IMPROVING SURFACE RADIATION IN A SATELLITE-BASED PHYSICAL MODEL

MOTIVATION
Solar resource assessment is needed to achieve high penetrations of concentrated solar power or photovoltaics on the grid. This requires:
- Accurate information about the availability of the solar resource
- Information about factors that influence the solar resource
- Spatial and temporal variability of the solar resource

GOALS
- Develop physics-based method to improve solar resource assessment
- Validate satellite product with ground measurements
- Improve satellite product

PHYSICAL METHOD FOR REAL-TIME PROCESSING OF CLOUDS AND SOLAR RADIATION

RESULTS: PRODUCTS DERIVED FROM PHYSICAL METHOD FROM GOES-11 [WEST] GEOSTATIONARY SATELLITE

VALIDATION: GROUND MEASUREMENT STATIONS FOR PRODUCT VALIDATION – NOAA SURFRAD

POSSIBLE REPLACEMENTS FOR THE SASRAB MODEL

EXPERIMENTAL SETUP
Two goals:
- Choose the best-performing radiative transfer model (speed and accuracy)
- Determine the need for high-resolution primary and secondary inputs

RESULTS: COMPARISON OF RADIATIVE TRANSFER MODEL ACCURACY

GHI - Desert Rock – NV - Results

DNI - Desert Rock – NV Clear Sky Comparison

CONCLUSIONS
- SOLIS, BIRD, and REST 2 significantly reduce errors created by the SASRAB model.
- High-temporal-resolution aerosol and water vapor information is important especially for accuracy in DNI.
- GHI is best estimated by REST2, whereas DNI is best estimated by the BIRD model.
- BIRD has significantly faster performance than REST2.
- The BIRD model has been chosen for other analysis, but the capability to use any of the three models has been developed.