



C A M S

Assessment of solar resources



User
Uptake

Context

- Solar farm developers need to make a first assessment of solar resource in order to identify suitable sites.
- Time series of solar data are necessary to produce solar resource assessment reports that are requested by bankers to finance a solar plant
- Copernicus Atmosphere Monitoring Service is useful to do that.
- This assessment is based on several years of solar radiation data.
- Developers analyze the time series data to:
 - Assess daytime, inter-monthly and inter-yearly variabilities.
 - Compare several candidate sites
 - Produce solar resource assessment reports
 - Compare with measurements and assess accuracy



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Use case

- This submodule describes how to access solar data from the **CAMS Total-Sky Surface Solar Irradiation** service.
- This service delivers time series of irradiation:
 - Global, Direct and Diffuse Irradiations on horizontal surface;
 - Direct Irradiation on normal plane (DNI) ;
 - Cloudy and Clear-sky conditions;
 - Time step ranging from 1 min to 1 month;
 - Data are available from Jan. 2004 up to current day -2.



- Go to CAMS catalogue (<http://atmosphere.copernicus.eu/catalogue#/>)
- Select Solar radiation.
- Choose **Total-sky surface solar irradiation**.
- Login or register to access the solar radiation service (<http://www.soda-pro.com/webservices/radiation/cams-radiation-service>)
- Choose location on map
- Extract 10 years of data and save it as csv file
- Using MS excel/OpenOffice:
 - aggregate the data on yearly base
 - Calculate the yearly and monthly means
 - build the corresponding inter-monthly and inter-yearly variabilities
 - build the daytime variability



- Video 1 :
 - Access service and download data
- Video 2 :
 - Analyse data in Excel





Video 1 : Access CAMS service

The screenshot shows the homepage of the Atmosphere Monitoring Service. The browser address bar displays <https://atmosphere.copernicus.eu>. The page features a navigation menu with links for 'DATA', 'ABOUT US', 'WHAT WE DO', and a search function. Logos for the European Commission, Copernicus, and ECMWF are visible. The main content area is titled 'Today's air quality forecasts' and includes two image-based links: 'Europe' (showing the Eiffel Tower) and 'Worldwide' (showing a satellite view of Earth). A large video player on the right shows a night view of Earth with city lights, captioned 'Daily CAMS air quality forecast on Euronews'. Below this, there is a 'Latest News' section with a tweet from CopernicusECMWF. The news items include 'C3S and CAMS Contribute to Annual Meeting of European Meteorological Society' and 'Enabling education using free and open Copernicus data'. A sidebar on the left contains a 'SAVE THE DATE' for the 'CAMS 3rd GENERAL ASSEMBLY' on 1-3 October 2018.



Video 2 : Data Analysis in Excel

```
1 # Coding: utf-8
2 # File format version: 2
3 # Title: CAMS Radiation Service v3.2 all-sky irradiation (derived from satellite data).
4 # Content: A time-series of solar radiation received on horizontal plane and plane always normal to the sun rays at ground level.
5 # Returns the global, beam and diffuse irradiancies integrated over a selected time step,
6 # for a selected location (Meteosat Second Generation satellite coverage) and a selected period.
7 # The research leading to these results has received funding from the European Union within the Copernicus programme.
8 # Provider: MINES ParisTech (France)
9 # More information at: http://www.soda-pro.com/web-services/radiation/cams-radiation-service
10 # Date begin (ISO 8601): 2017-01-01T00:00:00.0
11 # Date end (ISO 8601): 2018-01-01T00:00:00.0
12 # Latitude (positive North, ISO 19115): 59.8305
13 # Longitude (positive East, ISO 19115): 10.6574
14 # Altitude (m): 198.00
15 # Time reference: Universal time (UT)
16 #
17 # Encoding partly from D2.8.III.13-14 INSPIRE Data Specification on Atmospheric Conditions and Meteorological Geographical Features - Technical Guidelines (2013-12-10) and CF (Climate and Forecast) metadata (2013-11-11)
18 # CF Standard Names registry of ObservablePropertyValue
19 # http://cfconventions.org/Data/cf-standard-names/27/build/cf-standard-name-table.html
20 # urn:x-inspire:specification:DS-AC-MF:observable-property-name:cf-standard-name:1.6
21 # ObservableProperty
22 # basePhenomenon:"integral_of_surface_downwelling_shortwave_flux_in_air_sky_wrt_time"
23 # uom:"Wh m-2" [unit]
24 # StatisticalMeasure
25 # statisticalFunction:"sum"
26 # Summarization (integration) period: 0 year 0 month 0 day 1 h 0 min 0 s
27 # noValue: nan
28 #
29 # Columns:
30 # 1. Observation period (ISO 8601)
31 # 2. TOA. Irradiation on horizontal plane at the top of atmosphere (Wh/m2)
32 # 3. Clear sky GHI. Clear sky global irradiation on horizontal plane at ground level (Wh/m2)
33 # 4. Clear sky BHI. Clear sky beam irradiation on horizontal plane at ground level (Wh/m2)
34 # 5. Clear sky DHI. Clear sky diffuse irradiation on horizontal plane at ground level (Wh/m2)
35 # 6. Clear sky BNI. Clear sky beam irradiation on mobile plane following the sun at normal incidence (Wh/m2)
36 # 7. GHI. Global irradiation on horizontal plane at ground level (Wh/m2)
37 # 8. BHI. Beam irradiation on horizontal plane at ground level (Wh/m2)
38 # 9. DHI. Diffuse irradiation on horizontal plane at ground level (Wh/m2)
39 # 10. BNI. Beam irradiation on mobile plane following the sun at normal incidence (Wh/m2)
40 # 11. Reliability. Proportion of reliable data in the summarization (0-1)
41 #
```