

# SNS • **SORCE News Source**



Solar Radiation and Climate Experiment Monthly Newsletter

April 2006

## **SORCE “Solar Physics” Book Party**

*By Tom Woods, LASP, University of Colorado*

Many of the SORCE book authors gathered for a party on April 12 to celebrate the publication of the SORCE book (special issue of *Solar Physics* journal). The 19 papers in the SORCE book provide a valuable reference about the SORCE mission ranging from the science, spacecraft, operations, and data systems of the SORCE mission to all about the designs, calibrations, and early results from each SORCE instrument. It was a significant milestone to have this book finally published as it represents two years of work in writing and editing these papers. All papers are available on the Springer Publishing Company’s website: <http://www.springer.com>. We expect the actual books any day!



Gary Rottman and his wife, Ann, in front of their new home in Durango, Colorado. They officially moved on Monday, April 17.

With Gary Rottman and Ann Stringfellow moving down to Durango to their newly completed house on April 17, this party was also an opportunity for best wishes to them in this new phase of retirement. We anticipate their regular visits back to Boulder and expect them to attend all of the future SORCE science team meetings. Gary and Ann’s new home phone number is 970-259-0327. Gary’s old cell phone number (303-591-5169) is still active and works fine in Durango.



In recognition of her dedication in editing all of the papers and devotion to the completion of this book, Vanessa George was presented a plaque. Left to right: Gary Rottman, Vanessa, Tom Woods.



The new Durango house – 441 Zane Drive, Durango, CO 81303.

## **SIM / SOLSTICE Calibration Workshop, March 23 –**

*By Jerry Harder, LASP, University of Colorado*

Last month the SORCE Science Team conducted a workshop on the absolute calibration of the spectral instruments SOLSTICE and SIM. This was the fourth in a series, with the other three concerning the field of view performance of the instruments, the Mg II index, and instrument sensitivity degradation: see the October 2005, January 2006, and February 2006 issues of the SORCE

**200,189**  
**(YES, over 200,000!!)**  
**Hits to the SORCE Website**  
*(Since 4/21/03, As of 04/24/06)*

newsletters for a summary of these other workshops. Marty Snow presented the status of the SOLSTICE instrument, and Jerry Harder and Juan Fontenla represented the SIM instrument.

One of the major goals for the SOLSTICE instrument is to connect time series of ultraviolet spectral measurements over the nearly 2 solar cycles that ultraviolet measurements have been made. This process involves comparisons of multiple instruments such as the UARS SOLSTICE and SUSIM and the NOAA SBUV. To perform this comparison, not only the absolute irradiance calibration of each instrument must be understood, but field of view and degradation effects must be removed prior to the comparison. The details of these topics are presented in the *SORCE Special Issue of Solar Physics* (see Volume 230, 2005, for the full collection of *SORCE* papers), and can now be used to meaningfully perform the instrument comparisons and construct the composite time series. A couple results from this study are briefly described next.

Figure 1 summarizes the rolled-up responsivity uncertainty of the *SORCE* SOLSTICE FUV and MUV instruments as a function of wavelength. This graph shows the uncertainty for both the solar and stellar measurement modes. Typically, there is an uncertainty of 2-3% at most wavelengths with expected uncertainty increasing towards the margins of the spectrometer pass-band.

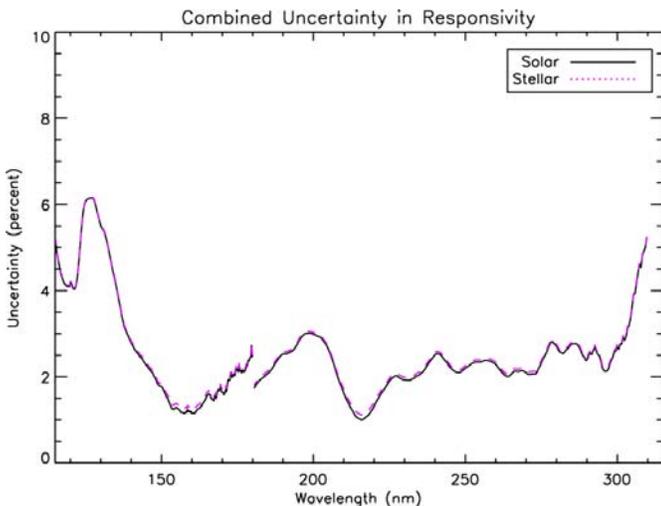


Figure 1. The combined uncertainty in the *SORCE* SOLSTICE instrument as a function of wavelength. The graph shows the uncertainty for both the MUV and FUV regions measured by this instrument. The graph also shows the similarity between the stellar and solar modes of operation. The majority of the uncertainty arises from the field-of-view correction.

The SOLSTICE measurement uncertainty shown here is well-characterized from pre-flight and in-flight calibrations and characterizations, and can be used to compare with other instruments. For instance, Figure 2 shows the relative uncertainties for *SORCE* and UARS SOLSTICE instruments for a common day on 01 March

2003 in the FUV portion of the spectrum. Similar levels of agreement are apparent in the MUV portion of the spectrum.

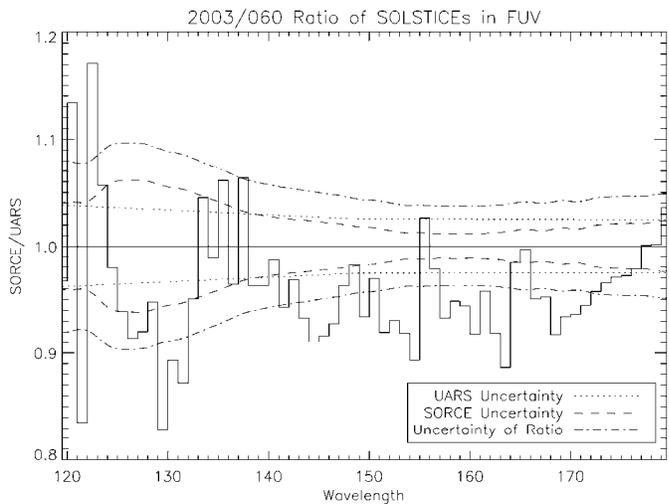


Figure 2. Comparisons of the UARS and *SORCE* SOLSTICE solar irradiances on 01 March 2003. At the time of this graph the UARS SOLSTICE had been in operation for nearly 11.5 years while the *SORCE* SOLSTICE was in operation for about a month.

In the visible and infrared portions of the spectrum (300-2000 nm), the data sets are much more sparse and piecing together time series from different missions is not possible at these wavelengths the way that it is in the ultraviolet. To date, the most fruitful comparison for the SIM instrument in the visible/infrared spectral regions are to use the SOLSPEC spectra (Thuillier *et al.*, *Solar Physics*, 214, 1, 2003) and the semiempirical model spectra produced by Juan Fontenla *et al.* (*ApJ*, 639, 441-458, 2006). Comparisons against the SOLSPEC spectrum are particularly valuable in the visible part of the spectrum where spectrum is more structured and non-LTE modeling of the spectrum is not yet complete, and the synthesis is most useful in the infrared where slowly varying trends in the instrument calibration are particularly difficult to access.

Figure 3 shows the SOLSPEC/SIM comparison in the visible part of the spectrum. The graph shows the two spectra convolved to the SIM resolution and the SOLSPEC-to-SIM bias as a function of wavelength. This in effect is the level of agreement (i.e. the bias) between the two instruments; the curve is strongly smoothed so that interpolation over the rapidly changing spectrum is not present. This bias continues to increase into the infrared part of the spectrum where the worst case is about 8% at 1.6  $\mu\text{m}$ . We have completed the SIM A and SIM B inter-instrument comparison over the full operating ESR range, and the agreement is very good with a worst case disagreement between these two spectrometer channels being about 1.6% occurring again in the 1.6  $\mu\text{m}$  region. This infrared bias is under study now and we plan to

study the problem by using SIM flight spare parts to assemble a breadboard version of SIM and then calibrate at the SIRCUS facility at NIST in Gaithersburg, MD.

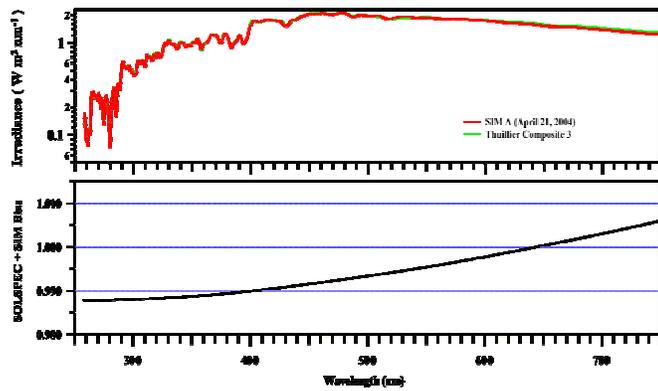


Figure 3. Comparison of SIM to the SOLSPEC composite 3 spectrum. The top panel shows good agreement between the two instruments with the SIM instrument tending to lower values at the longer wavelengths. This bias continues into the infrared, and is currently under study.

**Upcoming Meetings / Talks –**  
*SORCE* scientists plan to present papers or attend the following 2006 meetings:

- ASIC 3 Workshop, May 16-18,  
Lansdowne, VA
- American Astronomical Society, June 4-8,  
Calgary, Alberta, Canada
- 28<sup>th</sup> Review of Atmospheric Transmission Models,  
June 14-15, Lexington, MA
- American Astronomical Society, Solar Physics Division,  
June 25-30, Durham, NH
- SORCE Science Meeting, Sept. 20-22,  
San Juan Islands, WA



**SORCE Science Meeting**  
**San Juan Islands, Sept. 20-22**

The details of the 2006 SORCE Meeting, *Earth's Radiative Energy Budget Related to SORCE*, are in the final planning stages. The Call for Papers, agenda, and registration information will be out within a couple weeks. When everything is on-line an announcement will go out to visit the SORCE Meeting website – <http://lasp.colorado.edu/sorce/2006ScienceMeeting/>.



Rosario Resort and Spa, Orcas Island, San Juan Islands off the west coast of Washington state.

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