Public Interest
Energy Research

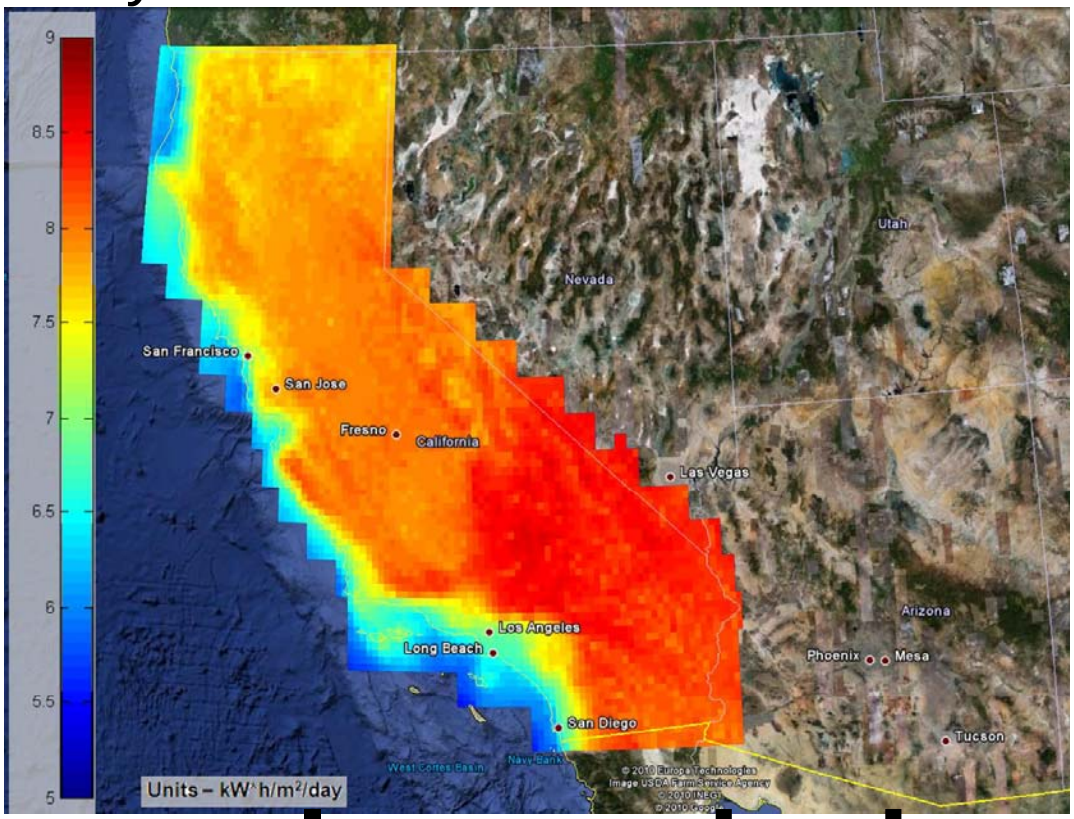
Solar Energy and Solar Forecasting

Jan Kleissl, Byron Washom, Carlos Coimbra
Professor, Dept of Mechanical and Environmental Engineering, UC San Diego
Director, Strategic Energy Initiatives
Center for Renewable Resources and Integration
California Solar Energy Collaborative

1. Solar Resource Mapping
2. Solar forecasting

Corrected Solar Maps for CA

- Applied correction algorithm to generate a corrected GHI data set for California
- Visualized using Google Earth (free software)
- GIS tool facilitates accurate solar resource assessment and economic analysis



Corrected NSRDB SUNY mean irradiation during June for California.
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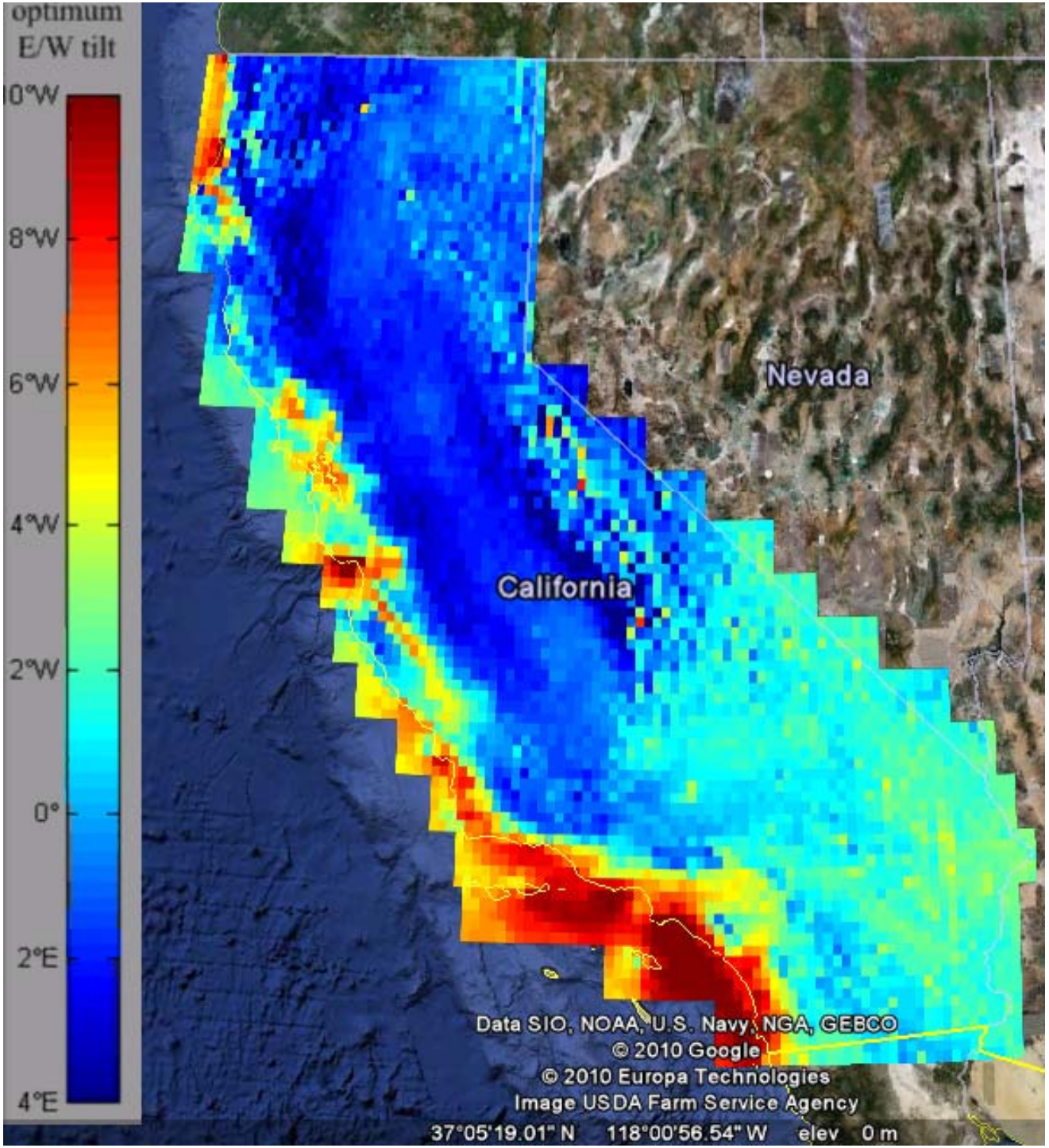

Optimum azimuth angles for PV

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California Solar Resource Data

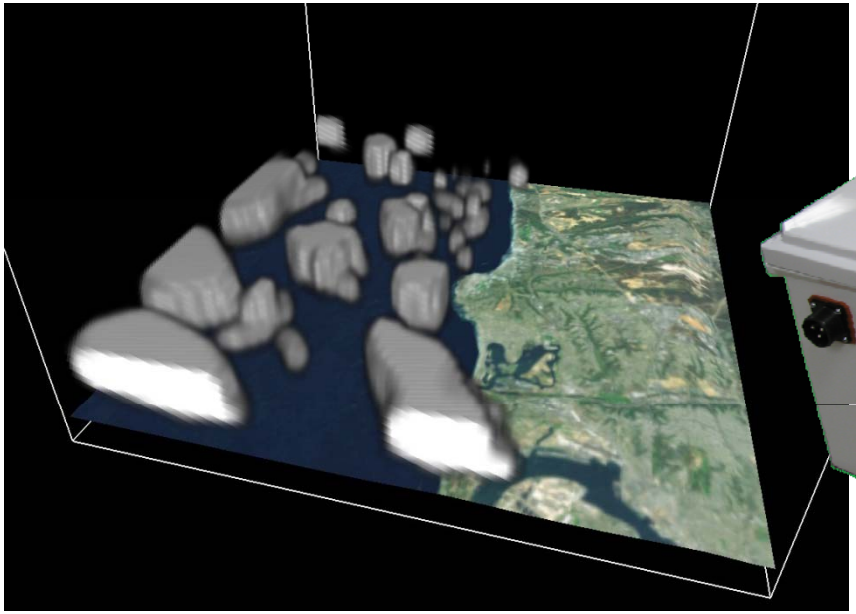
Name	Type	Resolution / # of stations	Time step	Real Time?	Accuracy for GHI
GOES	Satellite	1 km	15 min	Yes	Low
NOAA ISIS	Ground GHI, DNI, DIF	1 (Hanford)	3 min	Yes	Medium – High
NREL MIDC	Ground GHI, DIF	2 (LA, Rancho Cordova)	1 min	Yes (30 min)	Medium – High
CIMIS	Ground GHI	134	1 h	No (1x / day download)	Medium
NOAA ASOS	Cloud height and density	82 (airports)	10 min	Yes	Low
CSI PBI	PV output, some GHI	>2070	15 min	No, NDA required	Low
UCSD Sky Imager	Sky Image	50 m	30 sec	Yes	Low

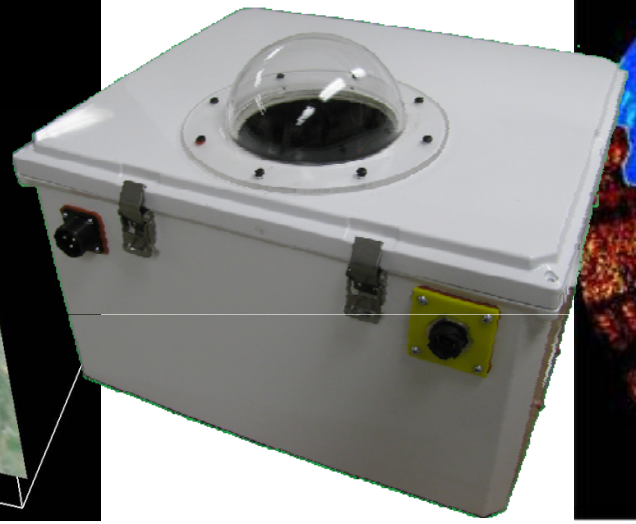
Available irradiance measurements in California. ISIS: Integrated Surface Irradiance Study; CIMIS: California Irrigation Management Information System; ASOS: Automated Surface Observation Syster PBI: Performance Based Incentive; MIDC: Measurement and Instrumentation Data Center.

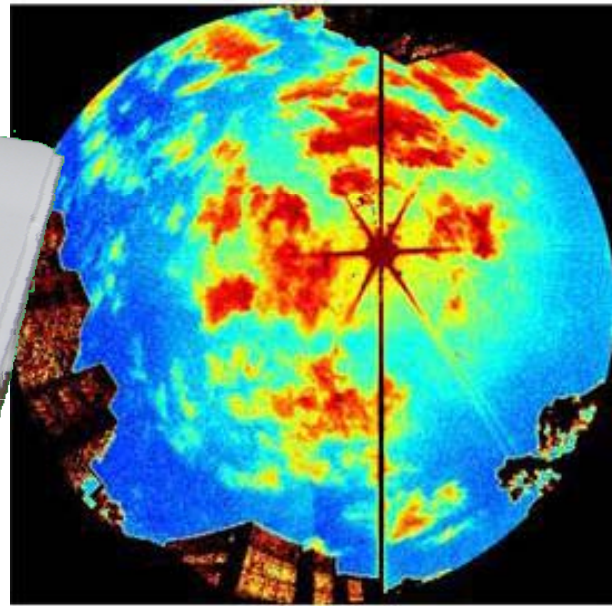
2010 Quality Controlled CIMIS and PBI data are available upon request.

Solar Forecasting

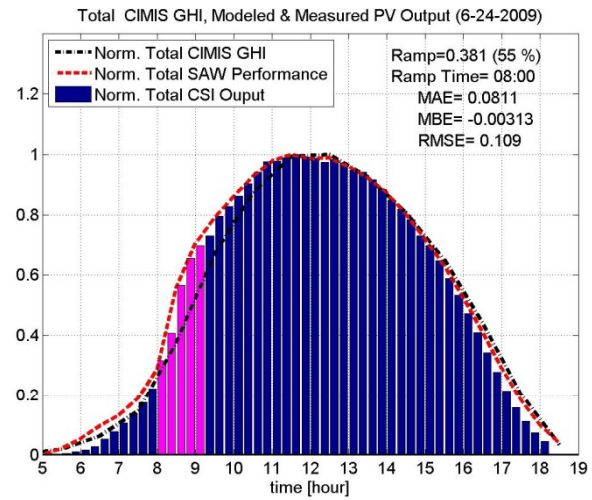
- Goal: reduce reserve requirements and integration costs
- Focus on meteorological conditions specific to California
- Horizon: Intra-hour (dispatch) and day-ahead (scheduling)



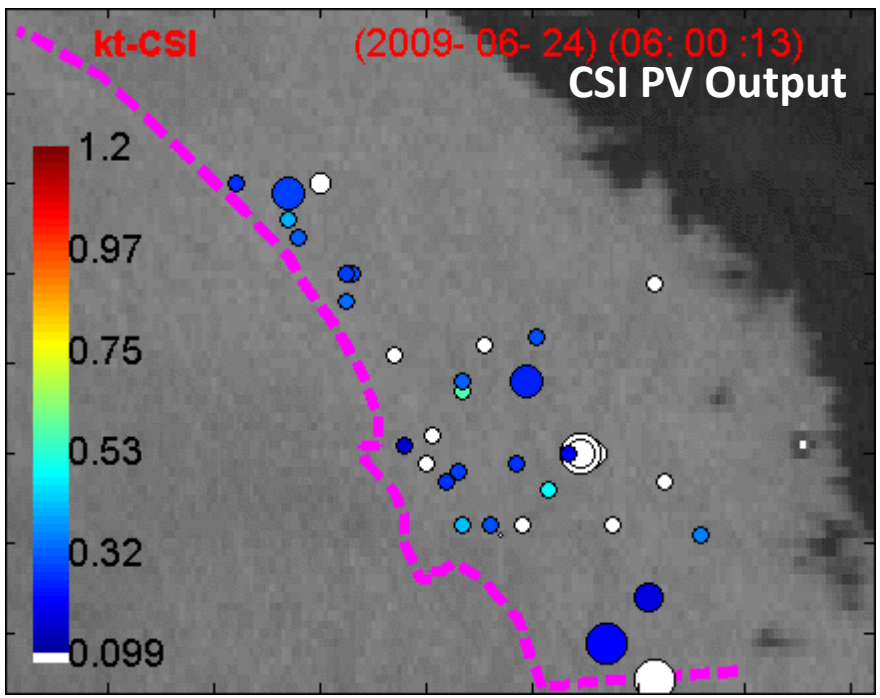


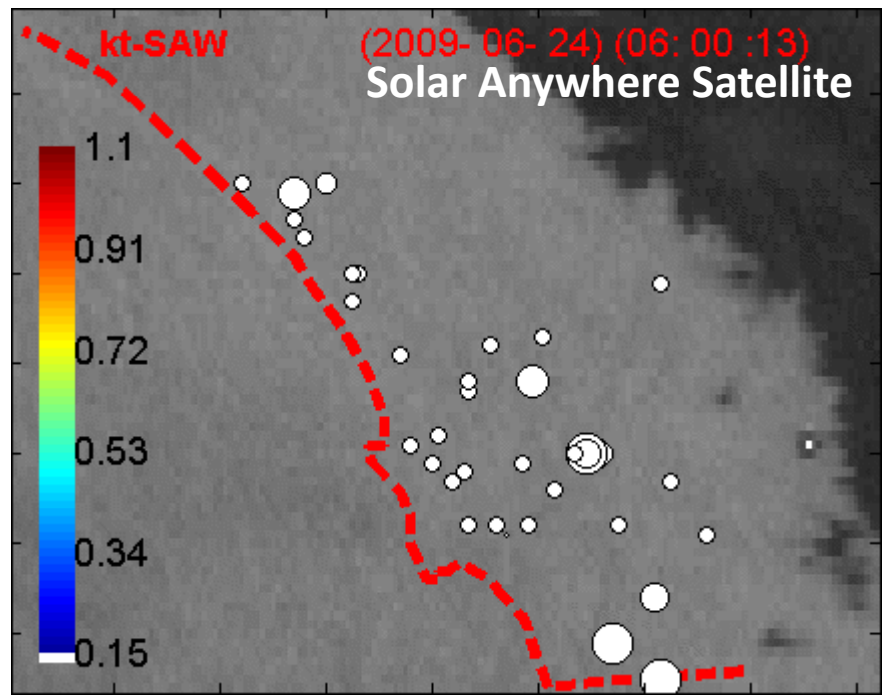


Example: Marine Layer



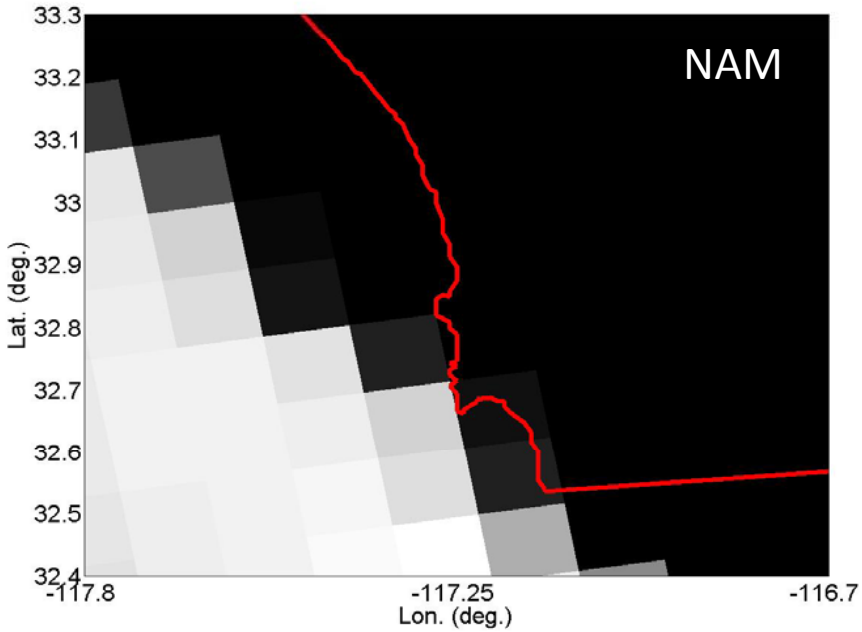
June 24, 2009: GOES Satellite Imagery

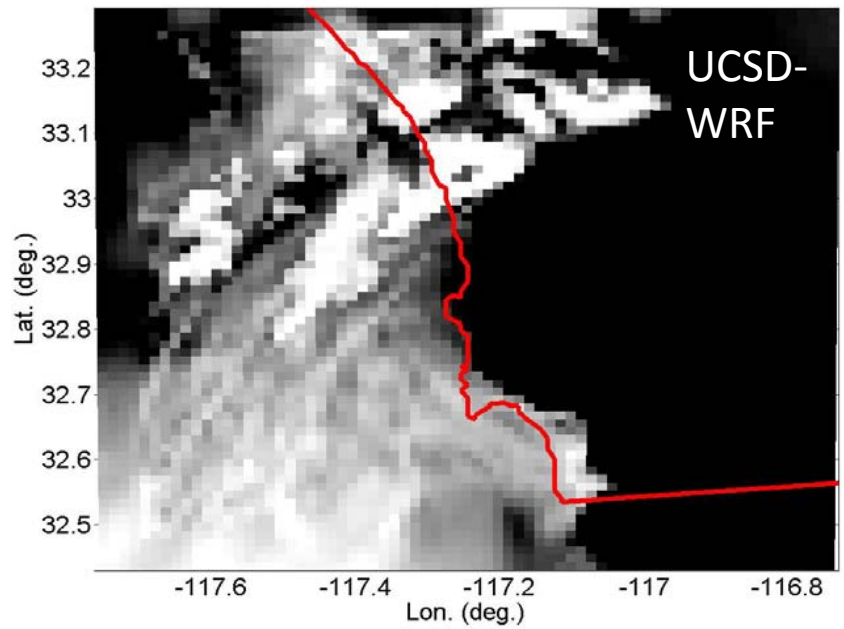


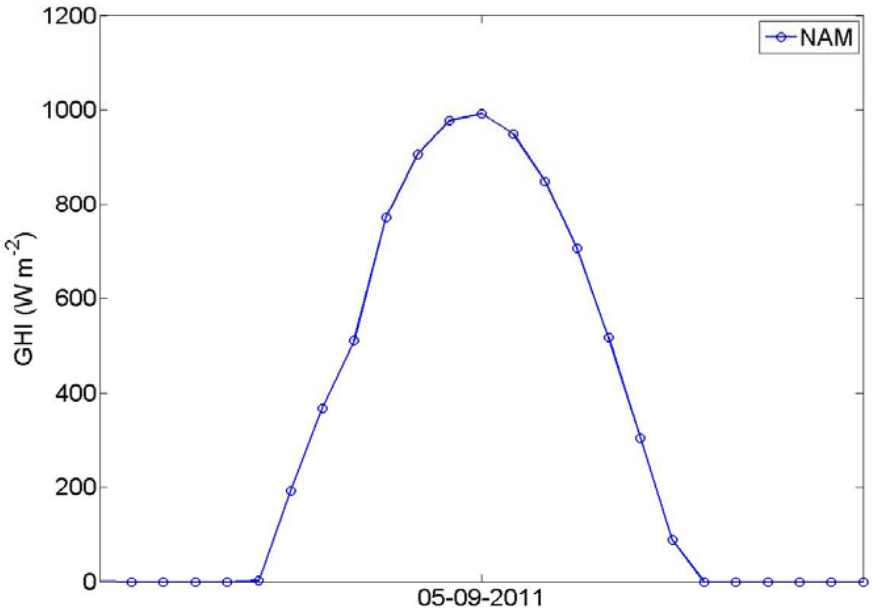


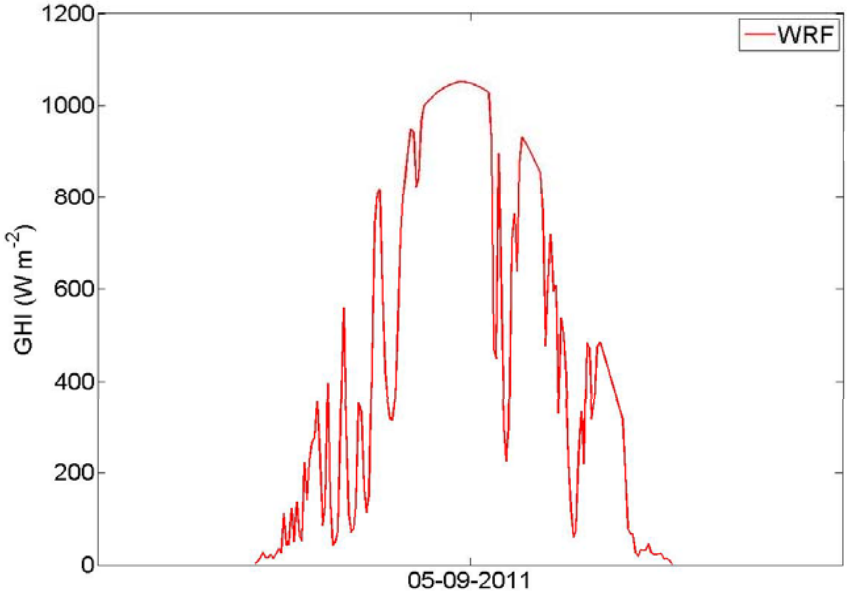
Color: clear sky index = fraction of possible power output. kt = 1: maximum power output (red). The size of the circles is proportional to the rated power of the solar power plant.

High-Resolution Numerical Weather Prediction



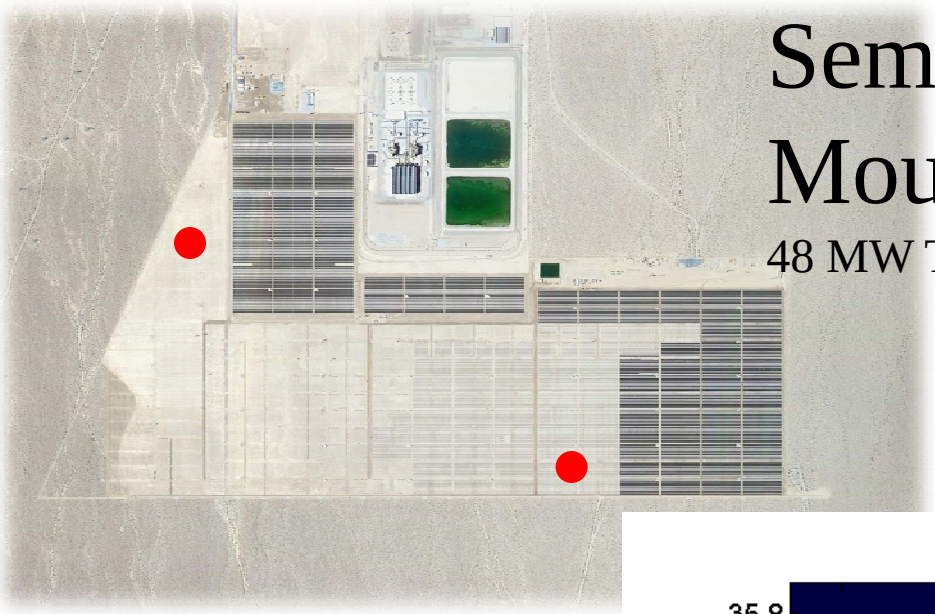


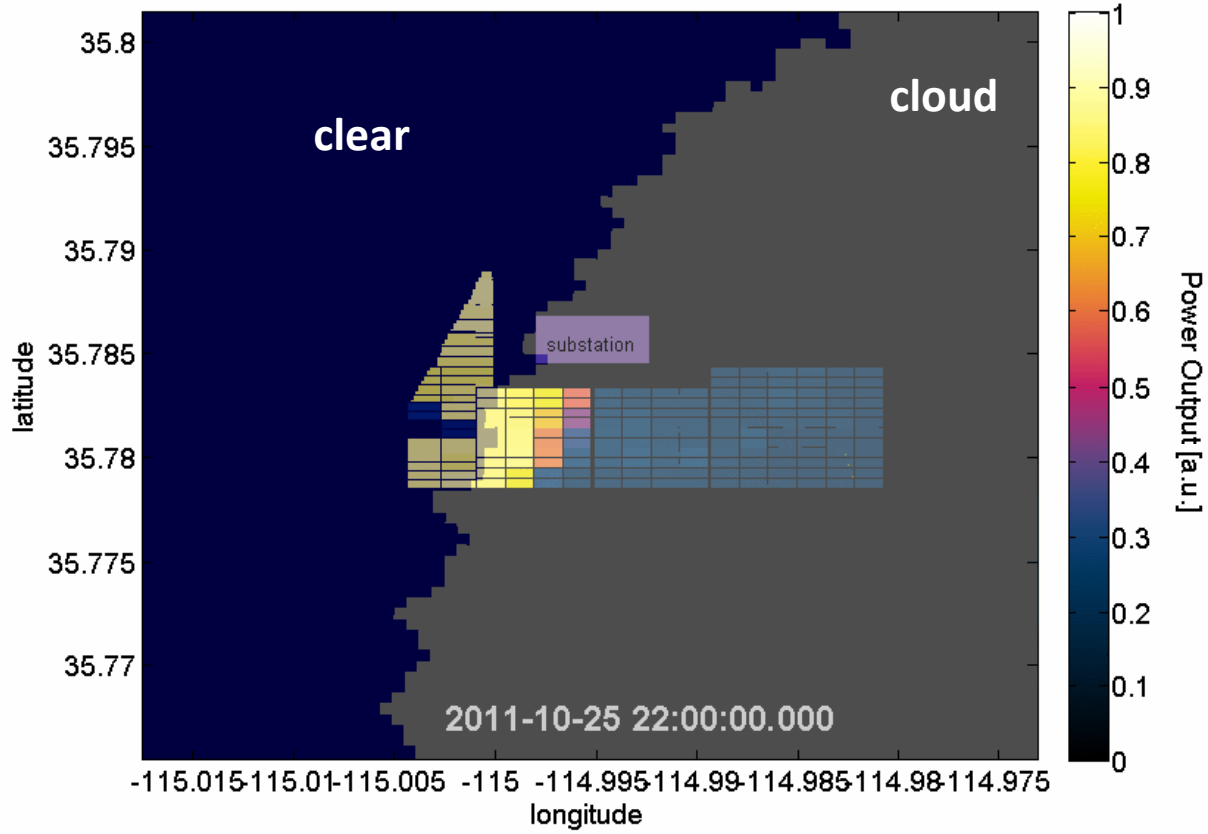




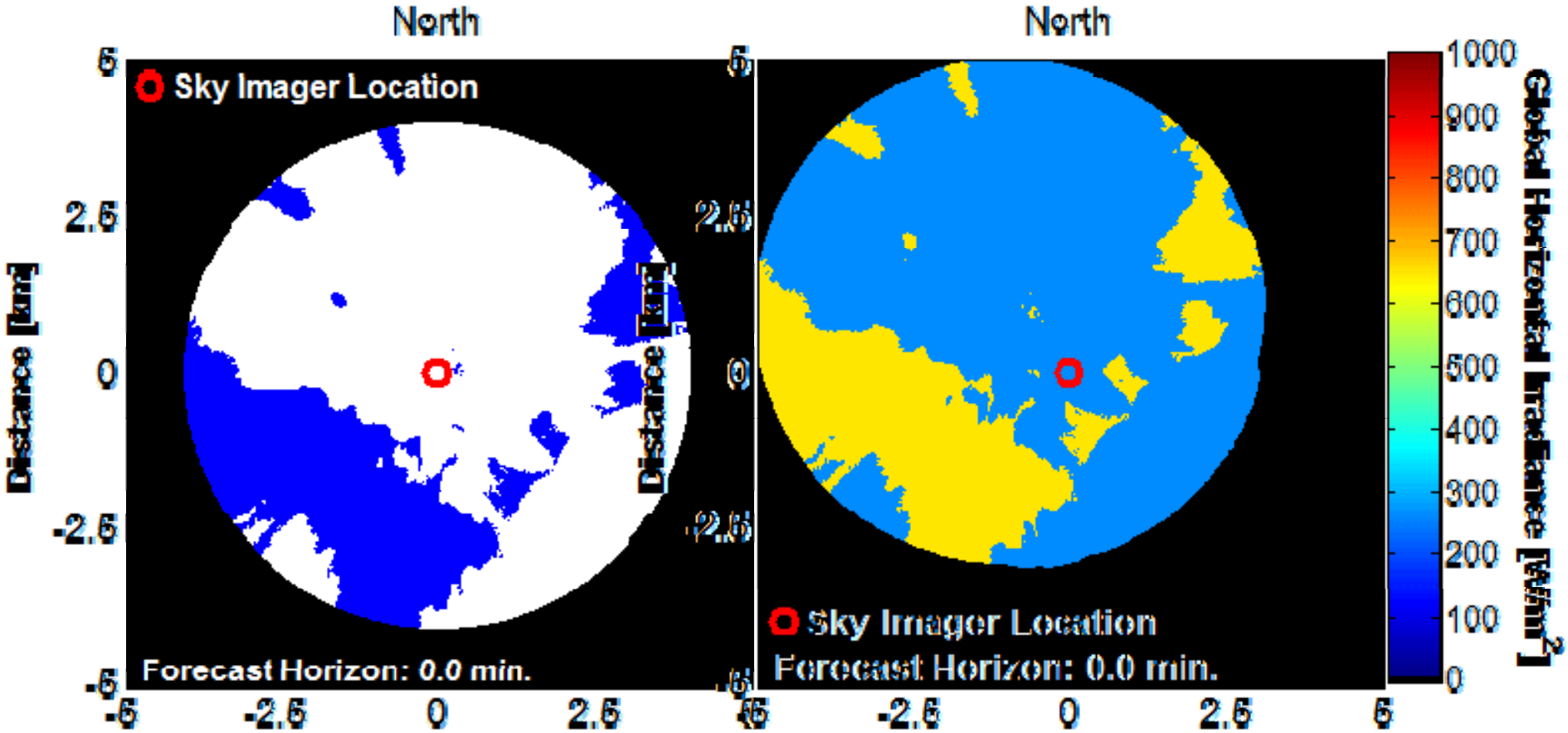
Sempra Generation Copper Mountain Demonstration

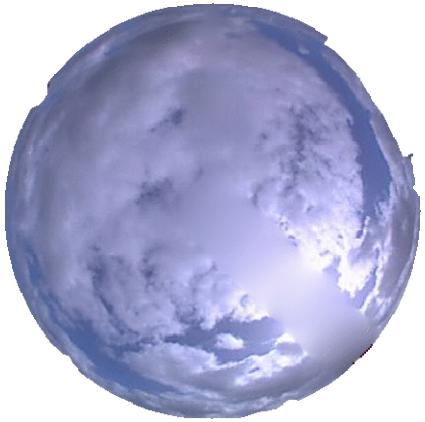
48 MW Thin Film PV Plant, Largest in the U.S.





Cloud Advection to Obtain Irradiance Forecast





Contact Information

Jan Kleissl, Assistant Professor, Dept of Mechanical and Aerospace Eng, University of California, San Diego, 858-534-8087

jkleissl@ucsd.edu

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