

SORCE X-ray Ultraviolet Photometer System (XPS) Highlights

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The XUV Photometer System (XPS) aboard SORCE measures the X-ray Ultraviolet, or XUV, energy input to Earth's atmosphere. The XPS instrument is measuring the solar XUV irradiance with 7-10 nm resolution shortward of 34 nm and the bright hydrogen emission at 121.6 nm. During the SORCE mission from 2003 to 2020, the solar activity has evolved from near solar maximum conditions in solar cycle 23, through the cycle 23/24 minimum, over the full range of activity of solar cycle 24, and now into cycle 24/25 minimum. The solar irradiance varies on all time scales, seconds to years, and this variation is very dependent on wavelength. During the SORCE mission, the XPS instrument has observed 17 years of solar cycle activity, more than 200 solar rotations with an average period of about 27 days, and several thousand flares which last from minutes to hours. The XUV radiation, being mostly from coronal emissions, varies more than other wavelengths in the solar spectrum. The XPS measurements indicate variations by a factor of more than 100 for the largest flares during the October-November 2003 solar storm period and the September 2017 solar storm period; those being the most intense periods of solar activity for solar cycle 23 and 24, respectively. The XUV contribution to the total energy of a flare is about 20% as determined with comparisons with total solar irradiance (TSI) flare variations recorded by the SORCE Total Irradiance Monitor (TIM) instrument. The variations of the solar XUV irradiance will be discussed in the context of the SORCE mission.