Optimized DNI forecast using combinations of nowcasting methods from the DNICast project

**Goals**

The efficient Operation of Concentrating Solar Technologies (CST) requires reliable forecasts of DNI.

**Ground-based Sky Imagers**
- Intra-hour nowcasting: 0 – 15 min

**Satellite based cloud and DNI nowcasting**
- Intra-hour and intraday: 5 – 360 min

**Numerical Weather Prediction**
- Intra-hour and intraday: 60 – 360 min or more

**TECHNICAL ASPECTS**

- Three different methodologies for combining nowcast outputs.
- Nowcasting outputs tested at Plataforma Solar Almería - Spain.
- 4 time periods:
  - Jan – Mar 2010
  - Mar – May 2013
  - Jul – Aug 2014
  - Sep – Nov 2015

**Uncertainty weighted based approach**
- Uses uncertainty of input nowcasting data set.
- Includes only available data set.
- Combines several nowcasts by weighting quality.

**Multi-regressive approach**
- Uses time-dependent multi-regressive model.
- Applies adaptive linear merging.
- DNI predicted values in previous forecast are the inputs used.

**Distance weighted combination**
- Uses the distance of previous measurements.
- Includes only available data set.
- Weights based in Euclidean distance and CoV comparisons.

**GENERAL RESULTS**

- Lower errors in combined nowcast than in single nowcasts.
- Better results in Summer periods: better coincidence in persistence and less clouds.
- UWA model is simple and effective.
- Combined nowcast used to evaluate benefits of power plant operation.

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