

Extreme ultraviolet Variability Experiment (EVE) on the Solar Dynamics Observatory (SDO)

Analogy on How the SDO EVE Measurements of the Solar Extreme Ultraviolet Irradiance will be Greatly Improved

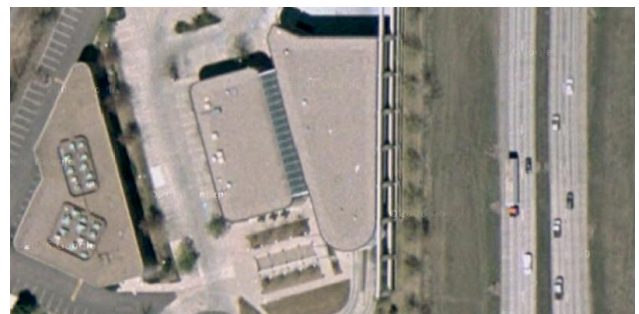
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The EVE instrument will be measuring the solar extreme ultraviolet (EUV) irradiance as part of the NASA SDO mission. These energetic photons in the EUV are the drivers for heating Earth's upper atmosphere and creating our ionosphere (plasma in the atmosphere). The solar EUV radiation changes on all time scales with changes being a factor of 2 to 1000 (wavelength dependent) over seconds-hours during flare events and also long term changes by a factor of 2 to 10 over the 11-year solar cycle. These changes have impact on our technology and society that includes our ability to track our satellites (e.g., satellite drag changes with atmospheric heating) and also causes degradation, and even disruption, of our communication and navigation (GPS) systems due to ionosphere responding to solar EUV variations.

While there has been much progress in understanding the solar EUV irradiance with current measurements from TIMED SEE, SOHO, and SORCE XPS, there are remaining challenges concerning spectral resolution in the shorter wavelengths and limited time coverage for understanding flare events. The SDO EVE instrument will greatly improve upon both the spectral resolution by factor of 70 in the shortest wavelengths (below 30 nm) and time cadence by factor of 30 in having 10-sec measurements with 100% duty cycle. The below images represent an analogy on how these EVE measurement improvements will enable advances in the understanding of the solar EUV irradiance and its variations. The two dimensions of the Google map images of NCAR Center Green / Foothills Parkway in Boulder are intended to represent the EVE spectral resolution and time cadence.



This image has 50 times less spatial resolution than the one on the right, and is an analogy of the current measurement capability of the solar EUV irradiance.



This image has 50 times more resolution than the one on the left, and is an analogy of EVE measurement capability. Obviously, the resolution improvements provide significantly more information.