P10   MAD-WRF: A solar irradiance nowcasting system to support the Group on Earth Observations Vision for Energy (GEO-VENER).

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A GEO Vision for Energy (GEO-VENER) goal includes "the availability and long-term acquisition of data from satellite and in-situ instruments and models to make possible the effective deployment, operation and maintenance of renewable energy systems and their integration in the grid". The challenge in renewable energy systems is managing the high spatial and temporal variability of renewable resources. The adverse effects of this high variability in energy production can be mitigated via accurate predictions of the renewable resources (e.g. solar irradiance).

Short term predictions of up to a few hours (i.e. nowcasting) of solar irradiance are already being used to manage renewable systems. Nowcasting systems help operators ensure grid stability and power plant performance. Standard nowcasting methodologies include the use of retrievals from earth observing satellites to detect and advance the clouds. This methodology faces limitations when clouds grow or decay or they are anchored to various terrain features. Full cloud processes are better represented in numerical weather prediction (NWP) models. However, nowcasting systems based on NWP models do not always include accurate satellite-based cloud initialization. To overcome these limitations and support GEOVENER, we are blending a satellite- based initialization system (MADCast) with a NWP-based nowcasting approach (WRF-Solar) to create an improved end-to-end solar irradiance forecast system, called MAD-WRF.