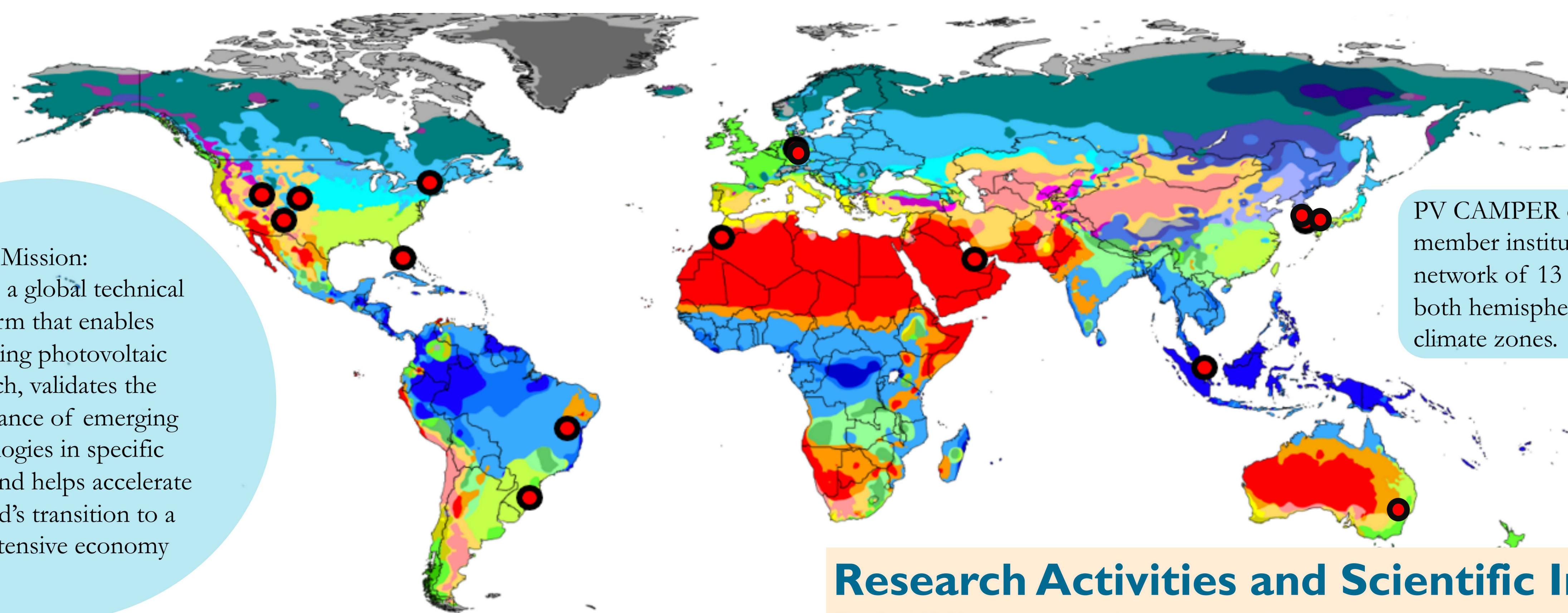




Photovoltaic Collaborative to Advance Multi-Climate Performance and Energy Research (PV CAMPER)

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Introduction

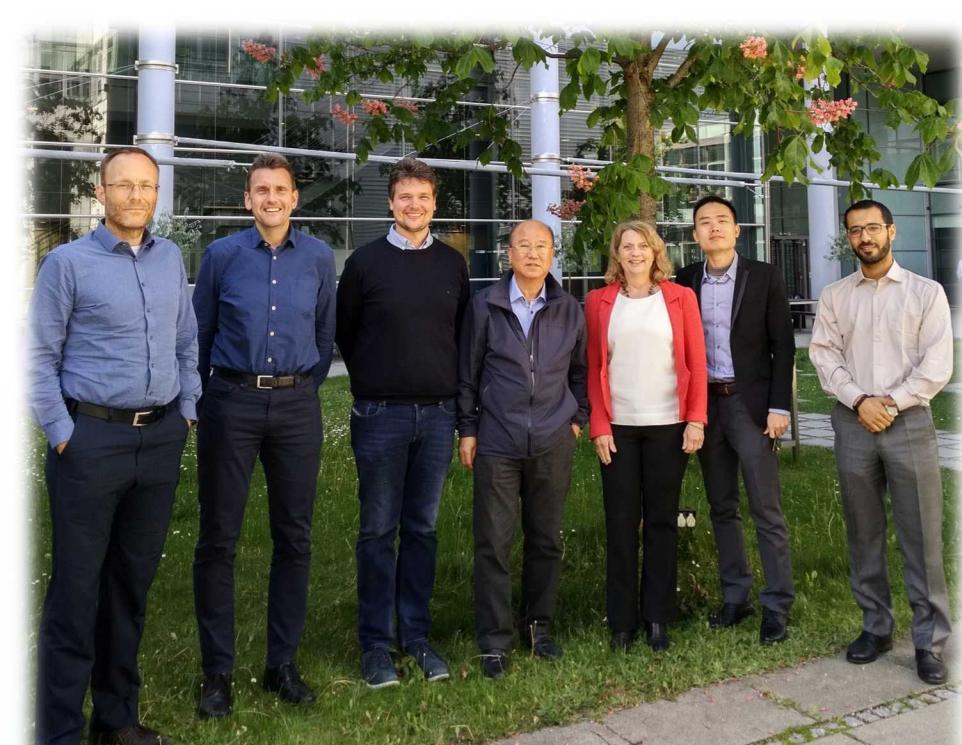
Formed in 2018, PV CAMPER is based on the US Regional Test Center Program, which has five climatically distinct sites in the US and supports research, product validation and solar education (see above map and rtc.sandia.gov)

Organizational Objectives

- Create a global research platform with common infrastructure and protocols to address persistent PV performance challenges (uncertainty drivers, degradation rates, soiling losses, component failures) and increase the accuracy of performance models
- Foster collaborative R&D in the areas of PV performance validation and reliability
- Identify and quantify the factors that contribute to climate-specific efficiencies and create a repository of data to support climate-specific design optimization
- Generate set of best-practices for data monitoring and collection
- Serve as a trusted forum for information-sharing among PV specialists

Founding Members

- Anhalt University of Applied Sciences
- Commonwealth Scientific and Industrial Research Organization (CSIRO)
- Fraunhofer CSP
- Institut de Recherche en Energie Solaire et en Energies Nouvelles (IRESEN)
- Korea Testing Laboratory
- Korean Institute for Energy Research
- Qatar Environment & Energy Research Institute (QEERI)
- Sandia National Laboratories
- Solar Energy Research Institute of Singapore (SERIS)
- Universidade Federal de Santa Catarina (UFSC)
- Yeungnam University



Research Activities and Scientific Impact

PV CAMPER supports multi-institutional, cross-climate research on multiple topics:

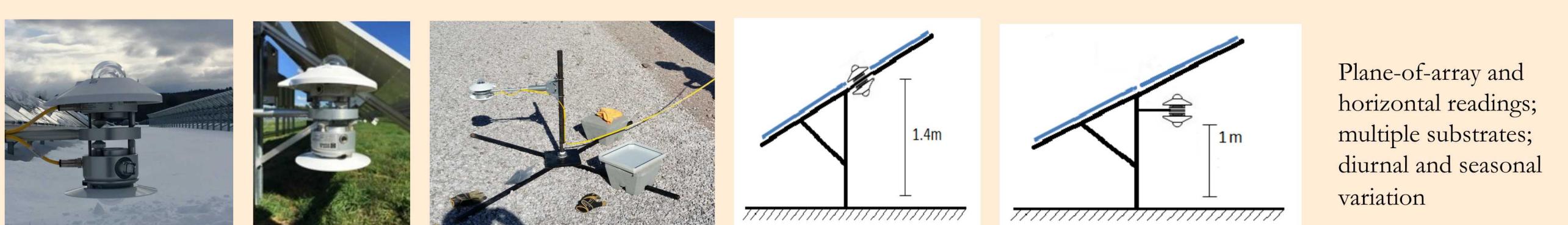
Pyranometer Uncertainty

Pyranometers calibrated to the same standard will be distributed to PV CAMPER members for field deployment and recalibrated at the end of a year



Global Albedo Analysis

Ground-based horizontal and plane-of-array albedo measurements are being analyzed for diurnal and seasonal changes and compared with satellite measurements*



* Dittmann, et al. Comparative Analysis of Albedo Measurements (Plane- of-Array, Horizontal, Satellite) at Multiple Sites Worldwide. EU PVSEC 2019, oral presentation 12.09.2019

Global Soiling Analysis

Multiple types of soiling instruments will be deployed and data collected on soiling losses as well as the composition of particulates throughout the year



Back-of-Module Temperature Study

Intent is to quantify the accuracy and reliability of different temperature sensors and build a global database

Membership Requirements

PV CAMPER is an expandable concept and welcomes new members committed to similar standards for data quality and availability, to data-sharing and to collaborative research. In addition, each member must have:

- A grid-tied crystalline-silicon PV reference system
- High-accuracy meteorological and irradiance instrumentation (DNI, GHI, DHI, POA and albedo)
- High-resolution DC data-monitoring instrumentation
- High-frequency data acquisition systems
- Module characterization capabilities that meet IEC standards

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