Comparison of HelioClim-3v5 satellite irradiation data within in-situ measurements for five states in Brazil

**HelioClim-3**

From MSG: 3 km at nadir, every 15 min, Feb. 2004 onwards

- All radiation components over a horizontal, fix-tilted and normal plane (tracker 2D)
- Updated in real time. Irradiation forecasts available. Duplicated servers for a robust service. Available via the SoDa website
- Version 5 of HelioClim-3 (Nov. 2014) combines the cloud index with the MACC clear sky properties service named McClear

**In-situ measurements**

5 stations from the INMET network

- Hourly Global Horizontal (GHI) values

<table>
<thead>
<tr>
<th>Stations</th>
<th>Brazilian state</th>
<th>Lat, lon (deg)</th>
<th>Time period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquidauana</td>
<td>Mato Grosso do Sul</td>
<td>-20.475, -55.784</td>
<td>2006-11-01 to 2014-12-31</td>
</tr>
<tr>
<td>Cacoal</td>
<td>Rondônia</td>
<td>-11.446, -61.434</td>
<td>2006-07-20 to 2014-12-31</td>
</tr>
<tr>
<td>Canela</td>
<td>Rio Grande do Sul</td>
<td>-29.369, -50.827</td>
<td>2006-08-27 to 2014-12-31</td>
</tr>
<tr>
<td>Cidade Gaucha</td>
<td>Parana</td>
<td>-23.359, -52.932</td>
<td>2008-03-11 to 2014-12-31</td>
</tr>
<tr>
<td>Curitibanos</td>
<td>Santa Catarina</td>
<td>-27.289, -50.604</td>
<td>2008-02-29 to 2014-12-31</td>
</tr>
</tbody>
</table>

**Validation protocol and results**

Quality check procedure (EU-funded FP7 ENDORSE project)

- Only keep in-situ GHI measurements above 50 W/m²
- Discard non plausible data (extremely rare and physical possible limits)
- Missing values: sum the available hours to generate partial daily values, idem for partial monthly values
- Compute: bias, Root Mean Square Error (RMSE), and correlation coefficient (CC) for each summarization

**Results for hourly values**

**Results for partial days**

**Results for partial months**

**Example of graph for the station of Canela, hourly values.**

**Conclusion and perspectives**

- With a low bias which ranges from -1% to 4% and a good to very good RMSE for all summarizations, these preliminary results demonstrate that HelioClim-3 version 5 is a reliable irradiation resource to assess the solar potential in Brazil.
- The objective is to widen this analysis to the other 26 stations available in the INMET network.
- We also plan to carry out the same validation process on the 11 stations of the INPE network.

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