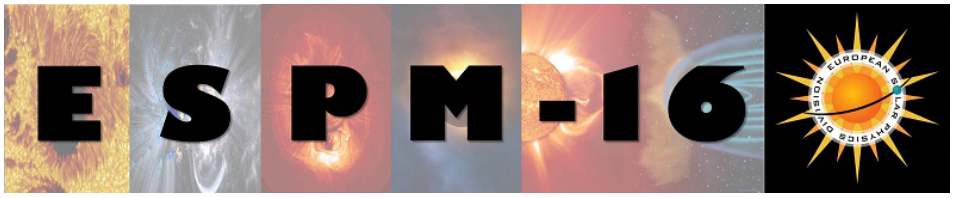

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Soft X-ray spectroscopy of the Solar corona during the deepest solar minimum of the past hundred years with the Solar X-ray Monitor (XSM) on-board the Chandrayaan-2 orbiter.

Thursday, 9 September 2021 09:26 (13 minutes)

The Solar X-ray Monitor (XSM) onboard the Chandrayaan-2 mission carries out spectroscopic observations of the Sun in the energy range 1-15 keV with a resolution of 180 eV (at 5.9 keV). Here, we present an overview of results from XSM observation of the Sun during the 2019–2020 solar minimum, considered to be the quietest solar minimum of the past hundred years. These observations provide a unique opportunity to study soft X-ray spectra of the quiescent solar corona and solar transients in absence of major activity. By modeling high-resolution broadband X-ray spectra from XSM, we estimate temperature, emission measure(EM), and absolute abundances of Mg, Al, and Si during periods with no active regions(AR) and very low X-ray intensities, and find a FIP bias of 2, which is lower than the value of 3-4 usually observed in the AR cores. We find that the derived parameters remain nearly constant over time with a temperature around 2 MK, suggesting the emission is dominated by X-ray bright points. During this quiescent period, XSM captured several sub-A class flares that occurred outside conventional ARs. It also observed nine B-class flares ranging from B1.3 to B4.5 originating from isolated ARs. Using time-resolved spectroscopic analysis during these flares, we examine the evolution of temperature, EM, and absolute elemental abundances of four elements- Mg, Al, Si, and S. These are the first measurements of absolute abundances during such small flares. The study offers a unique insight into the evolution of absolute abundances as the flares evolve.

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