ABSTRACT FINAL ID: SH23D-03;

TITLE: Time-Series Analyses of Supergranule Characteristics Compared Between SDO/HMI, SOHO/MDI and Simulated Datasets.

SESSION TYPE: Oral

SESSION TITLE: SH23D. The Sun and the Heliosphere During the Solar Cycle 23/24 Minimum II

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ABSTRACT BODY: Supergranulation is a well-observed solar phenomenon despite its underlying mechanisms remaining a mystery. Originally considered to arise due to convective motions, alternative mechanisms have been suggested such as the cumulative downdrafts of granules as well as displaying wave-like properties. Supergranule characteristics are well documented, however. Supergranule cells are approximately 35 Mm across, have lifetimes on the order of a day and have divergent horizontal velocities of around 300 m/s, a factor of 10 higher than their central radial components. While they have been observed using Doppler methods for more than half a century, their existence is also observed in other datasets such as magnetograms and Ca II K images. These datasets clearly show the influence of supergranulation on solar magnetism and how the local field is organized by the flows of supergranule cells.

The Heliospheric and Magnetic Imager (HMI) aboard the Solar Dynamics Observatory (SDO) continues to produce Doppler images enabling the continuation of supergranulation studies made with SOHO/MDI, but with superior temporal and spatial resolution. The size-distribution of divergent cellular flows observed on the photosphere now reaches down to granular scales, allowing contemporaneous comparisons between the two flow components.

SOHO/MDI Doppler observations made during the minima of cycles 22/23 and 23/24 exhibit fluctuations of supergranule characteristics (global averages of the supergranule size, size-range and horizontal velocity) with periods of 3-5 days. Similar fluctuations have been observed in SDO/HMI Dopplergrams and the high correlation between co-temporal HMI & MDI suggest a solar origin. Their nature has been probed by invoking data simulations that produce realistic Dopplergrams based on MDI data.

KEYWORDS: [7529] SOLAR PHYSICS, ASTROPHYSICS, AND ASTRONOMY / Photosphere, [7522] SOLAR PHYSICS, ASTROPHYSICS, AND ASTRONOMY / Helioseismology, [7536] SOLAR PHYSICS, ASTROPHYSICS, AND ASTRONOMY / Solar activity cycle, [7544] SOLAR PHYSICS, ASTROPHYSICS, AND ASTRONOMY / Stellar interiors and dynamo theory.

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