Cloud Type Impact on Surface Radiation

**Motivation**

- Forecast systems are impacted by inaccurate radiation forecasts
- Cloud amount and type influences radiation forecasts
- Inclusion of cloud type may improve forecasts for a variety of end-users

**Case Study**

Tactical Forecasting

- Left: Mean radiation time series for 29 May 2012 with modal cloud color-coded.
- Right: Cumuliform cloud types impact midday radiation, reduction period of 45 minutes and a recovery period of 25 minutes. Such information is useful to develop tactical forecasting products.

**Methods**

**Naval Research Lab Cloud Classifier**

- A combination of visible and infrared satellite channels to produce cloud type
- Pixel-by-pixel brightness thresholds
- Day and night operation

**Conclusions and Future**

- Clouds and other atmospheric particles impede 60-80% of total radiation.
- 32.9% variability in solar radiation on cloudy case days due to clouds
- 7.2% solar radiation variability due to clouds when clear case days considered
- Another significant influence on radiation: Water vapor? Aerosols?
- Next steps are to compute regression statistics for OK
- Conduct similar assessment for other regions / seasons

**Research**

- Track Weather Forecast System

**Cases v OK-Mesonet**

- Percentage of max radiation transmission:
  - Low 20%, Mid-level 32%, High 40%, Cumuliform 34%.
  - OK-Mesonet distributions similar to case studies

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