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2025

SCIDOSOL newsletter



O.I.E.

open science
FOR THE solar
community

EDITO

We are pleased to present the second edition of the SciDoSol newsletter, continuing our journey in applying data science to Earth observation and solar energy for the energy transition.

Building on the first edition, which highlighted our interns, this issue focuses on teaching and knowledge transfer activities carried out within the chair during the second half of 2024 and the first quarter of 2025.

At the heart of these initiatives lie SciDoSol's three core pillars: open academic research, knowledge transfer to industry and society, and high-quality education and training.

Among the actions implemented, the following can be highlighted:

- Training engineering students at MINES Paris-PSL through educational projects,
- Offering continuing education in data science applied to solar energy for academics and industry professionals,
- Promoting knowledge transfer with a strong potential for rapid valorization of research results.

On the agenda

Highlights

- Meet our new team members
- IEA PVPS Task 16
- New in-situ instrumentation

Spotlight on training

- Solar Winter School 2025
- MIG Solaire 2024

Teaching and transfer activities

- GEOSTAT 2024
- PSL week – Solar Energy
- EEDays – *Enjeux écologiques*
- Partnership between Mines Paris – PSL and L'INDUSTREET

We hope you find this edition insightful and look forward to sharing more with you in the future.

The SciDoSol team

Meet our new Team members



**Susanne
WEYAND**

PhD student

After obtaining an M.Sc. in Environmental Geoscience, Susanne worked at DLR (German Aerospace Center) as a scientific researcher. She recently joined SciDoSol as a PhD student, working on the following topic :

“FishSPN1”

Data fusion of information from a fish-eye camera and a global / beam / diffuse pyranometric sensor with no moving part

The SPN1 Pyranometer is a low-maintenance and robust field instrument with no moving parts and simple levelling. It measures the global, beam and diffuse solar radiation using seven thermopile sensors and a computer-generated shading pattern.

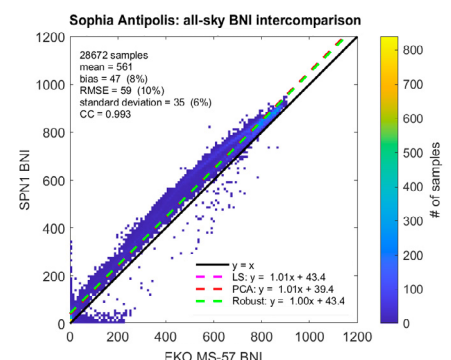
Even if it provides high-quality global horizontal irradiance measurements equivalent to Class A pyranometers, the estimated beam and diffuse components have an approximate 10% root mean square error with systematic errors (bias) depending on the solar zenith angle. This is attributed to the anisotropic nature of the sky, which may be quantified by fish-eye imagers.

This thesis aims to fuse the data of the low-cost fish-eye camera and the SPN1 pyranometer of the SciDoSol monitoring station for improved retrievals for both instruments.



▲ The SPN1 pyranometer alongside the low-cost fish-eye imager, located at the SciDoSol solar monitoring station in Sophia Antipolis.

Errors of the SPN1 beam normal irradiance (BNI) when compared to those of the EKO MS-57 pyrheliometer.





NEW HIRE
Valentin BAUER
Research Engineer

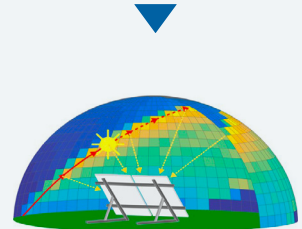
Valentin joined SciDoSol Chair as a Research Engineer in March 2025.

He already completed his internship with SciDoSol in 2024, where he developed a low-cost all-sky imager using a Raspberry Pi and a compatible fish-eye camera.

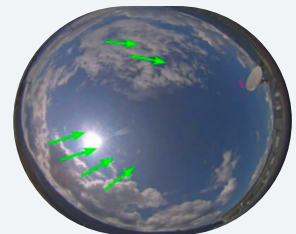
His work was featured in the previous newsletter.

During his upcoming tenure, he will further develop and optimize image-based methods for low-cost sky radiance measurement, cloud motion detection, and discover its application in short-term solar forecasting, whilst adhering to the principles of Open Science.

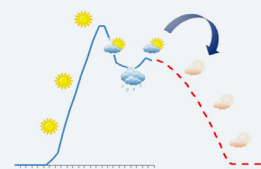
Applications of the low-cost fish-eye imager >



Model Plane of
Array Irradiance



Cloud Location
and Motion



Short Term
Solar Forecast

IEA PVPS Task 16

Within the framework of SciDoSol Chair, the Centre Observation, Impacts, Energie (O.I.E.) of MINES Paris – PSL continues its involvement in the Research Task 16 of the Photovoltaic Power Systems (PVPS) Programme of the International Energy Agency (IEA).



International Energy Agency
Photovoltaic Power Systems Programme

Theme of Task 16:

“Solar Resource for High Penetration and Large-Scale Applications”

Theme of Subtask 2:

“Enhancement of data & value-added products”

This subtask is currently being led by Yehia EISSA, Senior Scientist, SciDoSol.

New In-situ Instrumentation

In 2024, SciDoSol commissioned a high-quality solar monitoring station with the following objectives:

- characterizing the solar resource in Sophia Antipolis, in southeastern France,
- supporting the validation of satellite-based and numerical weather models,
- showcasing solar measurement instrumentation, QC and data formatting for training and teaching purposes,
- hosting the testing of new low-cost devices to monitor downwelling surface solar radiation.

In February 2025, the station was upgraded with a new EKO MS-80SH Class A Pyranometer to measure the global horizontal irradiance.

Additionally, a shading ball was installed on the previous pyranometer to measure the diffuse horizontal irradiance component separately.

The station now comprises the low-cost fish-eye camera, SPN1 pyranometer, two Class A pyranometers, and one Class A pyrheliometer.

Providing high-quality scientific data for Susanne's PhD, this setup includes colocated reference global, beam and diffuse irradiance measurements from the three-components pyranometric stations, 7 partially-shaded horizontal measurements from SPN1 and hemispherical sky images from the low-cost fish-eye camera.



The EKO MS-80SH Pyranometer ▶
for global horizontal irradiance measurements

◀ The shaded EKO-MS80 Pyranometer mounted on the EKO STR-21G Sun Tracker for diffuse horizontal irradiance measurements



The measurements of the station have also been added on [THREDDS server](#) for open accessibility, following the FAIR principles (*Blanc et al., 2022¹*).

1. Blanc, P., R. Jolivet, L. Ménard, Y.-M. Saint-Drenan, 2022. Data sharing of in-situ measurements following GEO and FAIR principles in the solar energy sector. Working document. <https://universite-paris-saclay.hal.science/OIE/hal-03811628v1>

SPOTLIGHT ON TRAINING

solar winter SCHOOL 2025

Organized by the SciDoSol Chair at Mines Paris – PSL, the third edition of Solar Winter School took place from March 10 to 14, 2025, on the Pierre Laffitte campus in Sophia Antipolis.

The audience comprised 45 international attendees, including postgraduate, master's, and doctoral students, as well as researchers and engineers specializing in solar radiation and energy.

The program combined theoretical courses, practical work, and a master class in Python for solar resource analysis and forecasting.

The lecturers for SWS 2025 were affiliated with Centre O.I.E., CalibSun, Everoze and an independent solar expert.

The Solar Winter School (SWS) is an annual intensive training program dedicated to solar energy challenges.



More than just a training course, the SWS was also an opportunity for the attendees to meet experts and build an international network of professionals committed to the energy transition. Experience sharing, and social and cultural interactions were also part of the program.


solar winter
SCHOOL 2025



The MIG Solaire 2024 program offered 17 first-year Civil Engineering students the chance to work on projects contributing to the decarbonization of the mobility of the Sophia Antipolis Urban Community (CASA). It took place over a three-week period in November 2024.

The students explored how solar energy can support CASA's zero-carbon mobility goals, by researching various strategies, including public transport development, bike lanes, electric car-sharing, and intermediate vehicles such as the Vhéliotech. These initiatives rely on photovoltaic systems installed in CASA parking areas.

The students also proposed a timeline for implementing these solutions through two scenarios: one prioritizing public transport and the other focusing on individual mobility.



The students took on the major challenge of building a Vhéliotech: a solar-assisted, low-tech, open-source vehicle, in just two days!

They modeled the energy performance of the vehicle, and analyzed its impacts on the CASA 2040 territorial planning and urban development project.



The students also worked on:

Identifying and sizing photovoltaic canopies, used for car park shading and linked to charging stations, with or without storage capability.

Developing an online tool to optimize electric (and potentially solar-powered) mobility routes, considering terrain constraints and solar energy availability along possible paths.

GEOSTAT 2024

On October 10, 2024, a seminar was held for 15 third-year engineering students specializing in Geostatistics at MINES Paris – PSL.

The objective was to engage with the students and inspire them to pursue their internships or careers in the field of solar resource modelling.

Five of the nine presenters were researchers at the Centre Observation, Impacts, Energy, affiliated with the SciDoSol Chair. >

Presentations delivered:



Philippe BLANC

Solar resource assessment and forecasting using earth observation & data sciences



Yehia EISSA

Downwelling surface solar radiation: basics and measurements



Susanne WEYAND

Solar assessment and forecasting as a service tool



Yves-Marie SAINT-DRENAN

Estimation of solar irradiance from satellite images



Valentin BAUER

Sky radiance estimation: with a low-cost all-sky camera

PSL week solar energy

In late November 2024, ESPCI Paris – PSL hosted PSL Week on Solar Energy for engineering students.

As part of the event, Yehia EISSA delivered a scientific presentation titled “Overview of the Solar Resource: Concentrating Solar Systems and Ovens”.

Yehia with attendees during PSL week at ESPCI Paris – PSL ▼



- The students were initially introduced to the significance and potential of solar resources, alongside the growing interest in solar energy. This was followed by a presentation about the speaker, the Centre Observation, Impacts, Energy, and the SciDoSol Chair. The session then covered essential concepts and definitions related to downwelling surface solar irradiance, the radiative transfer phenomena in the atmosphere, and methods for measuring such data.
- Subsequently, the historical development of solar-inspired systems from 6000 BCE onwards was explored. The focus then shifted to concentrating solar collectors, leading to a presentation on various types of solar ovens. Additionally, a life-cycle assessment of solar ovens was compared to that of conventional ovens.
- To conclude, an open discussion was held, encouraging attendees to engage actively. Each student was invited to share at least one unique takeaway from the experience.

EEDays

ENJEUX ÉCOLOGIQUES

From January 8 to 10, 2025, the EEDays (*Enjeux Écologiques* – Ecological Challenges), hosted at Chimie ParisTech, was organized by ESPCI Paris – PSL, Chimie ParisTech – PSL, and MINES Paris – PSL.

These scientific days focused on ecological challenges. They included scientific presentations, networking, and roundtable discussions on the ecological transition.

Yehia EISSA gave a scientific presentation on solar ovens, in which he covered:

- the relevant solar resource for different oven systems and its measurement methods,
- the historical evolution of solar-powered cooking systems,
- a life-cycle assessment, comparing solar ovens to three conventional cooking techniques.

Yehia EISSA giving a presentation to students at EEDays, Chimie ParisTech – PSL ▼



The objective of this participation was once again to transfer knowledge and encourage students to pursue studies in the subject of solar resource modelling or applications requiring accurate information about the solar resource.

PARTNERSHIP

between Mines Paris – PSL and L'INDUSTREET

On February 13, 2025, Philippe Blanc gave a lecture to the learners at L'INDUSTREET, providing an overview of solar resources.

He also introduced the UNDERSOLAR engineering project, which starts on March 10, 2025, and invited the eight most motivated learners to join the team of eight second-year civil engineering students from MINES Paris – PSL. Together, they will spend a trimester designing, building, and testing an efficient solar cooker for the company Lytefire.



ONGOING ACTIVITIES

UNDERSOLAR PROJECT 2025

Engineering trimester with second-year Civil Engineering students, from March to May 2025, in Sophia Antipolis

In collaboration with
Lytefire



open science FOR THE solar community



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