Evaluating Regional Changes in Performance of Several Databases in Arabic Peninsula

Partners

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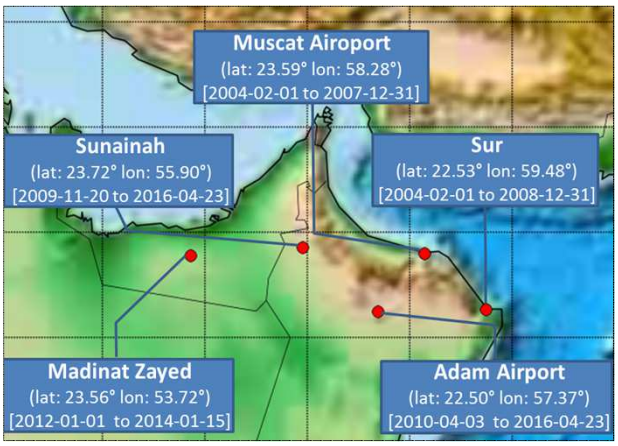
HelioClim-3 and CAMS-RAD in a nutshell

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 (www.soda-pro.com)
- HelioClim-3 is based on the Heliosat-2 method (cloud index)
- Version 5 of HelioClim-3 (Nov. 2014) combines the cloud index with Copernicus McClear service providing irradiation in cloud-free conditions
- CAMS-RAD is based on Heliosat-4 method, combining McClear and cloud properties from APOLLO (DLR)



In-situ measurements

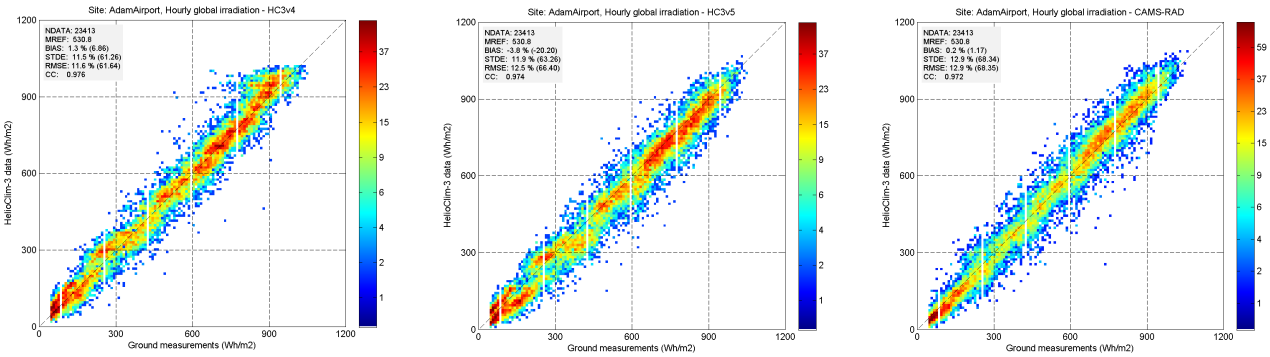
- Hourly global irradiation on horizontal plane (GHI)

Quality Check, Validation Protocol and Results

- Quality Check (EU-funded FP7 ENDORSE project)
  - Only keep in-situ GHI measurements above 50 Wh/m²
  - Discard non plausible data (extremely rare and physical possible limits)
- Compute difference: database - measurements
- Compute: bias, Root Mean Square Error (RMSE), and correlation coefficient (CC)

			HC3v4			HC3v5			CAMS		
Stations	Number of values	Mean – station (Wh/m²)	Bias Wh/m² (rel. in %)	RMSE Wh/m² (rel. in %)	CC	Bias Wh/m² (rel. in %)	RMSE Wh/m² (rel. in %)	CC	Bias Wh/m² (rel. in %)	RMSE Wh/m² (rel. in %)	CC
Sunainah	25790	522.5	-6 (-1%)	68 (13%)	0.972	-7 (-1%)	68 (13%)	0.975	-2 (0%)	73 (14%)	0.969
Muscat Airport	15636	565.3	-20 (-4%)	77. (14%)	0.969	-30 (-5%)	78 (14%)	0.971	-30 (-5%)	81.7 (14%)	0.968
Madinat Zayed	7374	551.8	-59 (-11%)	92 (17%)	0.972	-50 (-9%)	89 (16%)	0.968	-21 (-4%)	60 (11%)	0.983
Sur	18749	559.4	-11 (-2%)	73 (13%)	0.970	-41 (-7%)	83 (15%)	0.971	-30 (-5%)	90 (16%)	0.959
Adam Airport	23413	530.8	7 (1%)	62 (12%)	0.976	-20 (-4%)	66 (13%)	0.974	1 (0%)	68 (13%)	0.972

Example of graph for the station of Adam Airport, hourly values



Conclusion

- Three databases reproduce very well the hourly changes (correl. coeff. > 0,97)
- There is a tendency to underestimate (negative bias) for each database
- RMSE varies between 11% and 17%, which is very good for hourly values
- For a given station, performances vary only slightly from database to database. Conversely, for a given database, performances vary more from station to station. This relates to the specifics of the method behind each database
- The three databases are reliable sources to assess the solar potential in this region

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www.soda-pro.com

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