



A Multi-isotope Composite Record of Solar Activity and Irradiance Reconstruction over the last 9000 Years

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While direct measurements of the solar irradiance are available for the last four decades, reconstructions of the past solar variability are needed to understand the solar influence on Earth's climate. The longest observational record of solar activity is the sunspot number, going back to 1610 A.D. with uneven quality. To assess solar variability at earlier times, indirect proxies of solar activity, such as concentrations of cosmogenic isotopes ^{10}Be and ^{14}C in terrestrial archives are often used. These isotopes are produced in the terrestrial atmosphere by impinging cosmic rays, whose flux is modulated by both heliospheric magnetic field and geomagnetic field. Therefore, the isotope signals retrieved from various sites around the globe show a very high degree of similarity, reflecting changes in the solar activity. Significant short-and mid-term deviations, however, can be observed due to the different geochemical production and redistribution processes and local climatic conditions. We have taken this into account and developed a state-of-the-art consistent multi-isotope composite reconstruction of solar activity based on six regional ^{10}Be and the global ^{14}C data sets. This composite is then used to reconstruct the total TSI and spectral SSI solar irradiance over the last 9000 years with a semi-empirical model (SATIRE-M) developed in MPS.