SNS • SORCE News Source

Solar Radiation and Climate Experiment Monthly Newsletter　　　　**June 2006**

SSI & Climate Modeling Workshop

On Wednesday, August 9, 2006, the LASP SORCE science team is hosting a one-day workshop to address *"SORCE Solar Spectral Irradiance Needs for the Modeling Community"*. The focus in on meeting the needs of users of SORCE Solar Spectral Irradiance (SSI) data, and will include climate, chemistry, and radiative transfer models.

This informal workshop will include a small number of invited speakers with the primary emphasis on significant discussion on open issues related to implementation of SORCE SSI in a variety of applications.

After beginning with a brief overview of SSI measurements and their variability, we will introduce SSI variability models, and identify the primary SSI data users and their applications. We will explore the use of SSI in coupled climate/atmospheric models (for example, WACCM, HAMMONIA, GISS, among others), potential paleoclimate applications, and radiative transfer models.

This workshop is open to the public, and participants are welcome to submit a few slides for discussion. The workshop will begin at 8:30 a.m. in the LASP Auditorium (room 299), 1234 Innovation Drive, Boulder, Colorado. Please RSVP to Vanessa George at vanessa.george@lasp.colorado.edu.

SORCE SOLSTICE Collecting Lunar Data –

By Greg Holsclaw and Marty Snow, LASP, University of Colorado

One of the most important characteristics of the SORCE SOLSTICE instrument is its ability to measure the irradiance of targets that differ in brightness. By switching between the solar and stellar entrance apertures and tailoring the detector integration times the sun,

Image courtesy of Wikipedia, the free encyclopedia.

moon, and the stars can be measured with good signal-to-noise ratios. In fact, SOLSTICE is supremely well suited to measure the reflectance of the moon since it can measure both the moonlight and sunlight and simply take the ratio. The moon is about a million times fainter than the sun, but that presents no problem for SOLSTICE. Other measurements of the lunar reflectance normally require two separate instruments with the relative calibration between them as an additional source of uncertainty. SOLSTICE bypasses those issues and measures the reflectance of the moon directly.
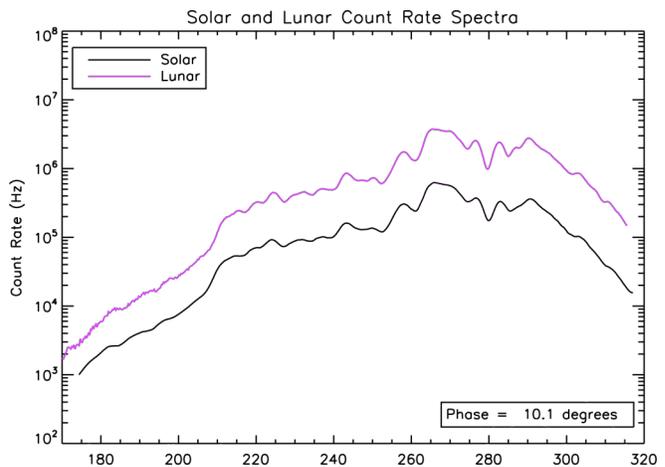

Figure 1. Solar and lunar count rate spectra. Since the entrance aperture on SOLSTICE is 2x10^4 times larger in stellar mode than in solar mode, the lunar signal is easily measured. The ratio of these two spectra (taking proper account of instrumental parameters) determines the reflectance.

Figure 1 shows the spectrum of the moon (in count rate) along with a spectrum of the sun taken on the previous orbit. The solar spectrum has been convolved with the stellar bandpass to match spectral resolution. The ratio of these two curves (taking account of the aperture ratios and celestial geometry) produces the lunar reflectance.

In 2004, SOLSTICE conducted a number of observing campaigns to measure the lunar albedo as a function of phase angle. We gathered a spectrum of the moon once per orbit for several days starting just before full moon and then continuing to a phase angle of 80 degrees for the MUV wavelength range. Figure 2 shows a typical phase curve. The decrease in disk equivalent albedo is due to

both smaller visible sunlit area and changing photometric properties with viewing angle.
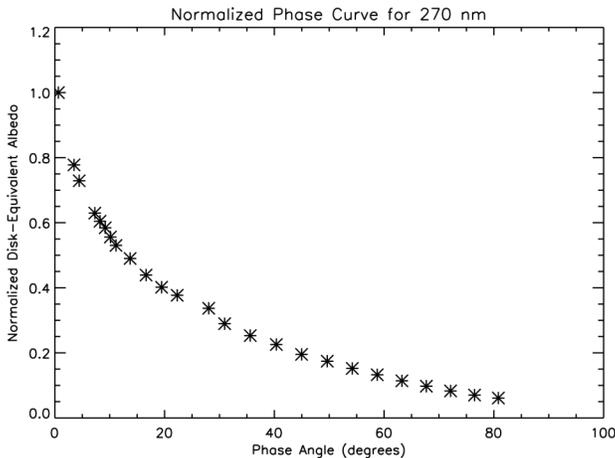

Figure 2. Phase curve. The ratio of the spectra in Figure 1 in a 2 nm wide bin at 270 nm is shown as a function of lunar phase angle. The ratio decreases due to a smaller illuminated fraction as well as changing photometric properties of the lunar surface.

Why are these measurements important? Besides the obvious scientific merit of understanding the properties of the lunar surface, the moon can serve as a calibration transfer standard for future missions. It has the advantage that nearly any earth-observing satellite can also view the moon during at least some part of its orbit. If the solar irradiance and lunar reflectance are known, then the lunar irradiance can be used for in-flight calibration, much the same way that SOLSTICE uses stellar irradiances. There have been very few measurements of the lunar reflectance in the ultraviolet, and in particular, very few that measure the full-disk irradiance over a large range of phase angles.

Another important aspect of this study is that the SOLSTICE instrument seamlessly ties together the irradiance standards of the sun, the moon, and the stars with the NIST SURF facility, a very important attribute for using these extraterrestrial objects as calibration sources. The SORCE Mission Operations Group is amending the planning and scheduling system to facilitate routine lunar measurements, and the science team is now planning further analysis and publication of their findings. Results will be more fully analyzed in a forthcoming paper from the SOLSTICE team.

SOLSTICE Stellar Irradiances Discussed at AAS Meeting –

By Marty Snow, LASP, University of Colorado

Unlike normal astronomical spectrometers, SOLSTICE was calibrated using a NIST standard source, in this case the SURF III synchrotron. Therefore its absolute irradiance measurements are directly traceable to NIST standards. We have carefully traced the uncertainty budget for our preflight calibration, and have now measured the irradiances from a set of standard stars to a precision of a few percent from 115-300 nm. Marty Snow presented a poster at the American Astronomical Society's (AAS) 208th meeting in Calgary, Alberta, Canada, describing the calibration of SOLSTICE and showing the observed spectrum of a subset of our stellar catalog.

The agreement with ultraviolet irradiances found in the literature is quite good, given that the uncertainty of previous measurements is nearly double SOLSTICE's uncertainty. In particular, our preliminary analysis shows that IUE spectra are perhaps 3-4% low, but the stated uncertainty of those IUE irradiances is 5-10%. Comparisons for all the SOLSTICE stars are in preparation and will be presented in a future publication.

Calgary has a number of memorials to those that fought in World War II. This photo of Marty Snow was taken on June 6, 2006 (the 62nd anniversary of D-Day). The Sherman tank is sitting on a piece of "Bailey Bridge," a modular temporary structure that could be assemble in a matter of hours, allowing vehicles to cross rivers and other obstacles quickly.

SORCE Meeting – Register On-Line Today!

September 20-22, 2006
San Juan Islands, Washington
Deadlines: July 14

Register for the SORCE Meeting, *Earth's Radiative Energy Budget Related to SORCE*, on-line today! Complete meeting information is available at – http://lasp.colorado.edu/sorce/2006ScienceMeeting/.

At the meeting website you will find a detailed science program description, tentative speaker list, on-line abstract and registration forms, as well as complete lodging and logistical information. Between the great science program and magnificent setting, you won't want to miss this SORCE Meeting!
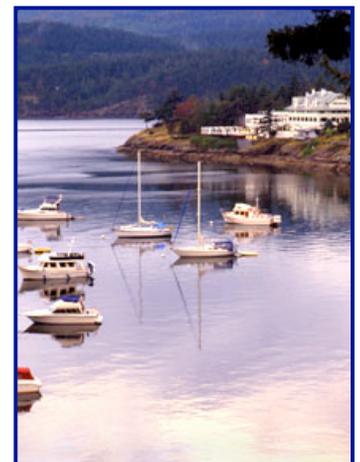
Upcoming Meetings / Talks –
SORCE scientists plan to present papers or attend the following 2006 meetings:

28th Review of Atmospheric Transmission Models,
     June 14-15, Lexington, MA
American Astronomical Society, Solar Physics Division,
     June 25-30, Durham, NH
American Meteorological Society 12th Conference on
     Atmospheric Radiation, July 10–14, Madison, WI
EUFAR (EUropean Fleet for Airborne Research)
     Workshop on Combining Satellite Missions and
     Aircraft Activities: Future Challenges for the EU-
     FAR Fleet, Sept. 13-15, Paris, France
SORCE Science Meeting, Sept. 20-22,
     San Juan Islands, WA
Coimbra Solar Physics Meeting, "The physics of
     chromospheric plasmas," Oct. 9-13,
     Coimbra, Portugal

To submit information to this newsletter, please contact:
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