A Proposed Solar Radiation and Aerosol Optical Depth Network for the Continental United States

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The U.S. ground-based measurement of solar radiation has been, to put it kindly, inconsistent. In the 1970s the Department of Energy (DOE) funded NOAA to install solar direct and diffuse measurement stations at 39 NOAA National Weather Service (NWS) sites. That funding lasted about five years and only a few stations continued to take data. Other efforts by the DOE and collaborators have had similar starts and stops. There are many existing networks of solar measurements that obtain global horizontal irradiance only, which is of limited usefulness and uncertain quality because of calibration and maintenance issues. This poster will present a possible network configuration that uses instrumentation capable of measuring global and diffuse horizontal and direct normal solar irradiances. Further, it is capable of accurate spectral measurements useful for photovoltaic (PV) prospecting. These spectral measurements can produce accurate aerosol optical depth (AOD) and water vapor retrievals, useful for prospecting for concentrating systems. A wavelength matched down-pointing radiometer is planned that would provide spectral albedo useful, not only to renewable energy, but to satellite retrieval and chemical transport model validation. Network, instrumentation, and value-added products will be described.
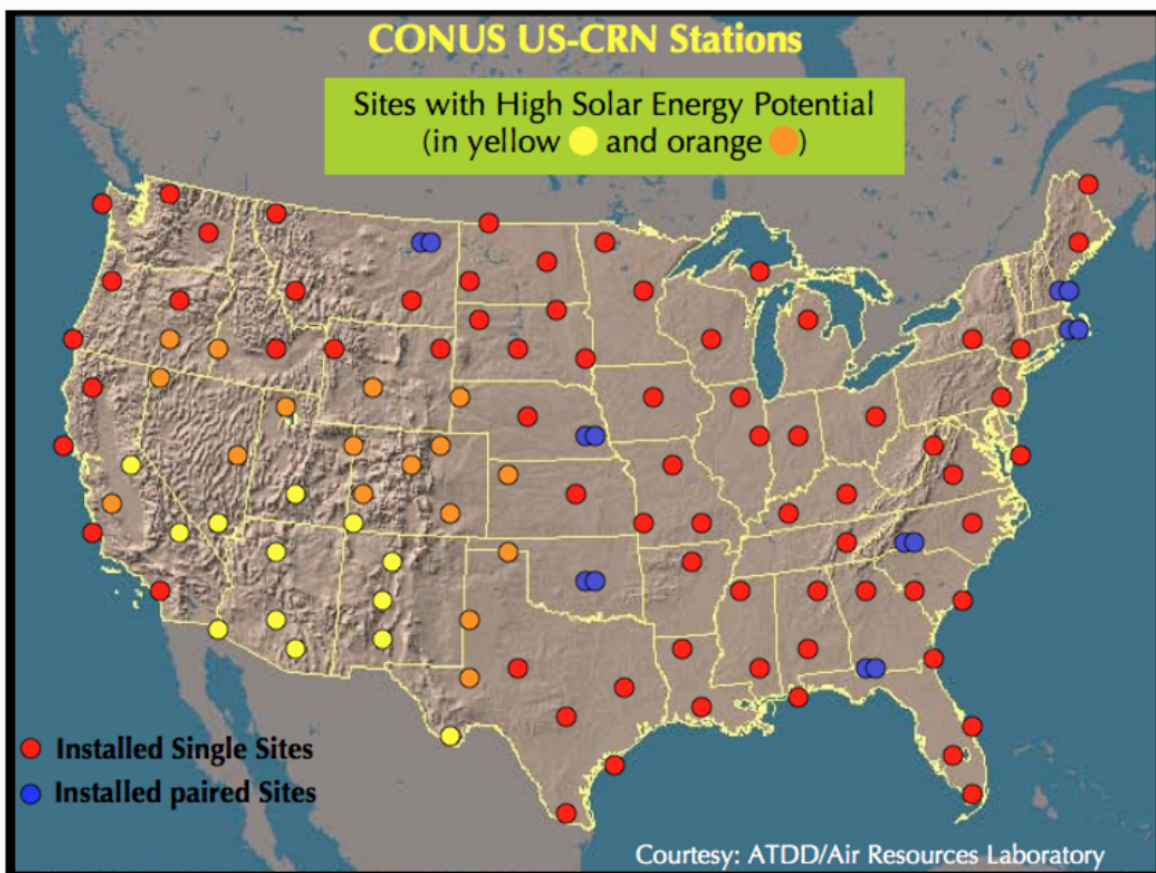

Figure 1. One possible siting strategy for the proposed solar and AOD network is to use the current Climate Reference Network sites shown here. This is attractive because the infrastructure exists and sites are remote to minimize pollution's interference with solar radiation. A modification of this would be to use suitable NWS sites near cities that have a low probability of widespread use of concentrating systems for solar energy, but have a preference of rooftop thermal and PV systems.