



SORCE Battery Update –

By Sean Ryan, LASP, Univ. of Colorado



The capacity of the SORCE battery and the end of discharge voltage have been significantly degrading over the past three years. The SORCE battery consists of 11 common Pressure Vessels (CPVs) with 2 cell stacks in each CPV effectively totaling 22 cells providing ~1.2

V at the end-of-discharge per cell. The first indication of any battery issues occurred in July 2009 when the end of discharge voltage of CPV #4 started to diverge from the others. Since that time we have been closely monitoring the performance of each CPV. At the present time 3 of the 11 CPVs have seen significant degradation.

In May of 2011 one of the cells in CPV #10 experienced a full short which caused the end of discharge voltage to fall ~1.2V. In September one cell in CPV #4 started to fully discharge every eclipse. This changed has caused the end of discharge voltage to fall ~1.2V. In October one cell in CPV #9 also started to fully discharge every eclipse. That caused the end of discharge voltage to fall another 1.2V. To put this into the context of good news/bad news: the bad news is that we have 3 cells/CPVs with significantly reduced capacity; the good news is that these 3 cells are in the CPVs with the poorest historical performance but the remaining CPV's have shown stable long-term performance.

At the present time the minimum bus voltage reaches ~22.8 V at the end of eclipse. Given our current power demands in eclipse, the SORCE observatory should be able to tolerate the failure of one additional cell. At that time the program would need to consider decreasing our power consumption in eclipse further. It is believed that our only option would be to start turning off the MU and TIM instrument in eclipse. Doing so would allow the observatory to survive a 4th and 5th cell failure.

In the meantime the SORCE team closely monitors the battery status and is diligently managing the charge load during eclipse periods in order to maximize the science experiments and still remain above minimum operational end-of-discharge voltage.

Based on the performance observed to date, it appears that the battery should be treated as a life-limiting factor for the observatory. The operations team has taken numerous steps over the past three years to limit the wear and tear on the battery in order to extend its life. These steps have focused on reducing the power consumed in eclipse and optimizing the battery charge profile during orbit day. The recent changes in the performance of battery have lead to a much more dynamic battery environment. We have added another member to the flight operations team to focus on the short and long term maintenance of the SORCE battery.

The SORCE mission continues to collect science data and all of the instruments are functioning properly.

SORCE-Related AGU Sessions –



While you are at AGU, don't miss the SORCE-related sessions to hear the latest TSI and SSI news. Consider the following presentations, which all occur on Tuesday, Dec. 6:

Session GC21C: Climate Change and the Sun: Quantifying Solar Terrestrial Contributions to Global Change Including Updated TSI Records I

Greg Kopp (invited talk), *An Improved Total Solar Irradiance Climate Data Record*

Richard Willson, *Revision of ACRIMSAT/ACRIM3 TSI results based on LASP/TRF diagnostic test results for the effects of scattering, diffraction and basic SI scale traceability*

Session GC22A: Climate Change and the Sun: SSI Variability in the Spacecraft Era II

Jerald Harder (invited talk), *Measured and modeled trends in the solar spectral irradiance variability using the SORCE SIM and SOLSTICE instruments*

Aimee Merkel (invited talk), *Impact of solar spectral variability on middle atmospheric constituents*

Session GC23A: Climate Change and the Sun III Posters

Erik Richard, *Future Long-term Measurements of Solar Spectral Irradiance by JPSS TSIS*

Martin Snow, *Rotational Variability in Ultraviolet Solar Spectral Irradiance*

3,393,289

Hits to the SORCE Website

(Since 4/21/03, As of 11/11/11)

Greg Kopp, *TSI Instrument Validations on the TSI Radiometer Facility*

James Mason, *Solar Spectrum Atomic Database Update Comparisons*

Doug Lindholm, *Solar Irradiance Data Products at the LASP Interactive Solar Irradiance Datacenter (LISIRD)*

Tom Woods, *Understanding Solar Cycle UV Variations from SME and Subsequent Satellite Measurements*

Fall AGU Meeting, Dec. 5-9, San Francisco, CA

<http://sites.agu.org/fallmeeting/>



Fontenla Publishes JGR Paper –

The *Journal of Geophysical Research* has published a paper by Juan Fontenla *et al.* entitled “**High-resolution solar spectral irradiance from extreme ultraviolet to far infrared**”. The paper (JGR, 116, D20108, doi: 10.1029/2011JD016032, 20 October 2011) presents solar irradiance at very high spectral resolution over a broad wavelength range. Daily solar irradiance spectra are available over a full solar cycle, and are available for climate modeling studies. Co-authors include Jerry Harder, Marty Snow, and Tom Woods from LASP; and Bill Livingston from the National Solar Observatory (Tucson, AZ). The abstract is below –

This paper presents new extremely high-resolution solar spectral irradiance (SSI) calculations covering wavelengths from 0.12 nm to 100 micron obtained by the Solar Irradiance Physical Modeling (SRPM) system. Daily solar irradiance spectra were constructed for most of Solar Cycle 23 based on a set of physical models of the solar features and non-LTE calculations of their emitted spectra as function of viewing angle, and solar images specifying the distribution of features on the solar disk. Various observational tests are used to assess the quality of the spectra provided here. The present work emphasizes the effects on the SSI of the upper chromosphere and full-non-LTE radiative transfer calculation of level populations and ionizations that are essential for physically consistent results at UV wavelengths and for deep lines in the visible and IR. This paper also considers the photodissociation continuum opacity of molecular species, e.g., CH and OH, and proposes the consideration of NH photodissociation which can solve the puzzle of the missing near-UV opacity in the spectral range of the near-UV. Finally, this paper is based on physical models of the solar atmosphere and extends the previous lower-layer models

into the upper-transition-region and coronal layers that are the dominant source of photons at wavelengths shorter than ~50 nm (except for the He II 30.4 nm line, mainly formed in the lower-transition-region).

SORCE Opportunity –

SORCE scientists Jerry Harder and Marty Snow took advantage of an afternoon opportunity to meet up with Picard Principal Investigator Gerard Thuillier. Gerard was in Denver to attend the World Climate Research Programme meeting.



LASP SORCE scientists, Jerry Harder (right) and Marty Snow, visited briefly with Gerard Thuillier (left) from LATMOS (Laboratoire Atmosphères, Milieux, Observations Spatiales), France, while Gerard was visiting Denver in late October. They discussed the comparisons between SORCE and Picard.

Upcoming Meetings / Talks –

SORCE scientists plan to present papers or attend the following 2011-2012 meetings:

AGU Fall Meeting, Dec. 5-9, San Francisco, California

AAAS Annual Meeting, Feb. 16-20, Vancouver, Canada



Happy Thanksgiving!