 128 MB of RAM are recommended.

Observing Modes

A SIRTF Observation uses any of the set of 7 Astronomical Observing Templates (AOTs). A filled-out AOT is an Astronomical Observing Request (AOR). Four of the AOTs (IRAC Mapping, IRS Staring, MIPS photometry, and MIPS Scan Map) will be commissioned during the Science Verification period (days 60-90) following launch and In-Orbit Checkout (IOC). Two more AOTs, IRS Spectral Mapping and MIPS SED Mode, are expected to be commissioned in time for the first GO Call for Proposals.

All observing modes are available for moving target observations, including full mapping and scanning capabilities.



IRS Staring AOT

SIRTF Proposal Submission

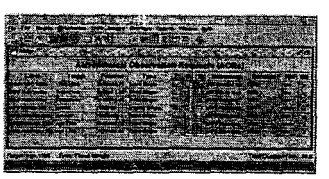
There are three main elements to submitting a SIRTF proposal:

- The 'cover sheet' file with basic contact information, etc.
- A science justification file in PS or PDF format.
- A finalized set of AORs, with precise integration times, etc. (A one-phase submission process). Archive proposals need not submit AORs.

Creating an AOR for Submission

Astronomical Observing Requests (AORs) are designed using SPOT. Your proposal **must include final AORs**. The AORs you generate are basically the commands sent to SIRTF to execute your observation, but generating AORs is easy using SPOT!

The SPOT main screen is shown below. You will see this screen when entering targets and working on AORs.



Solar System Observing with SIRTF

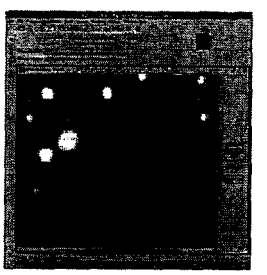
Solar System Observers who are planning to use SIRTF should be aware of the following constraints and features.

- **The SIRTF Viewing Region:** Due to solar-power generation and sunlight avoidance considerations, SIRTF has a highly constrained viewing region. At any given time, the SIRTF viewing region, known as the Operational Pointing Zone (OPZ) is an annulus constrained between 80-120° solar elongation. As SIRTF orbits the Sun, objects in the ecliptic are visible to SIRTF within two ≈40 day windows separated by about 6 months. Objects at higher ecliptic latitudes are visible longer, and objects within 10° of the ecliptic poles are visible continuously.
- **Solar System Tracking:** Tracking is performed in linear segments at rates ranging from 0.1 milliarcsec/sec to 1 arcsecond/sec. This allows tracking of objects ranging from KBOs to NEAs.
- **Ephemeris Management:** SIRTF uses ephemerides derived from the Horizons database maintained by th the Solar System Dynamics Group at JPL. User-defined ephemerides can also be supported. A core set of ephemerides is provided with each SPOT release. Observers can also submit a SIRTF Helpdesk request to have new objects added at any time during the proposal planning period. For approved observations, ephemerides are updated 3 weeks prior to execution on the telescope. Ephemeris updates closer to the time of execution can be accommodated but incur an additonal observing time overhead.
- **Observing Modes for Solar System Observers** All standard observing modes are available to Solar System Observing, and in addition we support:
  - Shadow Observations: SIRTF Solar System observers can specify background observations in which the track across the sky can be replayed or pre-played when the target is not there.
  - Observe Offsets Only: SIRTF allows all users to specify "cluster" observations for a group of positions close together on the sky that require the *same observational parameters*. SIRTF allows moving target observers to track on a centrally specified object, but observe only the offset positions from that central object. This may assist with comet observations, or any observation that requires displacement off the detector of a nearby bright source.
  - Flexible Bright Moving Object Avoidance: Although observing close to a known bright moving object is avoided by default in the SPOT software, this feature can be deselected to allow observations close to bright moving objects. This obviously carries an inherent risk of poorer-quality data and should be researched carefully!

SIRTF SSO Planning Tools

Both SPOT and JPL's Horizons can be used to plan your SIRTF observations:

- Horizons: SIRTF can be requested as a coordinate system center using the telnet and e-mail interfaces to JPL's Horizons software.
- SPOT Visualization of Solar System Targets: The SPOT software will plot the orbit of your target across the infrared sky, plot the positions of multiple moving targets on a given date, plot your AOR on a given date to show exactly how the object and background will be observed, overlay the SIRTF focal plane and apertures, display diffraction spike angles on a date of observation and query background levels. The example below shows an IRAC mapping AOR for Comet Encke near closest SIRTF approach. The AOR is elongated due to the superposition of the mapping motion of the spacecraft on Encke's rapid apparent path across the sky.



SPOT visualization of IRAC observations of Comet Encke near closest approach.

Supporting Documentation and Help for SIRTF Solar System Observers

The SIRTF Science Center Website

http://sirtf.caltech.edu/SSC/

The SIRTF HelpDesk

sirtf@ipac.caltech.edu

All of these items can be found at the SSC website:

- Proposal Kit Website: This site contains the SIRTF Solar System Observer's section with supporting information including Solar System Observing With SIRTF.
- SPOT Software
- SIRTF Observer's Manual
- The SPOT User's Guide
- The SIRTF Observer's Cookbook: This document takes the reader from science concept through AOR and currently includes an example chapter on how to plan and execute a MIPS imaging study of a Centaur.
- Horizons Tips for SIRTF Solar System Observers