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Preface

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I am pleased to introduce the *Solar Physics* Topical Issue entitled "The Many Scales of Solar Activity in Solar Cycle 24 as seen by SDO."

SDO, short for *Solar Dynamics Observatory*, is in the fourth year of a mission to study the Sun in unprecedented detail. Every second, the flagship of the heliophysics fleet beams back 150 million bits of data, 24 hours a day, 7 days a week. That is almost 50 times more science data than any other mission in NASA history.

Operating at ten different wavelengths of specific interest to solar activity, SDO routinely images the entire disk of the Sun with a resolution ten times better than high-definition television. The pixel count is similar to an IMAX movie.

Spatial resolution is only half the story, though. Previous missions have imaged the Sun no more rapidly than once every minute or few minutes. SDO has shattered that record with IMAX-quality images every 12 seconds. Combining these images with the EUV spectra, Dopplergrams, and magnetograms produced by the other instruments on SDO means that every nuance of solar activity is time-tagged and tracked both globally and locally.

The articles in this Topical Issue show how SDO's simultaneous big-picture view, small-scale resolution, and fast-paced cadence pushes solar research forward. Highlights include a series of articles describing SDO's vector magnetic-field maps, a unique data product that took much effort to produce and is now available for researchers. There are two invited reviews, describing the rapidly growing fields of coronal EUV waves and the structure and dynamics of the solar convection zone. Both of these fields are using copious amounts of SDO data to explore the temporal dependence of phenomena related to the solar magnetic field.

This Topical Issue was inspired by an SDO Science Workshop, "Exploring the Network of SDO Science," held in Cambridge, Maryland, USA, 3 – 8 March 2013. But only half of the articles began at that conference. The remainder came from a broad call to the community.

The Many Scales of Solar Activity in Solar Cycle 24 as seen by SDO
Guest Editors: Aaron Birch, Mark Cheung, Andrew Jones, and W. Dean Pesnell

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This collection continues the tradition of *Solar Physics* to gather articles from major missions into a single volume. In heliophysics, SDO is most definitely a major mission, worthy of such attention. Please read the articles, download and analyze some SDO data, and enjoy watching Solar Cycle 24 unfold before you.

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Aaron Birch, Mark Cheung, Andrew Jones, W. Dean Pesnell, and John W. Leibacher

Articles

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