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The Most Energetic GOES/XRS Flares

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The soft X-ray photometric records from the GOES/XRS instruments now approach a half century of coverage, and constitute the most complete space-based proxy for solar flare X-ray luminosities and energies. Observations continue with the GOES-16 and -17 and forthcoming satellites, which use a slightly different detector technology. Some of the most powerful earlier events saturated the telemetry range of their ionization-chamber detectors, making it difficult to study the event distribution function at its most interesting top end. Over the interval 1976–2015 a total of 11 events saturated the key 1–8 Å channel, many of which were from NOAA region 6659 in 1991. We have devised an algorithm for best estimates of the peak fluxes for these saturated events. Based on this new input, and our understanding of the calibration issues for GOES-15 and earlier, we discuss the event distribution function (e.g. Aschwanden & Freeland, 2012) looking for evidence of a downward break in the event distribution in the vicinity of magnitude X10. Note that the absolute calibration of this level is under investigation at present, but this does not concern the relative magnitude distribution. Any departure from the power law will crucially affect our understanding of “superflare” occurrence on the Sun.

Student poster?

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