



SORCE RW3 Anomaly –

SORCE reaction wheel #3 (RW3) (1 of 4 wheels) is having anomalously high friction. Starting at ~2008/263-16 UT, the SORCE flight team at LASP observed from the housekeeping telemetry anomalous performance in reaction wheel #3 (RW3) on the spacecraft. The reaction wheel is intermittently marked invalid by the flight software because it is failing the torque test. SORCE normally operates with four reaction wheels.

The SORCE team has seen torque test failure before. In the 5+ years of on-orbit operation, the torque test failed a total of ~800 times per wheel, with each wheel averaging one failure every 2.5 days. Since Day 263, RW3 has reported a torque error ~450 times per day. The average attitude error prior to the anomaly was 0.012 degrees, but the error after the anomaly started is 0.026 degree. Looking at the housekeeping telemetry so far indicates that the anomaly occurred abruptly with no observable degradation trend. Inspection of RW3 telemetry indicates higher current (0.2 A now versus 0.05 A previously). The higher current is due to the extra friction. The wheel continues to rotate and is not sitting at one value. It still crosses 0 rpm without a problem.

The SORCE operations team has been in close contact with Orbital Sciences Corporation (OSC) spacecraft engineers (spacecraft manufacturer), NASA GSFC, and Ithaco (reaction wheel manufacturer), exchanging detailed telemetry data and subsequent analyses. The Ithaco engineer reported that the observed degradation is similar to those observed in FUSE, a 3000 pound NASA satellite launched in June 1999. It was suggested by Ithaco that the degradation will continue for several weeks and then partial recovery will occur and the nominal performance of RW3 is expected to last for several more months.

OSC worked with the SORCE team to generate a new set of friction coefficients that were uploaded to the spacecraft to improve attitude control on Oct. 18. The pointing quality did not show any significant improvements, but this is thought to be related to how the flight software only applies 25% of the friction coefficient in the control algorithm. The short-term solution was to update this 25% scaling factor to be a 90% effect as a simple change to a flight software table. This update did not provide an appreciable improvement in point performance during steady state operations, although performance during maneuvers is improved. The current plan is to switch SORCE control to using just three wheels, to turn off RW3 to preserve it

for backup operations, to study options for 2-wheel control as backup, and to update data processing algorithms to correct for field-of-view and wavelength shift effects related to offset pointing.

So, what is the impact on program, project, and schedule?

The current pointing error has no impact on the XPS data. There is some impact on TIM and SOLSTICE data, but this error can be corrected in ground data processing. The impact to SIM is more significant and may take a large effort (perhaps a year) to implement the pointing correction for the ground data processing.

The SORCE team will continue to work closely with OSC and Ithaco engineers to analyze the telemetry data and better understand the failure. SORCE can easily operate with 3 reaction wheels, and even 2 if necessary. Our intentions are to manage the reaction wheel usage so that SORCE mission can be extended until at least 2013 to provide overlap with NPOESS TSIS.



ISSI Working Group Meeting –

By Jerry Harder, LASP, University of Colorado

Juan Fontenla, Jerry Harder, Margit Haberleiter attended the *Interpretation and Modeling of Solar Spectral Irradiance Measurements* working group



meeting in Bern, Switzerland at the International Space Science Institute (ISSI), Sept. 23-26. The meeting, led by Ilaria Ermolli from the Rome Observatory, is working to provide a set of observations over defined time periods which can be used to study the effectiveness of solar models such as SATIRE and SRPM to capture trends seen in the data. Another important aspect of this working group is that it provides an excellent opportunity to interact with the SCIAMACHY team, Mark Weber and Joseph Paganan of University of Bremen, on solar irradiance measurements. Joseph will be completing his PhD in the next several months and he will be including SIM data in his dis-

sertation. Our ISSI team has also added Mark Rast, a member of the LASP Solar Influences Group, to provide additional expertise on processing and interpreting solar images from PSPT. These images are used in SRPM modeling of irradiance and are valuable for other analyses as well. Also at the meeting, Juan Fontenla and Margit Haberieter discussed the progress of the SRPM modeling and the work they have done in extending it into the XUV spectral range. Jerry Harder discussed the long-term trends seen in the SIM data as well.

ISSI is an Institute of Advanced Studies where scientists from all over the world meet in a multi- and interdisciplinary setting to reach out for new scientific horizons. The main function is to contribute to the achievement of a deeper understanding of the results from different space missions, ground based observations and laboratory experiments, and adding value of those results through multidisciplinary research in the framework of International Teams, Workshops, Working Groups, Forums or as individual Visiting Scientists. The program of ISSI covers a widespread spectrum of disciplines from the physics of the solar system and planetary sciences to astrophysics and cosmology, and from Earth sciences to astrobiology.

SOLSTICE Anomalies –

By Marty Snow, LASP, University of Colorado

Recently SOLSTICE B experienced a loss of about 17 hours of science data. On October 22 SOLSTICE B had a SPaM reset and began its normal reset procedure. A large number of packets from the TIM instrument were being processed by the MU at this time, so there was a delay in processing packets from SOLSTICE B. A TMON that is normally disabled during the reset was re-enabled during the delay, and SOLSTICE B was put into safe mode by the TMON. This condition was not detected until the next contact, at which time SOLSTICE B was restarted manually. This sequence of events also happened 10 months ago, so the flight operations team is investigating changes to prevent the race condition that occurs when MU packets back-up across the spacecraft interface.

Investigation into the causes of a recent (mid-September) group of SOLSTICE B grating drive errors continues. The grating drive is functioning normally and we believe the set of grating drive errors was caused by overshooting the fiducial mark after a SPaM reset. The flight software only allows 30 seconds before issuing another error, so the large number of consecutive grating er-



rors represents the continued autonomous recovery from the initial error rather than multiple grating drive errors. We are continuing to analyze the detailed timing of these events, but in the mean time, the instrument continues to operate normally.

SSI and Solar Global Changes Workshop –

By Juan Fontenla, LASP, University of Colorado

SIM scientist Juan Fontenla is organizing an informal workshop in early November at LASP to discuss existing evidence for global changes in the Sun's radiant output as a result of solar cycle trends. This small gathering will specifically focus on the photospheric layers responsible for the visible and IR initially, and then on the chromosphere and coronal layers that produce the UV/EUV/XUV. Collaborations for future work will be discussed.

694,783

Hits to the *SORCE* Website

(Since 4/21/03, As of 10/24/08)

5th Canadian Solar Workshop –

By Jerry Harder, LASP, University of Colorado

Jerry Harder, *SORCE* Project Scientist, will travel to Montreal, Canada to participate in the 5th Annual Canadian Solar Workshop to be held November 5-7, 2008. He has been asked to make three presentations. His primary talk, *The SORCE Mission: Main Achievements*, will address *SORCE*'s main achievements in the last 5+ years since launching in January 2003. The second talk, *Understanding the Solar Spectrum and its Changes*, is part of a special session dedicated to educational lectures geared towards students working in solar physics. The third lecture will be a presentation to the Canadian Space Agency on the history and development of the *SORCE*, Picard, SOLSPEC-ISS mission.

This meeting is important to the *SORCE* mission in that it will establish collaborations on the topic of modeling the *SORCE* observations of solar spectral irradiance with our international colleagues, as well as broaden the usage of *SORCE* data products. We would like to thank Dr. Stella Melo, of the Canadian Space Agency's Atmospheric Sciences Program for inviting us to participate in this exciting conference.

Upcoming Meetings / Talks –
SORCE scientists plan to present papers or attend the following 2008-2009 meetings:

SSI Modeling Tools and Findings, Nov. 4-5,
LASP, Univ. of Colorado, Boulder
5th Annual Canadian Solar Workshop, Nov 5-7,
Montreal, Canada
International Space Science Institute (ISSI) Working
Group Meeting – Tools for UV Calibration,
Nov. 24-26, Bern, Switzerland
AGU Fall Meeting, Dec. 15-19, San Francisco, CA



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