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# SCIDOSOL

## newsletter

**OPEN SCIENCE**  
FOR THE SOLAR  
COMMUNITY



O.I.E.

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- Meet our new team member

#### Society and training

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##### Valentin BAUER

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##### Pierre CHAPEL

Surface Solar Irradiance (SSI) Variability

#### Save the date!

**Solar Winter School 2025**  
from 10 to 14 March

EDITO

## WELCOME TO OUR FIRST NEWSLETTER!

We are delighted to present this first edition of our newsletter, dedicated to SciDoSol. This research and teaching chair supports the energy transition by applying data science for solar energy.

Our commitment in innovation and excellence is based on three pillars: academic open research, attractive education and open source based transfer of knowledge to industry and society.

Our goal? To actively contribute to the scientific community, push the boundaries of current knowledge and have a tangible impact on society, thus, advancing science and innovation for a sustainable future.

This bi-annual newsletter will give you a concrete overview of our team's progress, key projects and on-going collaborations.

Enjoy your reading. We look forward to sharing important moments with you.

The SciDoSol team

# HIGHLIGHTS ON OUR ON-GOING PhD STUDENTS

Working on Surface Solar Irradiance (SSI) modelling



**Vadim BECQUET**  
3rd year PhD student

## DeepHeliosat

Advancing satellite-based solar resource modelling with deep learning techniques

With a background in data science, physics, and mathematics from Aix-Marseille Université and École Polytechnique, and experience as a data science consultant, Vadim is well-equipped for cutting-edge research.

His PhD work paves the way for next-generation satellite-based SSI retrieval methods, harnessing deep learning and the enhanced resolution of third generation geostationary satellites for greater accuracy in solar resource assessment.



**Max ARAGÓN CERECEDAS**  
2nd year PhD student

## GeoFishEye

Simulated sky camera networks for spatial SSI

Max is working on the intersection of computer graphics, cloud-radiation interactions, and generative artificial intelligence.

His research focuses on producing multi-view synthetic sky imagery for training and evaluating machine learning algorithms, with a special emphasis on sky camera networks for SSI modelling.

This work is of value for PV nowcasting, PV performance monitoring, and in the integration of all-sky irradiances into cloud-scale weather models.



**Jose GOMEZ GOMEZ**  
2nd year PhD student

## SSI Variability

Modelling, characterization and prediction of SSI variability

Jose is leveraging the synergies between various Earth observation sensors and techniques, combined with machine learning and deep generative modelling, to research innovative methods for modelling the SSI. His focus is to explore and develop methodologies for generating SSI data with high spatial and temporal resolutions.

This work enhances energy storage planning, smart grid management and solar power plant optimization. It provides valuable data for insurance and finance sectors to improve risk assessment and financial modelling in solar projects.

## MEET OUR NEW TEAM MEMBER

Dr. Yehia EISSA joined the SciDoSol Chair in June 2024 as a full-time researcher. He is an expert in solar energy with extensive experience in academia, notably as a Postdoctoral Researcher and Assistant Professor. His research focuses on understanding solar energy resources in various environments, using advanced modelling and data analysis techniques, to support the transition to sustainable energy solutions.



**Dr. Yehia EISSA**  
**Senior Scientist**  
Expert in solar energy

PhD in Energy & Processes  
MINES Paris – PSL



SOCIETY AND TRAINING

# solar winter SCHOOL 2024

The Solar Winter School 2024 was organized at the Pierre Laffitte Campus in Sophia Antipolis from March 11 to 15, 2024.

This event brought together over 50 international participants, including postgraduate, master's and doctoral students, researchers and engineers in the field of solar radiation and solar energy.

## Main activities:

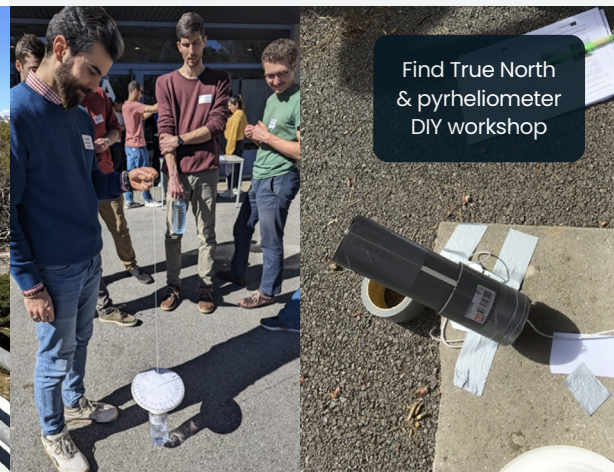
Lectures on the latest advancements in solar irradiance modelling and forecasting

Practical workshops on pyranometric measurements and solar forecasting techniques

Networking sessions to further collaboration and knowledge sharing



Showcasing in situ measurements



Find True North & pyrheliometer DIY workshop





# LOW-TECH UNDERSOLAR PROJECT

In Sophia Antipolis, from March to May 2024  
Engineering trimester with second-year  
Civil Engineering students

Supported specifically by Total Energies, under the framework of SciDoSol, in collaboration with a colleague of the CEMEF (experts in glass materials modelling), Mines Paris – PSL proposed to the second-year Civil Engineering students an engineering trimester named UNDERSOLAR.

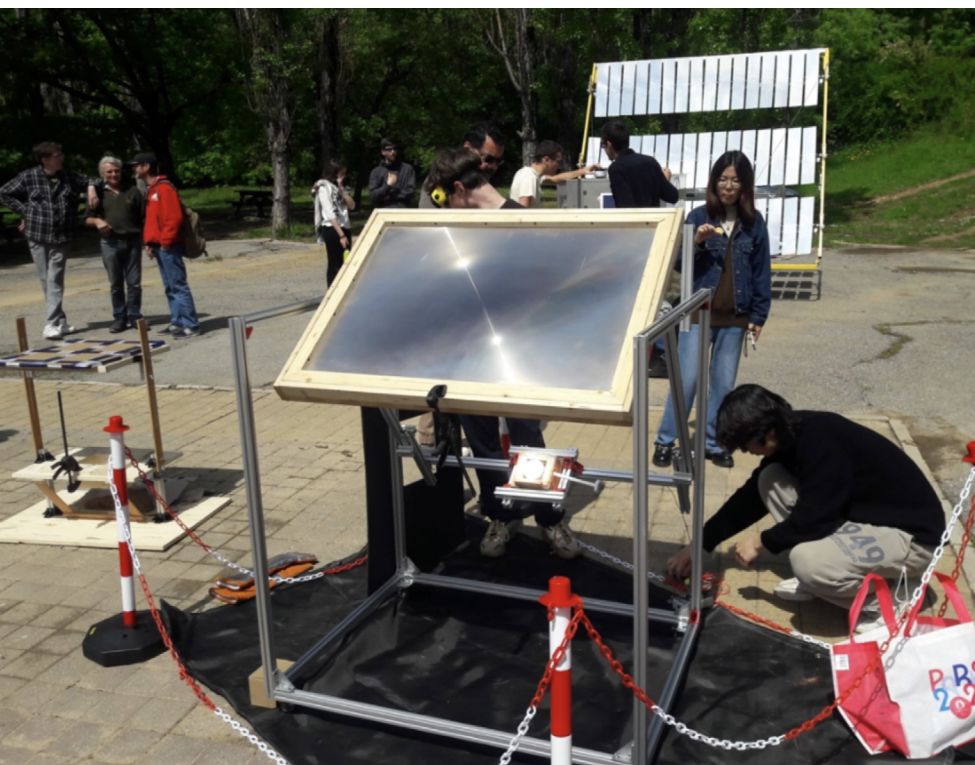
This session was dedicated to concentrated thermal systems invoking notably low-tech response to environmental challenges.

## They designed and implemented different low-tech solar systems such as:

- a concentrated solar furnace in collaboration with craftsmen from the Verrerie de Biot glassworks able to reach 1100°C in the (small) cavity placed in the focal point of the optical system
- two types of solar cookers: cylindro-parabolic and isolated box

”

By combining technology with a low-tech approach, the student's work paves the way for a more sustainable energy transition.



▲ A practical demonstration of the Lytefire solar food oven

◀ Solar furnace using a Fresnel lens to concentrate the beam solar radiation (capable of melting glass at over 1000°C)





**MIG** (Métiers de l'Ingénieur Généraliste) is a part of the training program for the first year aiming at introducing with a 3-week intensive project the general engineering professions.

## Solar resource as an energy source for the transition of Communauté d'Agglomération de Sophia Antipolis ([CASA](#))

The MIG Solaire 2023 program allowed 15 first-year students from the Civil Engineering Cycle to work on projects related to the energy transition of the Sophia Antipolis Urban Community. It took place over a period of 3 weeks in November 2023.

### Objectives of the program:

- Assess the solar potential of the CASA region
- Develop innovative solutions combining engineering and landscape design
- Contribute to the local energy transition



▲ After a visit to the CNR in Lyon, the students visited the Castellet solar power plant with a team from [Solaïs](#), a SciDoSol stakeholder.



## SPOTLIGHT ON THE INTERNS



**Arthur PAOLINI**  
Engineering student at  
MINES Paris – PSL

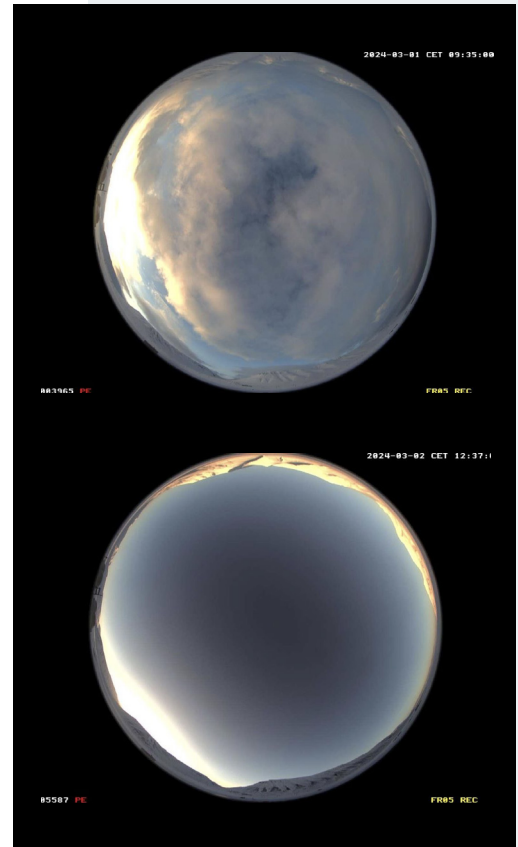
# Solar Measurements in Polar Regions

Arthur has undertaken a 6-months internship during his gap-year at the University of Svalbard, Norway (UNIS).

His project focused on developing an innovative method to measure solar irradiance in Arctic regions using a fish-eye camera. This approach is designed to overcome the challenges posed by harsh Arctic conditions.

### Objectives:

- Replace traditional pyranometers with a versatile, camera-based method for measuring solar irradiance
- Improve temporal and spatial resolution for more accurate solar energy forecasting in extreme environments

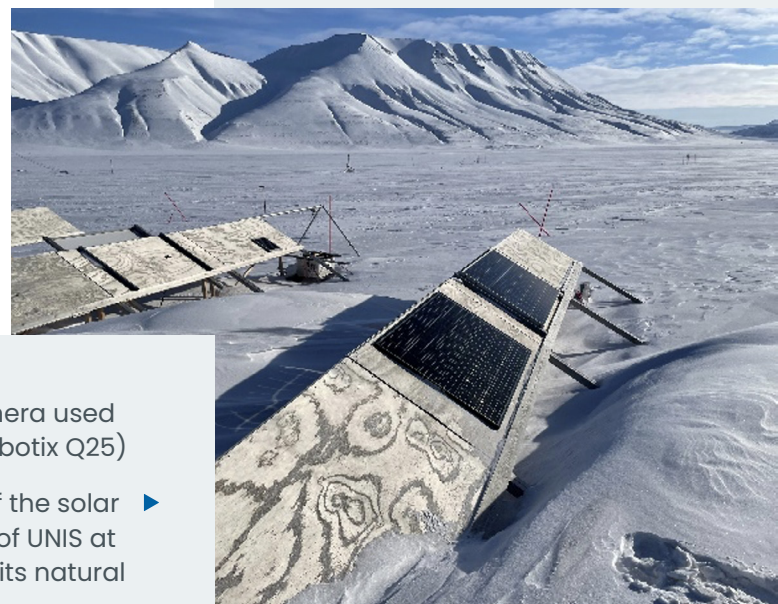


▲ Example of two hemispherical sky images from the fish-eye camera installed by Arthur in Svalbard



◀ The fish-eye camera used for the study (Mobotix Q25)

The solar array of the solar research station of UNIS at Longyearbyen in its natural environment ▶







**Valentin BAUER**

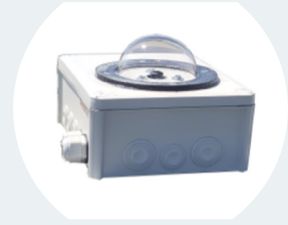
Student at the Technical University of Vienna

## Low-Cost All-Sky Imaging for solar radiance estimation

Valentin is developing a low-cost all-sky imager using a Raspberry Pi and a compatible fish-eye camera. His project focuses on estimating sky radiance at a specific location on Earth, leveraging affordable hardware and open-source sensor and software.

### Objectives:

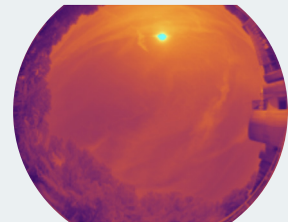
- Create an accessible tool for measuring solar radiance for the scientific solar community and industries
- Utilize affordable technology to support renewable energy applications



Camera



Color Image



Sky Radiance Estimate



**Pierre CHAPEL**

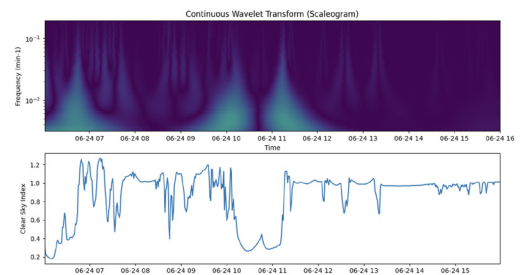
Engineering student at MINES Paris – PSL

## SSI Variability

### Characterizing Surface Solar Irradiance (SSI) data using wavelet transforms

Pierre is focusing on the mathematical modelling of Surface Solar Irradiance variability.

He is using wavelet transforms to model the statistical nature of the SSI under different atmospheric conditions.



▲ Example of the scaleogram of a time series of SSI using Continuous Wavelet Transforms (CWT)

### Objectives:

- Develop new metrics to gauge how realistic synthetic SSI data is
- Improve the understanding of SSI variability through advanced mathematical techniques

# Solar Winter SCHOOL 2025

## save THE DATE!

The 3rd edition of Solar Winter School will take place on the week of  
**March 10-14, 2025**

## CONTACTS

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