



Reconstructing Total Solar Irradiance with the help of MHD simulations

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The variation in the solar irradiance is an important input into the climate system. Whereas it is commonly thought that solar irradiance variability is driven by the evolving surface magnetism, verifying this assumption has been more difficult. Making use of 3D MHD simulations of the solar atmosphere layers and state-of-the-art solar magnetograms from the Solar Dynamics Observatory, we present a model of total solar irradiance (TSI) that does not require any calibration of the modeled TSI by the measured TSI. I.e., the modeled irradiance variability is entirely independent of the observational record, except for the absolute level. The model replicates 95% of the observed variability between April 2010 and July 2016, leaving little scope for alternative drivers of solar irradiance variability, at least over the time scales examined (days to years).