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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Challenges in weather, climate and water services for energy

Partners

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solar radiation data

http:// www.soda-pro.com

Copernicus

Many valuable atmospheric parameters, among which:

Atmosphere Monitoring Service — atmosphere.copernicus.eu

CAMS McClear | CAMS radiation service

http://www.soda-pro.com

TRANSVALOR | SoDa solar radiation data

Users

HelioClim-3 version5

an example of successful take-up of a Copernicus service by the SoDa team

CAMS McClear

Combined with +

HelioClim-3 (HC3)

=

HelioClim-3 version 5 (HC3v5)

http://www.soda-pro.com

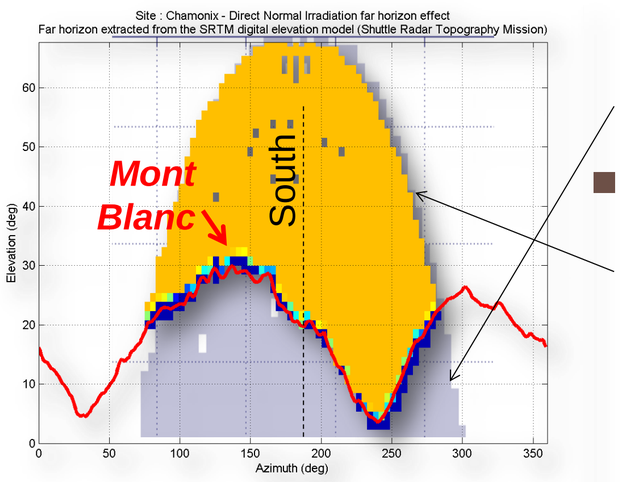
Outperforms all previous versions

More than **60** annual subscriptions (for pay)

More than **1400** requests per week day in 2017

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

Horizon

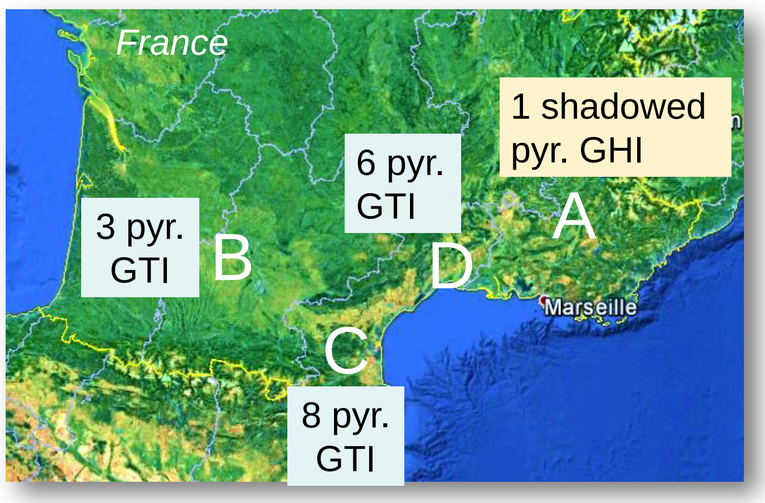


- CAMS radiation components are horizon free data (gray + yellow values).
- HC4 proposes an option to take into account (yellow values + a fraction of gray values) the shadowing effect due to the far horizon computed from SRTM

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:
  - ***CASE 1***: Exploit all CAMS radiation components (GHI and BHI)
  - ***CASE 2***: Exploit only GHI, and use an empirical model (Ruiz-Arias et al.) to compute BHI prior transfer on the tilted plane

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

Hourly GTI values Groups of stations		CASE 1 HC4	CASE 2 HC4	HC3 V5
B	Bias (%)	5%	9%	4%
	STD (%)	23%	23%	18%
	RMSE (%)	23%	25%	18%
	CC	0.963	0.963	0.978
C	Bias (%)	4%	6%	5%
	STD (%)	21%	20%	16%
	RMSE (%)	21%	21%	17%
	CC	0.958	0.960	0.975
D	Bias (%)	6%	9%	4%
	STD (%)	18%	19%	16%
	RMSE (%)	19%	21%	17%
	CC	0.971	0.969	0.976

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

Hourly GHI values Group of stations		GHI CAMS radiation (without horizon)	GHI HC4 (with horizon)	HC3 V5 without horizon	HC3 V5 with horizon
A	Bias (%)	8%	7%	3%	2%
	STD (%)	25%	24%	23%	23%
	RMSE (%)	26%	26%	23%	23%
	CC	0.950	0.953	0.957	0.958

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