# New solar irradiances for use in space research

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Space environment research applications require solar irradiances in a variety of time scales and spectral formats. We describe the development of research grade modeled solar irradiances using four models and systems that are also used for space weather operations. The four models/systems include SOLAR2000 (S2K), SOLARFLARE (SFLR), APEX, and IDAR, which are used by Space Environment Technologies (SET) to provide solar irradiances from the soft X-rays through the visible spectrum. SFLR uses the GOES 0.1–0.8 nm X-rays in combination with a Mewe model subroutine to provide 0.1–30.0 nm irradiances at 0.1 nm spectral resolution, at 1 minute time resolution, and in a 6-hour XUV–EUV spectral solar flare evolution forecast with a 7 minute latency and a 2 minute cadence. These irradiances have been calibrated with the SORCE XPS observations and we report on the inclusion of these irradiances in the S2K model. There are additional developments with S2K that we discuss, particularly the method by which S2K is emerging as a hybrid model (empirical plus physics-based) and real-time data integration platform. Numerous new solar indices have been recently developed for the operations community and we describe their inclusion in S2K. The APEX system is a real-time data retrieval system developed under contract to the University of Southern California Space Sciences Center (SSC) to provide SOHO SEM data processing and distribution. SSC provides the updated SEM data to the research community and SET provides the operational data to the space operations community. We describe how the SOHO SEM data, and especially the new $S_{EUV}$ index, is being integrated directly into the S2K model. The IDAR system has been developed by SET to extract active region, plage, network, and internetwork features from solar images. We report on the convolution of these features to form an equivalent $S_{EUV}$ index for use in near-term solar flux forecasting.