Solar energy meteorology: A Finnish-Nordic perspective

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Abstract
The energy system is currently experiencing a rather quick change, moving away from fossil fuels, while instead relying more and more on weather-dependent renewable energy. This also entails electrification of the energy system, and a need for dedicated energy weather forecasts helping to solve optimization problems related to various parts of the energy system, from balancing the electricity in a national grid to optimal usage of solar electricity production in households.

With this background, I will in my talk cover solar photovoltaic (PV) energy meteorology from a Finnish-Nordic perspective. My talk is mostly based on ongoing and recent research done at the Finnish Meteorological Institute.

I will explain how solar PV electricity production behaves in relation to meteorological parameters such as solar radiation and temperature, and how such knowledge can be utilized for creating solar electricity production forecasts. I will also cover the climatological behavior of the surface solar radiation (SSR; also called global radiation) in our region of interest, in comparison with other parts of the world. Finally, I will talk about forecasts. For example: how does satellite-based nowcasts of solar radiation compare with those of the MetCoOp ensemble prediction system (MEPS), and how does a MEPS-based probabilistic forecast of the aggregated, grid-connected solar electricity production in Finland behave.