

SPD Thomas Metcalf Travel Award Report

Hinode-18/IRIS-16 Meeting

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Dr. Morgan Stores



Morgan is a NASA Jack Eddy Fellow working at the University of Minnesota with Prof. Lindsay Glesener. Her research interests are in modeling and observing accelerated particles during solar flares. In particular, focusing on the acceleration region itself and how the acceleration region alters the observed electron properties. Additionally, she is a member of the instrumentation team for the The Focusing Optics X-ray Solar Imager (FOXSI) sounding rockets fifth launch.

Oral-Contribution

Constraining turbulent solar flare acceleration regions by connecting multi-wavelength observations and kinetic modeling.

Morgan Stores, Natasha Jeffrey, James McLaughlin, Eduard Kontar, Ewan Dickson

Abundant solar flare observations suggest that magnetohydrodynamic plasma turbulence plays a crucial role in transferring energy between the magnetic field and energetic electrons. Though exact properties remain largely unknown, the non-thermal broadening of spectral lines is a key sign of this turbulence. In this study, we map the evolution of flare turbulence in time and space using spectral profiles of Fe XXIV, Fe XXIII, and Fe XVI, observed by the Hinode/EUV Imaging Spectrometer for times covering the X-ray rise, peak, and decay. We find that turbulence is distributed throughout the entire flare, often greatest in the coronal loop tops, and decaying at different rates at different locations. Additionally, we connect turbulence, EUV observations, and hard X-ray observations with kinetic modeling to constrain the properties of flare acceleration. Observing three large flares with RHESSI or Solar Orbiter/STIX, we extract X-ray imaging and spectroscopy observables. We compare with modeling results, mapping observables to electron acceleration and turbulent properties.

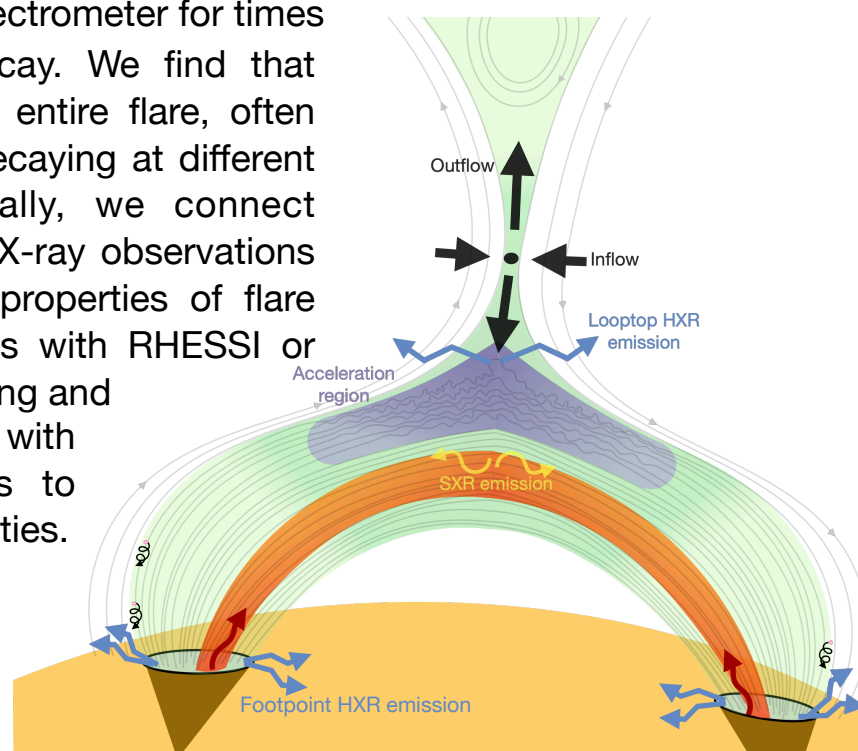


Figure 1 Morgan's cartoon of a solar flare, highlighting the turbulent acceleration region and hard X-ray (HXR) emission.

I am very grateful to both the AAS/SPD Metcalf Travel Award Committee for this award. During my time in London I have had many insightful conversations which will aid in improving my kinetic model and have inspired new collaborations.