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Magnetic reconnection rates in solar flares and implications for "superflares"

Astrid Veronig, Johannes Tschernitz, Jürgen Hinterreiter, and Julia Thalmann
Institute of Physics & Kanzelhöhe Observatory, University of Graz, Graz, Austria (astrid.veronig@uni-graz.at)

We present a statistical study of magnetic reconnection rates and fluxes to study the energy release process in solar flares. Our data set covers 50 events, including 19 eruptive flares (i.e. flares associated with a coronal mass ejection) and 31 confined flares (i.e. not associated with a coronal mass ejection). The events under study are distributed over a wide range of GOES classes, from B to >X10. Magnetic reconnection rates and fluxes are derived from the flare ribbon evolution studied in Halpha filtergrams from Kanzelhöhe Observatory and co-registered photospheric line-of-sight magnetic field maps from HMI/SDO and MDI/SOHO. We find a distinct correlation between the total flare reconnection flux with the GOES peak flux for both eruptive and confined flares. In the largest events, the flare reconnection fluxes may reach up to >30% of the total active region magnetic flux. The implications of the distinct correlations obtained are discussed with respect to the recently detected superflares on solar-like stars and the largest flares expected on the Sun.