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A New Multi-Wavelength Synoptic Network for Solar Physics and Space Weather

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Continuous solar observations are important for many research topics in solar physics, such as magnetic field evolution, flare and CME characteristics, and p-mode oscillation measurements. In addition, space weather operations require constant streams of solar data as input. The deployment of a number of identical instruments around the world in a network has proven to be a very effective strategy for obtaining nearly continuous solar observations. The financial costs of a network are 1-2 orders of magnitude lower than space-based platforms; network instrumentation can be easily accessed for maintenance and upgrades; and telemetry bandwidth is readily available. Currently, there are two solar observing networks with consistent instruments: BiSON and GONG, both designed primarily for helioseismology. In addition, GONG has been augmented with continual magnetic field measurements and H-alpha imagery, with both being used for space weather operational purposes.

However, GONG is now 18 years old and getting increasingly more challenging to maintain. There are also at least three scientific motivations for a multi-wavelength network: Recent advances in helioseismology have demonstrated the need for multi-wavelength observations to allow more accurate interpretation of the structure and dynamics below sunspots. Vector magnetometry would greatly benefit from multi-wavelength observations to provide height information and resolve the azimuthal ambiguity. Finally, space weather operations always need a consistent reliable source of continual solar data. This presentation will outline the scientific need for a multi-wavelength network, and discuss some concepts for the design of the instrumentation. A workshop on the topic will be held in Boulder this April.