SNS • SORCE News Source

SORCE's TIM is Featured on the GSFC "Image of the Week" –

By Greg Kopp, LASP, University of Colorado

The TIM instrument's high cadence TSI measurements of the recent Mercury transit were featured on the GSFC Climate Group's Image of the Week website (http://climate.gsfc.nasa.gov/viewImage.php?id=195) in late December 2006. TIM instrument scientist Greg Kopp provided the image and data, and the article titled "TIM Instrument on SORCE Observes Total Solar Irradiance (TSI) During Mercury Transit" was written by Guoyong Wen, Robert Cahalan, and Greg Kopp.

SORCE/TIM Observations of Mercury Transit – 8 Nov. 2006
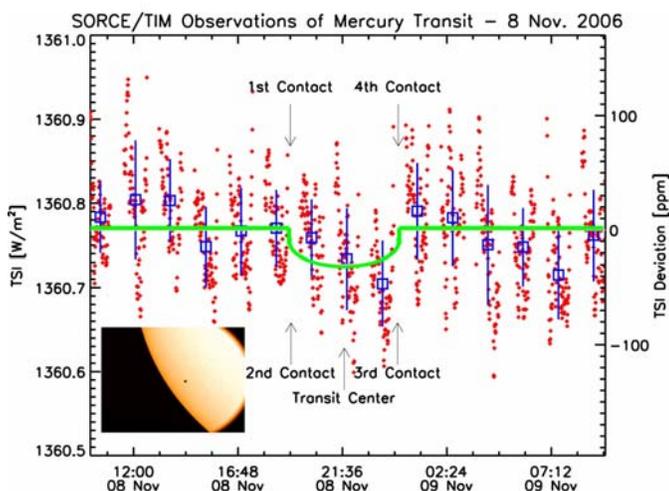
The TIM viewed the Sun for the three SORCE orbits during which the 8 Nov. 2006 Mercury transit occurred, although the SORCE was in the Earth's shadow for both ingress and egress. During this recent transit, Mercury decreased the sunlight at the Earth by up to 30 parts per million (0.003%), indicated by the predicted light curve (shown in green). Even with the TIM's low noise, this transit is not independently detectable in TSI because of the underlying continual solar variations, which have much greater amplitude. High cadence TSI measurements are shown in red with orbital averages and their standard deviations in blue. The inset shows Mercury against the solar disk in this TRACE image.

288,293
Hits to the SORCE Website
(Since 4/21/03, As of 1/19/07)

SORCE's Birthday!

By Jerry Harder and Tom Woods, LASP, University of Colorado

On January 25, SORCE celebrated its fourth anniversary of its 2003 launch. With this milestone, SORCE is 80% of the way through its planned mission lifetime and poised for an extended mission out to 2012 after the NASA Senior Review that will occur this spring. The SORCE science team is very pleased with the performance of all the instruments. Below are some of the mission highlights so far:

- The TIM supports a solar minimum total solar irradiance (TSI) value of 1361 W/m^2, nearly 5 W/m^2 lower than the canonical value [Kopp et al., "The Total Irradiance Monitor (TIM): Science Results", *Solar Phys.*, **230**, 129, 2005].
- Observations of facular brightening in the infrared not predicted by current solar models (SIM) [Fontenla et al., "Semi-Empirical Models of the Solar Atmosphere. I. The Quiet- and Active-Sun Photosphere at Moderate Resolution", *ApJ*, **639**, 441-458, 2006].
- Improvement of the NOAA Mg II index used extensively for solar proxy modeling and space weather predictions (SOLSTICE) [Snow et al., "The Mg II index from SORCE", *Solar Phys*., **230**, 325, 2005].
- Characterization of the extremely large solar flares during the impressive Halloween Storm of 2003 (all instruments) [Woods et al., "Solar Irradiance Variability During the October 2003 Solar Storm Period", *Geophys. Res. Lett.,* **31,** L10802.1-L10802.4, 2004].
- Measurement of the total energy output of flares (TIM and XPS instruments), which show a factor of 10 more energy than previous estimates [Woods, Kopp, and Chamberlin, "Contributions of the Solar Ultraviolet Irradiance to the Total Solar Irradiance During Large Flares", *J. Geophys. Res.*, **3,** A10S14, 2006].
- Observations of astronomical interest such as:
  - observations of planet transits and predictions concerning extra-solar planet finding based of effects seen in TSI (TIM), and

o the ultraviolet spectra of the moon reflectance and of comets (SOLSTICE).

The mission outlook looks excellent going into the next decade and in the future we will be concentrating on:

- Improved web-based interface with easy access to solar data and models for atmospheric and climate modelers
- Creating long-term irradiance time series data sets by combining SORCE and previous solar measurements
- Creating composite spectra with the SORCE and TIMED SEE solar irradiance measurements to cover the full range from 0.1 nm to 2400 nm
- Enhanced studies of important atmospheric effects such as atmospheric density variations using SOLSTICE stellar occultation data, and atmospheric heating rates derived from SIM and SOLSTICE measurements from the ultraviolet all the way into the infrared
- Calibration support for other NASA Earth and Space Science instruments through solar, lunar, stellar calibration results from SORCE

The SORCE project is healthy and contributing strongly to NASA science goals concerning energy budget and climate change, and we are looking forward to several more birthdays and the science that can be derived from continuing these measurements.

Happy 4th Birthday SORCE!

Space Science Reviews Publishes Rottman Paper –

The Space Science Series of the International Space Science Institute (ISSI) has completed a volume entitled *Solar Variability and Planetary Climates.* This book includes a paper by Gary Rottman called "Measurement of Total and Spectral Solar Irradiance", which is based on invited presentations given at the workshop in Bern, Switzerland June 6-10, 2005. The goal of this exclusive workshop was to examine in detail the chemical and dynamical processes leading to atmospheric change, driven directly and indirectly by solar variability. A hardcover book will also be coming out by Springer Publishing Company. The abstract and paper are available at:
http://www.springerlink.com/content/hu00567370n11w00/

Upcoming Meetings / Talks –
SORCE scientists plan to present papers or attend the following 2007 meetings:

OSA (Optical Society of America) Fourier Transform Spectroscopy/ Hyperspectral Imaging and Sounding of the Environment Topical Meeting, Feb. 11-15, Santa Fe, NM
IUGG 2007, July 2-13, Perugia, Italy

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