

Reconstructing solar irradiance variations with SATIRE

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Direct measurements of solar irradiance variations began in the late 1970s. Recovery of irradiance over earlier periods is only possible with appropriate models. Such reconstructions require solid understanding of the physical processes driving the irradiance fluctuations as well as information on the past changes of the magnetic activity of the Sun. The magnetic field emerging at the solar surface forms bright faculae and dark sunspots, which eventually modulate irradiance changes. Since about 1974 direct measurements of the solar surface magnetic field, magnetograms, are available, which provide the best suitable input. A good alternative to the measured magnetograms is offered by Ca II K full-disc observations, which carry information on faculae, can be used to recover the magnetic field maps, and extend back to 1892. At earlier times, only sunspot observations are available, so that facular distribution has to be inferred from those. This, in turn, requires understanding of how facular emergence and evolution are linked to those of sunspots, which can be gained from an analysis of various available modern and historical solar data. Here we will provide an overview of the recent progress and current status of modelling and reconstruction solar irradiance with SATIRE.

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