

Irradiance and atmospheric optical properties from photovoltaic power data: model improvements and first results

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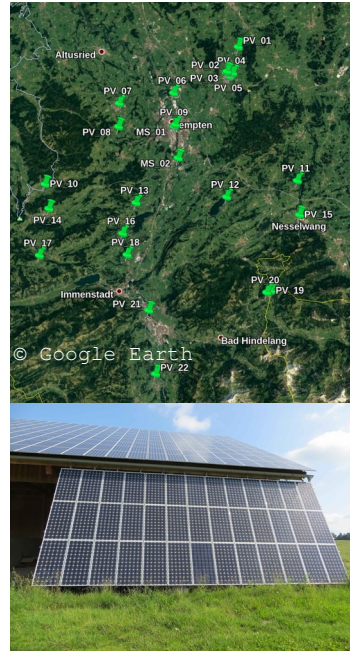
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Goal:

- Use data from photovoltaic (PV) systems to infer irradiance and atmospheric optical properties

Method:

- Calibrate systems on clear days with inputs: COSMO, AERONET → libRadtran
- Divide up days into categories based on weather conditions; clear, cloudy, broken clouds
- Infer aerosol and cloud optical depth along with diffuse, direct and global horizontal irradiance



Calibration



Inversion

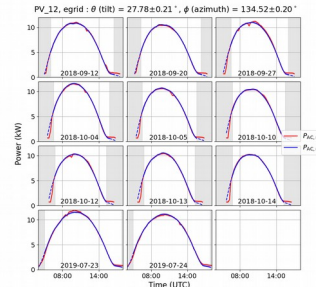
Tilted irradiance



libRadtran

Clear sky irradiance

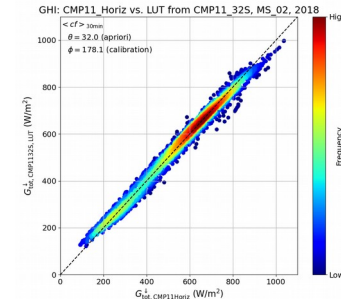
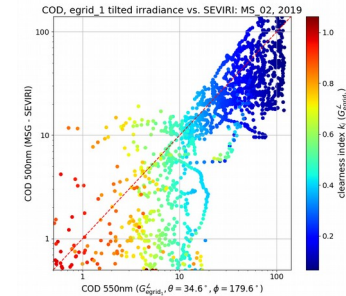
PV model



AOD

COD

GHI



Results:

- DC PV current gives better accuracy
- AOD: high sensitivity to model error
- COD: retrieval works well for cloudy periods
- Spectral effects need more study