Maintaining the Solar UV Database in the 21st Century
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Future Solar UV Measurements

• Start with reference irradiance spectrum, calculate new spectrum for different level of solar activity using relationship(s) with proxy indexes.
• Use of sunspot-darkening term provides information for modeling near-UV (~300-400 nm) variations (e.g. Lean et al. [1997]). Characterization can also be done using Mg II index only [Krivova et al., in preparation].
• Linear scaling between Mg II and mid-UV irradiance (~130-200 nm) has been demonstrated (e.g. DeLand and Cebula [1993]).
• Combination of short-term and long-term contrast factors can be derived for far-UV (~120-180 nm) (e.g. Woods et al. [2000]).

•Nominal SORCE mission runs through 2008 (5 years). Request for extension planned. No constraints on extended mission.
• Three SBUV/2 instruments are active, one more scheduled for launch in 2008. Anticipate lifetime beyond 2010 based on requirements for ozone data. No onboard calibration for sensitivity changes.
• SOLSPEC (180-3000 nm), SOLACES (17-220 nm): Nominal launch date in spring 2008 for 18-24 month deployment on International Space Station (ISS). Experiments will be recalibrated on Earth after mission.
• Total Solar Irradiance Sensor (TSIS) package will fly TIM and SIM instruments on NPOESS environmental satellites. Currently scheduled for C2 satellite with launch in ~2013.
• EUV sensor on GOES satellites will measure spectral band at Lyman alpha (121.6 nm).

Continuation of Solar UV Data

• Overlap between SORCE and TSIS: Best option because of similarity between instruments, complete onboard calibration. However, NPOESS schedule issues make this difficult unless SORCE is extended by ~5 years.
• SBUV/2 instrument(s) as link between SORCE and TSIS: Need method to establish SBUV/2 sensitivity changes. Response changes at 340 nm can also be tracked using Earth view measurements of bright scenes. Evaluate spectral changes by comparing dates with similar solar activity.

Synthetic Spectra

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Current Solar UV Measurements

• Solar spectral UV irradiance data now cover > 27 years from multiple individual instruments.
• Merged irradiance data set will be created for general use.
• Quality and consistency of data have steadily improved.
• Current measurements from SORCE SIM represent heritage data for NPOESS TSIS instruments.
• If SORCE and TSIS measurements do not overlap, spectral irradiance models based on current measurements will be critical for estimating solar UV irradiance values.

Current Irradiance Data Sets

• Absolute calibration agreement between instruments has improved over time.
• Basic solar cycle behavior is consistently observed.
• Wavelength-dependent and time-dependent differences between data sets still remain. Creation of merged irradiance data set is in progress.

References


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