

Founded in 2001, HYGEOS is a worker cooperative enterprise. The 12 associate employees take part in the strategic orientations of the company.

Our team of R&D and IT engineers develop and improve tools for analysing satellite observation data to extract high precision information.

Our mission:

To improve the understanding of physical processes which shape our living environment: atmosphere, ocean, soil and vegetation.

To provide precise, accurate, detailed and quality-controlled information.

To support pertinent actions to improve air quality, protect marine resources and biodiversity, promote sustainable agricultural activities, develop the renewable energy sources, monitor the climate change and attenuate its impacts.

Our customers:

The spatial agencies - ESA, EUMETSAT, CNES – to simulate the satellite signal, calibrate the sensors and study the feasibility of future satellite missions.

The European Commission via the Copernicus program to which we actively contribute with our tools, methods and expertise for monitoring the atmosphere, the land surfaces and the climate change impacts.

The industries in space and energy sectors, to which we offer the precision and accuracy of our algorithms.

The SMART-G code can be downloaded:
<https://www.hygeos.com/smartg>



Our commitments:

A careful attention to figure out the customer needs and propose adapted and customised solutions;

Reactivity and flexibility to permanently fit our customers' needs and to closely follow the ever increasing scientific knowledge;

A continuous innovation to exploit the state of the art methodologies in remote sensing and spatial imagery.



EURATECHNOLOGIES
165, avenue de Bretagne
59000 LILLE (FRANCE)
www.hygeos.com
Contact :
Thierry Elias | +33 3 20 08 24 98
te@hygeos.com



Your partner for sustainable and optimised management of solar energy



SOLAR ENERGY | SOLAR RESOURCE | SOLAR THERMAL TOWER PLANT
SATELLITE OBSERVATION DATA | RADIATIVE TRANSFER MODEL | 3D SIMULATIONS

High added value to secure the solar plant development

HYGEOS supports your solar energy project, from feasibility study to production management. Indeed HYGEOS provides solar resource parameters required for planning productivity by photovoltaic and concentrated solar plants (CSP), in function of the meteorology, the air quality, the topography, the surface properties, the collecting technology.

All solar resource parameters are computed:

- > the direct normal irradiance (DNI),
- > the global horizontal irradiance,
- > the tilted global irradiance,
- > the slant path attenuation for tower CSPs,
- > all optical losses in a tower CSP like spillage, shadowing, blocking.



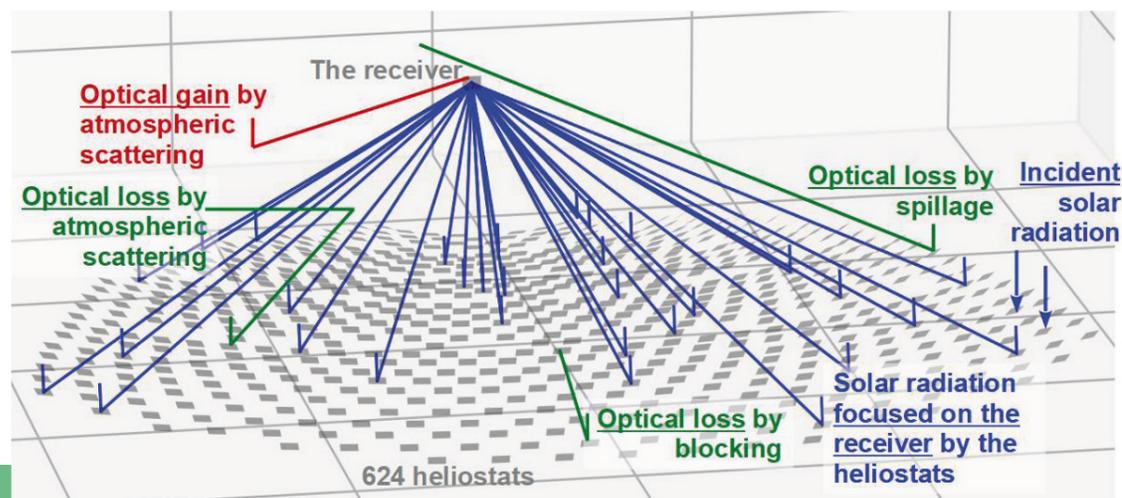
Any other parameter can be joined, as the wind speed, air temperature, circumsolar ratio.

Ask for a customised study:

- > Computations can be performed at any required spatial resolutions, for a specific location or extended areas anywhere in the world.
- > Time series can cover several tens of years at a time resolution below the hour.

Our tools:

- > a physical radiative transfer code (SMART-G):
 - coupling with ray tracing for 3D interactions between solar radiation and heliostats, tower, ground, ...
 - fed with the most pertinent databases to describe clouds, aerosols, water vapor, ozone, and other atmospheric components (e.g. MERRA-2, ECMWF ERA,...)
 - able to monitor the changes in solar resource in near real time using both satellite and ground-based data
 - state of the art in atmosphere modelling, thanks to 20-year experience
- > a high performance computing centre to manage the databases and to perform the computations and a satellite reception antenna.



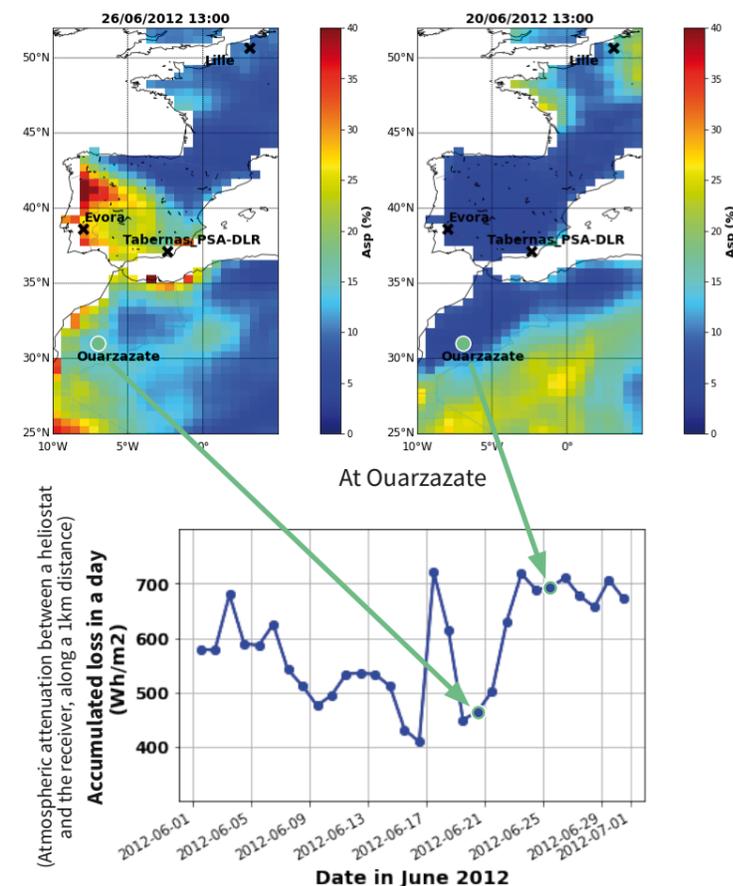
3D interactions between solar radiation and the CSP, considering atmospheric scattering and absorption, as simulated by the SMART-G code (done by Hygeos)

Use case: the atmospheric attenuation in the Moroccan High Atlas

HYGEOS has provided to the Electricité de France company (EDF) very accurate simulations of solar resource taking into account the impact of aerosols on power generation by CSP.

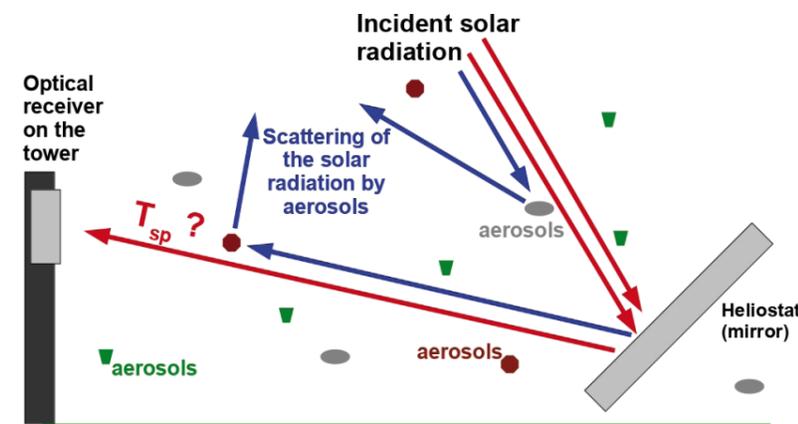


Regional maps of the slant path attenuation (%) on 2 close dates



The particles in suspension in the atmosphere (named aerosols) generate production losses by diffusing and absorbing solar radiation along the atmospheric column as well as in the slant path between the heliostat and the tower receiver. This effect becomes significant when the heliostat-receiver distances are greater than ~0.5 km as in the new generation of CSP which produce more than 100 MW.

ASoRa (<https://www.hygeos.com/project/asora>)



HYGEOS HAS STRONG VALUES

- > **Sharing:** we closely collaborate with the academic community by training students to pass on our expertise and favour a dynamic and collective emulation.
- > **Transparency:** we develop and promote open-source softwares, we publish our methodologies and we make available our tools for R&D activities.
- > **Equity:** we are committed to the cooperative status of HYGEOS where each associate employee contributes to the company success and benefits from them.

