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Oral
(Invited Talk)
The Polarimeter to Unify the Corona and Heliosphere (PUNCH) mission provides unprecedented, near-continuous polarized white-light imaging of the solar corona and inner heliosphere. This unique capability enables the resolution and tracking of mesoscale solar wind structures and evolving transients, opening new avenues for investigating solar wind formation and large-scale heliospheric dynamics. To fully exploit these observations, robust coronal and heliospheric modeling is essential. In this presentation, we demonstrate how the Wang–Sheeley–Arge (WSA) model can support PUNCH science objectives. We showcase the current capabilities of the WSA model, including the prediction of solar wind speed and large-scale heliospheric structure, derivation of the coronal S-web to characterize global magnetic topology, and identification and characterization of solar wind source regions observed in situ. We discuss how each of these capabilities can support the interpretation of PUNCH data, including such applications as identifying helmet streamer vs pseudostreamer structures and linking PUNCH observations with in situ measurements. This work highlights the critical role of coronal and solar wind modeling in maximizing the scientific return of PUNCH and advancing our understanding of the coupled corona–heliosphere system.
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