

References for Solar Flare Talk - Tom Woods, LASP, June 15, 2011

NOTE: this list is not intended to be comprehensive list of references, but it is a list of papers and data sources used for this talk and can serve as a starting point for those interested in research concerning solar flares, solar ultraviolet irradiance variability, and impact of solar flares on Earth's atmosphere.

You can download many of these papers from http://adsabs.harvard.edu/abstract_service.html.

Sun Introduction

NCAR Windows to the Universe - Sun Tour: <http://www.windows.ucar.edu/tour/link=/sun/sun.html>

HAO Sun Education Web Site: <http://www.hao.ucar.edu/education/slides/slides.php>

NOAA Space Weather Primer: <http://www.sec.noaa.gov/primer/primer.html>

Wavelength Ranges: ISO #21348: http://www.spacewx.com/ISO_solar_standard.html

Lean, J., Living with a variable Sun, *Physics Today*, 58, 32-38, 2005.

Lean, J. The Sun's variable radiation and its relevance for Earth, *Ann. Rev. Astron. Astrophys.*, 35, 33-67, 1997.

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Flare Introduction

Hugh Hudson Flare and CME Cartoons Web Site: <http://solarmuri.ssl.berkeley.edu/~hhudson/cartoons/>

NOAA Flare Data (near realtime plots): <http://www.sec.noaa.gov/Data/>

NASA SDO Web Site: <http://sdo.gsfc.nasa.gov/>

Hudson, H., Global properties of solar flares, *Space Sci. Rev.*, 158, 5, 2011.

Neupert, W. N., Comparison of solar x-ray line emission with microwave emission during flares, *Astrophys. J.*, 153, L59-64, 1968.

Kopp, R. A., & Pneuman, G. W., Magnetic reconnection in the corona and the loop prominence phenomenon, *Solar Phys.*, 50, 85-98, 1976.

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Tsuneta, S., Moving plasmoid and formation of the neutral sheet in a solar flare, *Astrophys. J.*, 483, 507-514, 1997.

Clever, E. W. and L. Svalgaard, The 1859 solar-terrestrial disturbance and the current limits of extreme space weather activity, *Solar Physics*, 224, 407-422, 2004.

Woods, T. N., F. G. Eparvier, J. Fontenla, J. Harder, G. Kopp, W. E. McClintock, G. Rottman, B. Smiley, and M. Snow, Solar irradiance variability during the October 2003 solar storm period, *Geophys. Res. Lett.*, 31, L10802, doi:10.1029/2004GL019571, 2004.

Reference Spectra

WHI 2008 Reference Spectra (0.1 nm - 2400 nm, 3 spectra):

http://lasp.colorado.edu/lisird/whi_ref_spectra/whi_ref_spectra.html

Woods, T. N., P. C. Chamberlin, J. W. Harder, R. A. Hock, M. Snow, F. G. Eparvier, J. Fontenla, W. E. McClintock, and E. C. Richard, Solar Irradiance Reference Spectra (SIRS) for the 2008 Whole Heliosphere Interval (WHI), *Geophys. Res. Lett.*, 36, L01101, doi:10.1029/2008GL036373, 2009.

ATLAS Reference Spectrum (0-2400 nm, 2 spectra):

ftp://laspftp.colorado.edu/pub/solstice/ref_spectra/atlas1refsp.dat

ftp://laspftp.colorado.edu/pub/solstice/ref_spectra/atlas3refsp.dat

Thuillier, G., T. N. Woods, L. E. Floyd, R. Cebula, M. Hersé, and D. Labs, Reference solar spectra during solar cycle 22, in *Solar Variability and Its Effect on Climate*, eds. J. Pap, C. Fröhlich, H. Hudson, J. Kuhn, J. McCormack, G. North, W. Sprig, and S. T. Wu, Geophys. Monograph Series, 141, Wash. DC, pp. 171-194, 2004.

VUV2002 Reference Spectrum (0-420 nm, variability):

ftp://laspftp.colorado.edu/pub/solstice/ref_spectra/ref_min_27day_11yr.dat

Woods, T. and G. Rottman, Solar ultraviolet variability over time periods of aeronomic interest, in *Comparative Aeronomy in the Solar System*, edited by M. Mendillo, A. Nagy, and J. Hunter Waite, Jr., Geophys. Monograph Series, Wash. DC, pp. 221-234, 2002.

ASTM E-490 Reference Spectrum (119 nm - 1 mm):

ftp://laspftp.colorado.edu/pub/solstice/ref_spectra/solar_ref_astm_e490.dat

Contact Gene Borson (GeneB476@aol.com).

Instruments & Measurements

Total Solar Irradiance (TSI):

Kopp, G. and J. L. Lean, A new, lower value of total solar irradiance: Evidence and climate significance, *Geophys. Res. Lett.*, 38, L091706, 2011.

Fröhlich, C., Evidence of a long-term trend in total solar irradiance, *Astron. Astrophys.*, 501, L27-L30, 2009.

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Solar Spectral Irradiance (SSI):

Lean, J., Variations in the Sun's radiative output, *Reviews of Geophysics*, 29, 505, 1991.

Harder, J. W., J. M. Fontenla, P. Pilewskie, E. C. Richard, and T. N. Woods, Trends in Solar Spectral Irradiance Variability in the Visible and Infrared, *Geophys. Res. Lett.*, 36, L07801, doi:10.1029/2008GL036797, 2009.

DeLand, M. T. and R. P. Cebula, Creation of a composite solar ultraviolet irradiance data set, *J. Geophys. Res.*, 113, A11103, 2008.

Woods, T. N., W. K. Tobiska, G. J. Rottman, and J. R. Worden, Improved solar Lyman α irradiance modeling from 1947 through 1999 based on UARS observations, *J. Geophys. Res.*, 105, 27,195-27,215, 2000.

TIMED SEE: solar EUV irradiance

<http://lasp.colorado.edu/see/>

Woods, T. N., F. G. Eparvier, S. M. Bailey, P. C. Chamberlin, J. Lean, G. J. Rottman, S. C. Solomon, W. K. Tobiska, and D. L. Woodraska, The Solar EUV Experiment (SEE): Mission overview and first results, *J. Geophys. Res.*, 110, A01312, doi: 10.1029/2004JA010765, 2005.

SORCE: total solar irradiance (TSI) and solar spectral irradiance (SSI)

<http://lasp.colorado.edu/sorce/>

Special issue (book) of *Solar Physics* – Volume 230 in 2005.

SDO EVE: solar EUV irradiance

<http://lasp.colorado.edu/eve/>

Woods, T. N., F. G. Eparvier, R. Hock, A. R. Jones, D. Woodraska, D. Judge, L. Didkovsky, J. Lean, J. Mariska, H. Warren, D. McMullin, P. Chamberlin, G. Berthiaume, S. Bailey, T. Fuller-Rowell, J. Sojka, W. K. Tobiska, and R. Viereck, The EUV Variability Experiment (EVE) on the Solar Dynamics Observatory (SDO): Overview of Science Objectives, Instrument Design, Data Products, and Model Developments, *Solar Phys.*, doi 10.1007/s11207-009-9487-6, 2010.

Solar Proxies:

F10.7 = 10.7 cm radio flux (1947-2011):

<http://www.ngdc.noaa.gov/stp/solar/flux.html>

Tapping, K. F., Recent solar radio astronomy at centimeter wavelengths: The temporal variability of the 10.7-cm flux, *J. Geophys. Res.*, 92, 829-838, 1987.

Tapping, K. F. and B. DeTracey, The origin of the 10.7 cm flux, *Solar Physics*, 127(2), 321-332, 1990.

Mg II Core-to-Wing Index (1978-2011):

<http://www.sec.noaa.gov/ftpdir/sbuV/NOAAMgII.dat>

Viereck, R. A., L. E. Floyd, P. C. Crane, T. N. Woods, B. G. Knapp, G. Rottman, M. Weber, L. C. Puga, G. de Toma, and M. T. DeLand, A composite Mg II index from 1978 to 2003, *Space Weather*, 2, S10005, doi: 10.1029/2004SW000084, 2004

Sunspot Number Record (1700-2011):

<http://www.ngdc.noaa.gov/stp/solar/ssn.html>

Composite Solar Lyman- α Time Series (1947-2011):

ftp://laspftp.colorado.edu/pub/solstice/composite_lya.dat

Solar Influences on Earth

NOAA Space Weather Primer: <http://www.sec.noaa.gov/primer/primer.html>

Space Weather now: <http://www.spaceweather.com/>

ESA Space Weather: http://www.esa-spaceweather.net/spweather/current_sw/index.html

Gray, L. J., J. Beer, M. Geller, J. D. Haigh, M. Lockwood, K. Matthes, U. Cubasch, D. Fleitmann, G. Harrison, L. Hood, J. Luterbacher, G. A. Meehel, D. Shindell, B. van Geel, and W. White, Solar influences on climate, *Rev. Geophys.*, 48, RG4001, doi:10.1029/2009RG000282, 2010.

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Solar Irradiance Variability

Sources of Solar Variability (surface features and magnetic fields):

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Fontenla, J., O. R. White, P. A. Fox, E. H. Avrett, and R. L. Kurucz, Calculation of solar irradiances. I. Synthesis of the solar spectrum, *Ap. J.*, 518, 480-499, 1999.

Harvey, K. L. and O. R. White, Magnetic and radiative variability of solar surface structures. I. Image decomposition and magnetic-intensity mapping, *Ap. J.*, 515, 812-831, 1999.

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Solar Rotation Variability and Center-to-Limb Variations:

- Crane, P. C., L. E. Floyd, J. W. Cook, L. C. Herring, E. H. Avrett, and D. K. Prinz, The center-to-limb behavior of solar active regions at ultraviolet wavelengths, *Astron. Astrophys.*, *419*, 735-746, 2004.
- Donnelly, R. F. and L. C. Puga, Thirteen-day periodicity and the center-to-limb dependence of UV, EUV, and X-ray emission of solar activity, *Solar Phys.*, *130*, 369-390, 1990.
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