HelioClim-4, or how to build a successful and sustainable business service based on CAMS radiation service
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HelioClim-4, a successful and sustainable business service based on CAMS radiation service

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Many valuable atmospheric parameters, among which:
- CAMS radiation service
- CAMS McClear

HelioClim-4 (HC4) = CAMS radiation enhanced with several value-added post-processing layers

Horizon

- CAMS radiation components are horizon free data (gray + yellow values).
- HC4 proposes an option to take into account (yellow values + a fraction of gray values) the shadowing effect due to the far horizon computed from SRTM

Evaluation of the performance

18 stations (hourly data) => 4 groups (A, B, C, D):
- 17 non-shadowed pyranometers (pyr.) measuring Global Tilted Irradiation (GTI) 25° South => evaluate the performance of fix-tilted data in HC4
- 1 pyr. measuring GHI with a discriminant horizon => horizon

Statistical results (bias in %, Standard Deviation STD in %, Root Mean Square Error RMSE in % and Correlation Coefficient CC) are provided for both HC4 \textit{CASE 1} and \textit{CASE 2}, and for HC3v5

Conclusions
- HC4 is fairly close to HC3v5 in most cases
- HC4 Case 1 returns better results than Case 2: the use of an empirical algorithm should be avoided
- Improvement when horizon is taken into account

Perspectives
- Reliable precursor of service
- Further development: e.g. modulate HC4 value with the height of the selected point inside a Meteosat pixel

Data on every plane orientation
- CAMS radiation service: all components on horizontal plane + Direct Normal Irradiation.
- HC4: all the irradiation components in all plane orientations: fox tilted, 2D Sun tracking, 1D Sun tracking (North-South or East-West axis), tilt or azimuth tracking
- Two models tested to compute fix-tilted components:
  - \textit{CASE 1}: Exploit all CAMS radiation components (GHI and BHI)
  - \textit{CASE 2}: Exploit only GHI, and use an empirical model (Ruiz Arias et al.) to compute BHI prior transfer on the tilted plane

Accuracy

<table>
<thead>
<tr>
<th>Groups of stations</th>
<th>\textit{CASE 1} HC4</th>
<th>\textit{CASE 2} HC4</th>
<th>HC3 V5</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>Bias (%) 5% 23% 23% 0.963</td>
<td>9% 23% 25% 0.963</td>
<td>4% 18% 18% 0.975</td>
</tr>
<tr>
<td>C</td>
<td>Bias (%) 4% 21% 21% 0.958</td>
<td>6% 20% 21% 0.960</td>
<td>5% 16% 17% 0.975</td>
</tr>
<tr>
<td>D</td>
<td>Bias (%) 6% 18% 19% 0.971</td>
<td>9% 19% 21% 0.969</td>
<td>4% 16% 17% 0.975</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group of stations</th>
<th>\textit{HC3 V5}</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Bias (%) 8% 25% 26% 0.950</td>
</tr>
</tbody>
</table>

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