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Study Solar Eruptions from a Global Perspective: Current Status and Future Improvements on the Global MHD Models

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The solar coronal mass ejection (CME) is a global phenomenon that not only disrupts the solar atmosphere but also leads to hazardous space weather events when propagating through the heliosphere. The forecast capability of the CME impacts depends critically on our understanding about the plasma environment of the CME source region, and the physical processes involved when CME interacts with the ambient corona and solar wind. The upcoming MUSE mission with its large FOV and high temporal/spatial resolution will provide crucial measurements on these topics therefore shed new light on the evolution and propagation of CMEs and their effects on the surrounding corona. In this talk, I would like to highlight several aspects of CME impact in the form of global EUV waves, sympathetic eruptions, coronal dimmings, CME-driven shocks, and solar energetic particles (SEPs), as well as the current global modeling efforts and challenges. More importantly, I would like to discuss the unique measurements provided by MUSE, when combined with existing remote-sensing and in-situ observations (e.g., SDO, Solar Orbiter, Parker Solar Probe), will significantly improve the data-constrained CME modeling, which will eventually lead to a better space weather forecast capability.

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