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SCIDOSOL NEWSLETTER



O.I.E.

Open science
FOR THE SOLAR
COMMUNITY

EDITO

We are pleased to present the fourth edition of the SciDoSol newsletter.

In this issue, we highlight two recent academic milestones within SciDoSol – a successful PhD defense and a Habilitation to Supervise Research (HDR) – as well as the fourth edition of the Solar Winter School.

We also showcase the scientific research driven by SciDoSol. Featured at the AI Workshop 2025 at Mines Paris – PSL, this work continues to gain visibility through scientific publications, international conferences, and expert engagements, reflecting the Chair's commitment to advancing solar science from fundamental modeling to practical energy applications.

Through research, training, and international engagement, SciDoSol strengthens the link between scientific excellence and real-world energy challenges.

On the agenda

Scientific Research

- Vadim Becquet's PhD defense
- Yves-Marie Saint-Drenan's HDR defense

Society and Training

Solar Winter School 2026

Scientific Dissemination

Scientific articles, conferences and expert engagements

Institutional Event

AI Workshop 2025

We hope you enjoy this issue and look forward to sharing further updates with you soon.

The SciDoSol team



VADIM BECQUET

PhD Defense

We extend our congratulations to Vadim Becquet, who successfully defended his PhD at Université PSL. His research was conducted at Mines Paris – PSL within the O.I.E. Center, as part of the SciDoSol Chair.

“Convolutional neural networks for the estimation of surface solar irradiance towards an optimal use of third-generation geostationary meteorological satellites.”

- **Vadim’s PhD thesis** investigates the estimation of global horizontal irradiance (GHI) from multispectral imagery acquired by the GOES-16 geostationary satellite, in the context of third-generation satellite systems.
- Using data from 31 ground-based pyranometer stations, the study performs a controlled comparison between fully connected neural networks and convolutional architectures explicitly integrating spatial context.
- **The results** show that convolutional models using appropriately sized context windows outperform single-pixel approaches, with performance gains varying across sky regimes and sites.

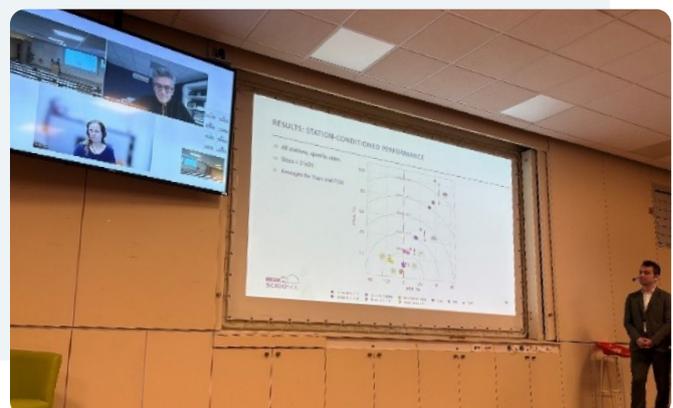
Interpretability analyses indicate that the network leverages spatial coherence, inter-band alignment, albedo information, and solar geometry.

This reinforces confidence in the physical validity of the learned models and guides the practical use of third-generation geostationary satellites.



This marks the very first doctoral thesis of the Chair, supervised by Philippe Blanc, with Yves-Marie Saint-Drenan and Yehia Eissa as co-supervisors.

Vadim Becquet’s PhD defense, December 2025

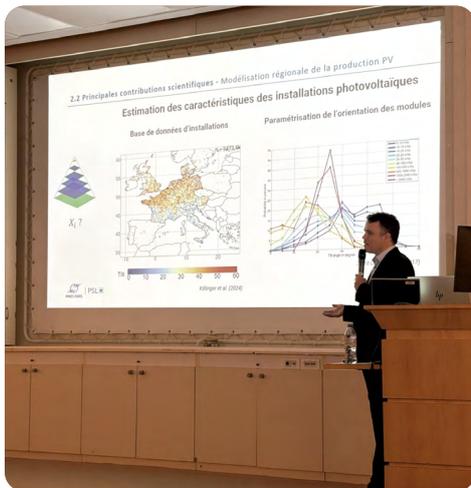




Yves-Marie saint-Drenan

HDR DEFENSE

Yves-Marie Saint-Drenan, co-holder of the SciDoSol Chair, successfully defended his Habilitation to Supervise Research (HDR) in January 2026.



“Contributions of Earth observation data to the energy transition.”

Yves-Marie’s research focuses on the integration of renewable energies into the power supply system.

In this context, Earth observation data provide essential information to characterize the spatio-temporal variability of energy production from weather-dependent resources. This information is essential for assessing the impact of such variability on grid balance and stability.

Effectively exploiting these data requires both modeling solar power production at scales compatible with power system needs, and improving methods for estimating solar irradiance from satellite observations or numerical model outputs.

Building on this approach, the research develops and applies irradiance models for energy applications, with a strong emphasis on validation through the assessment of in-situ measurement quality, often provided by external sources.



SOCIETY AND TRAINING

solar winter

SCHOOL 2026

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

Organized by the SciDoSol Chair at Mines Paris – PSL, the fourth edition took place from February 16 to 20, 2026, at the Pierre Laffitte campus in Sophia Antipolis.

32 international attendees, including engineers, master's students, and PhD candidates from academia and industry participated in a dynamic and engaging five-day training program.

**Resource
assessment,
modelling and
forecasting for
solar energy**




solar winter
SCHOOL 2026



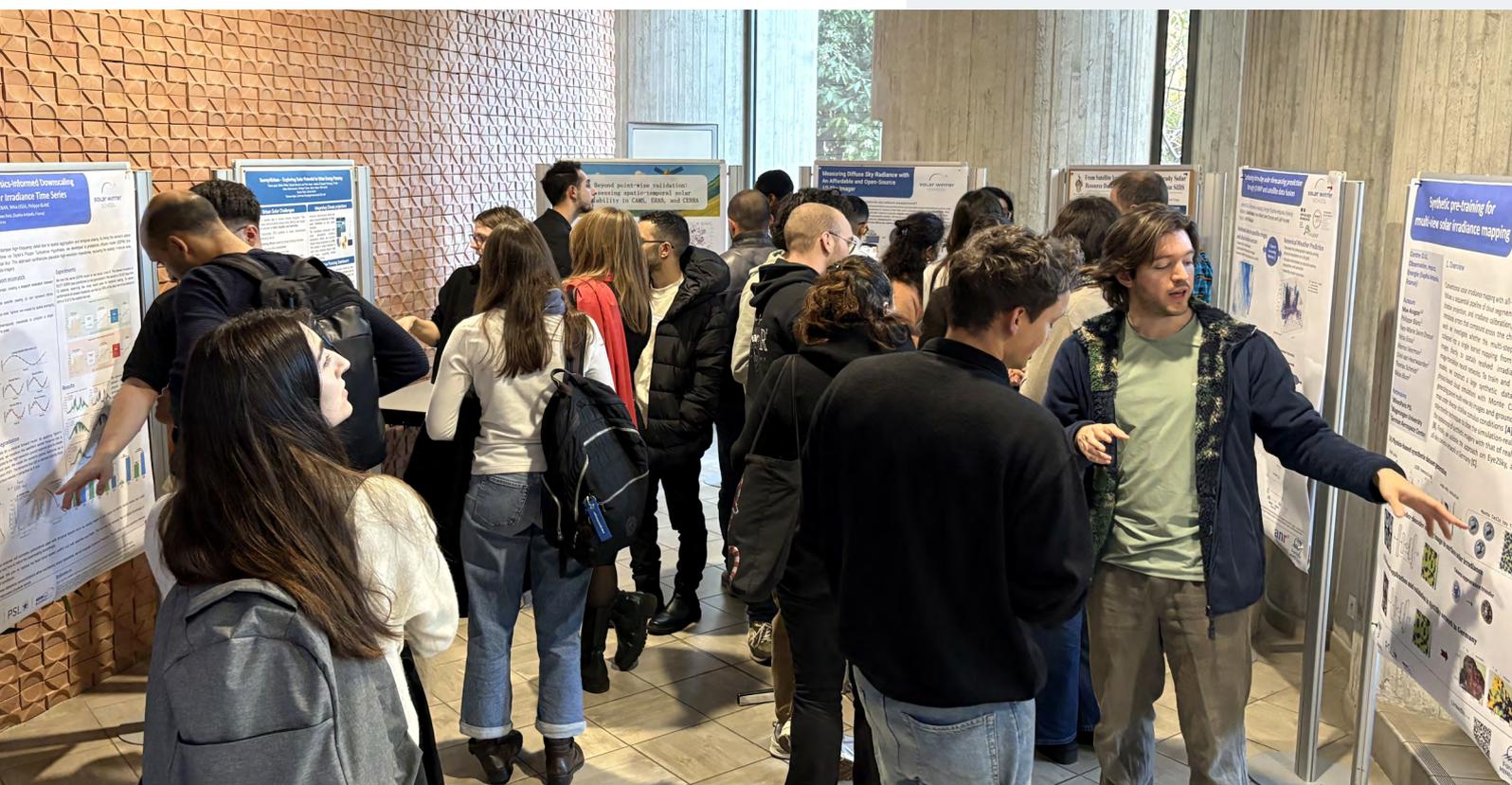


During the week, participants explored:

- ▶ basics of solar modeling,
- ▶ in-situ pyranometric measurements,
- ▶ solar resource assessment and forecasting based on Earth Observation with satellites, numerical weather models and chemical transport models, and in-situ measurements,
- ▶ environmental assessment of PV and agriPV plants,
- ▶ site prospection for urban PV.

The lecturers for SWS 2026 were affiliated with Centre O.I.E., Calibsun and an external expert.

The program includes networking sessions to foster collaboration and knowledge sharing.



SCIENTIFIC ARTICLES, CONFERENCES AND EXPERT ENGAGEMENTS

KEY FIGURES

2025 – 2026

4

scientific articles
(published & under
review, primarily in
Solar Energy)

5

international
conference
presentations

4

contributions to
IEA PVPS Task 16
expert meetings

+

Activities across
Europe & North
America

The main scientific themes structuring
SciDoSol's recent research activities:

ALL-SKY IMAGERS In situ measurements
SOLAR IRRADIANCE IEA PVPS Task 16
Data validation **Earth observation** Standardization **Photovoltaics**
GLOBAL HORIZONTAL Irradiance (GHI)
Machine learning Clear-sky modeling **METEOROLOGY**
Convolutional neural networks **ENERGY TRANSITION**
Aerosols **SATELLITE IMAGERY** Energy systems
Agrivoltaics Spatial context **DEEP learning** FAIR principles
ATMOSPHERIC EFFECTS Power forecasting
Radiative transfer **PHYSICAL MODELS**



INTERNATIONAL SCIENTIFIC ENGAGEMENT

- **Oct 2024 – Oct 2025**
**IEA PVPS Task 16,
expert meetings**
France, Switzerland, USA
- **8–13 June 2025**
IEEE PVSC
Montreal, QC, Canada
- **7–12 Sep 2025**
EMS Annual Meeting
Ljubljana, Slovenia
- **18 Nov 2025**
**Young Scientist
Symposium**
Klosterneuburg, Austria
- **3–8 May 2026**
EGU General Assembly
Vienna, Austria
- **14–18 Sep 2026**
EU PVSEC
Rotterdam, The Netherlands

INSTITUTIONAL EVENT

AI WORKSHOP 2025

The AI Workshop 2025 was a key event designed to showcase research in AI, foster exchanges between researchers, PhD candidates and faculty members, and encourage the emergence of new synergies.

Yehia Eissa presented the work of Centre O.I.E. MINES Paris - PSL at the AI Workshop of Mines Paris - PSL on Dec. 10, 2025. He highlighted the contributions made under the SciDoSol Chair by :

- **Valentin Bauer** (Research Engineer),
- **Max Aragón** (PhD Student),
- **Vadim Becquet** (PhD graduate),
- **Yoan Jheelan** (Research intern).



He also presented the contributions of SciDoSol researchers to the definition of the work plan for the new phase of Task 16 within the International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS), focusing on “Solar Resource for High Penetration and Large-Scale Applications”.





A low-cost all-sky imager using AI for device management and sky classification

Developed by **Valentin Bauer**, this camera leverages pre-trained convolutional neural networks (CNNs) adapted to sky imagery to:

- classify sky conditions (clear, cloudy, rainy),
- detect maintenance-related anomalies (soiling, condensation).

Monitoring sky conditions and camera status enhances solar irradiance modeling for tilted photovoltaic panels.



Low-cost hemispherical camera prototype mounted on a rooftop at the Mines Paris – PSL campus in Sophia Antipolis

These advancements result in practical outcomes, such as providing very short-term solar forecasts that are essential for grid operators dealing with the high variability of photovoltaic power generation.

Example of images



CLEAR SKY



CLOUDS



SOILING



DEW



RAIN



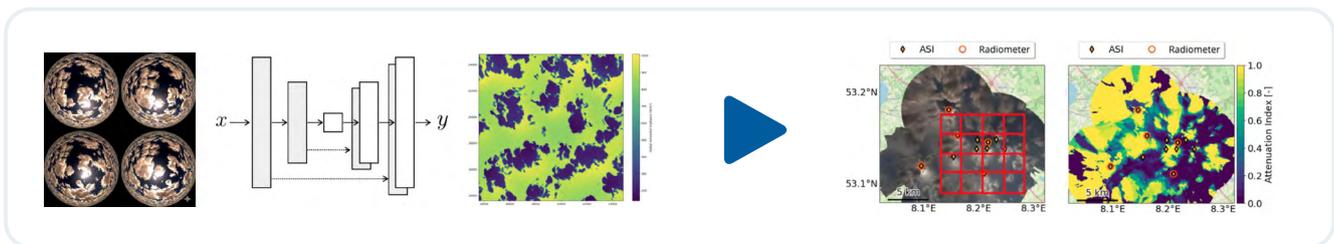
Synthetic multi-view images to optimize all-sky imagers placement in photovoltaic fields

This optimization strategy builds on a physics-informed, data-driven methodology developed by **Max Aragón**.

This approach combines controlled physical simulation, supervised learning and real-world validation. It enables the virtual assessment of camera configurations and supports optimized camera deployment strategies in photovoltaic fields.

Main objectives:

- Train image-to-image neural networks to generate global horizontal irradiance (GHI) maps from multiple all-sky cameras
- Demonstrate the feasibility of transfer learning from simulated data to real-world conditions, validated with in-situ pyranometers
- Assess performance against an established multi-camera solar mapping method under broken-cloud conditions



Real-world application and validation in Eye2Sky network in Germany

Frugal AI for energy forecasting

This study presents a frugal AI approach to energy forecasting, combining statistical rigor and computational efficiency, with contributions from **Yoan Jheelan**.

The approach prioritizes the simplest model satisfying physical and statistical constraints, while avoiding deep networks unless strictly necessary. It relies on low-cost computations to adapt to embedded Energy Management Systems (EMS) contexts.

This study addresses energy systems and storage management for short-term and day-ahead forecasting.



We are delighted to share the latest updates, research advances, teaching and training activities, and key initiatives from the SciDoSol Chair.

For a full overview of the chair's journey, explore our [previous newsletters](#).

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