



HAL
open science

Light pollution, a complex real-world problem to be tackled through an interdisciplinary approach

Samuel Challéat, Matthieu Renaud, Kévin Barré, Rémi Bénos, Christian Brouat, Mathieu Delsaut, Nicolas Farrugia, Hélène Foglar, Magalie Franchomme, Jérémy S P Froidevaux, et al.

► To cite this version:

Samuel Challéat, Matthieu Renaud, Kévin Barré, Rémi Bénos, Christian Brouat, et al.. Light pollution, a complex real-world problem to be tackled through an interdisciplinary approach. GA 2024: XXXII IAU General Assembly, Session of the Executive Committee Working Group Dark and Quiet Sky Protection, IAU (International Astronomical Union), Aug 2024, Cape Town, South Africa. hal-04671593

HAL Id: hal-04671593

<https://cnrs.hal.science/hal-04671593v1>

Submitted on 15 Aug 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial - NoDerivatives 4.0 International License



MITI

Mission pour les Initiatives
Transverses et Interdisciplinaires



Light pollution, a complex real-world problem to be tackled through an interdisciplinary approach

Samuel Challéat*, environmental geography (CNRS, UMR 5602, GÉODE, Toulouse)

Matthieu Renaud*, astrophysics (CNRS, UAR 3365, OSU-Réunion, La Réunion)

And in alphabetical order: **Kévin Barré** (CESCO, MNHN, Concarneau, France), **Rémi Bénos** (GÉODE, INU Champollion, Albi, France), **Christian Brouat** (ENERGY-LAB, Université de La Réunion, Saint-Denis, La Réunion), **Mathieu Delsaut** (ENERGY-LAB, Université de La Réunion, Saint-Denis, La Réunion), **Nicolas Farrugia** (LAB-STICC, IMT Atlantique, Brest, France), **Hélène Foglar** (ATHENA-LUM, Châtel-en-Trièves, France), **Magalie Franchomme** (TVES, Université de Lille, Lille, France), **Jérémy Froidevaux** (Chrono-Environnement, Besançon, France), **Laurent Godet** (LETG, CNRS Écologie & Environnement, Nantes, France), **Adrien Guetté** (CITERES, Université de Tours, Tours, France), **David Loose** (ATHENA-LUM, Châtel-en-Trièves, France), **Marion Maisonobe** (GÉOGRAPHIE-CITÉS, CNRS Sciences Humaines & Sociales, Paris, France), **Léa Mariton** (CESCO, MNHN, Paris, France), **Johann Michalczak** (Dijon, France), **Johan Milian** (LADYSS, Université Paris 8, Saint-Denis, France), **Béatrice Morel** (ENERGY-LAB, Université de La Réunion, Saint-Denis, La Réunion), **Sylvain Morvan** (GÉODE, CNRS Écologie & Environnement, Toulouse, France), **Charles Ronzani** (POESIS PAYSAGE, Belfort, France), **Léa Tardieu** (TETIS, INRAE, Montpellier, France). * Equal contributions.



XXXII IAU GA, WG Dark and Quiet Sky Protection meeting, Cape Town, South Africa, August 15th 2024



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



National
Research
Foundation

AfAS
African Astronomical Society



XXXII IAU GENERAL ASSEMBLY

CAPE TOWN, SOUTH AFRICA, 2024

What disciplines have shaped "the ALAN problem"?

Bazzell, R. J. (1971). Star bright, street light, which will they see tonight? *Science*, 177(3970), 461-461.

Star Bright, Street Light, Which Will They See Tonight?

Source: *Sci. Astronom. Soc. Trans.* 1971, Number 4088

...the light pollution caused by the street lighting... the glow of the street lighting... the light pollution caused by the street lighting... the glow of the street lighting...

SCIENCE

Volume 179, Number 4088

Light Pollution

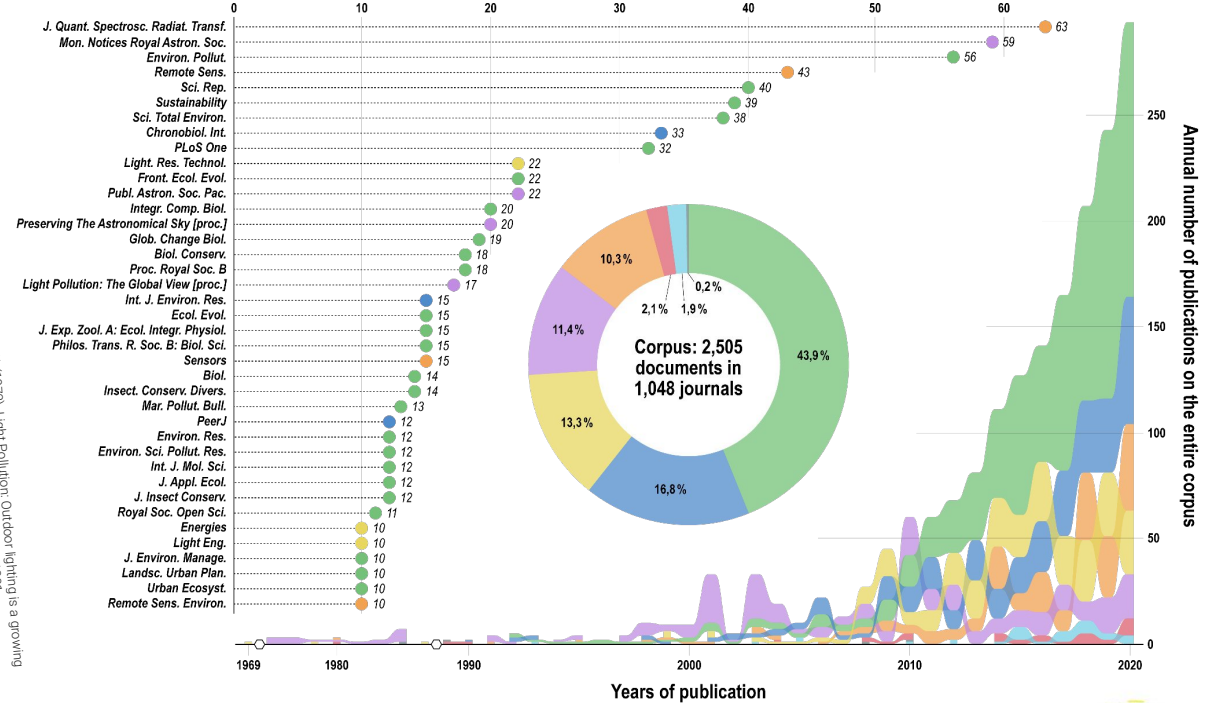
It is a growing threat to astronomy.

Karl W. Riegert

...the light pollution caused by the street lighting... the glow of the street lighting... the light pollution caused by the street lighting... the glow of the street lighting...

1973

Number of publications by journal with 10+ papers on light pollution between 1969 and 2020



Riegert, K. W. (1973). Light Pollution: Outdoor lighting is a growing threat to astronomy. *Science*, 179(4088), 1285-1291.

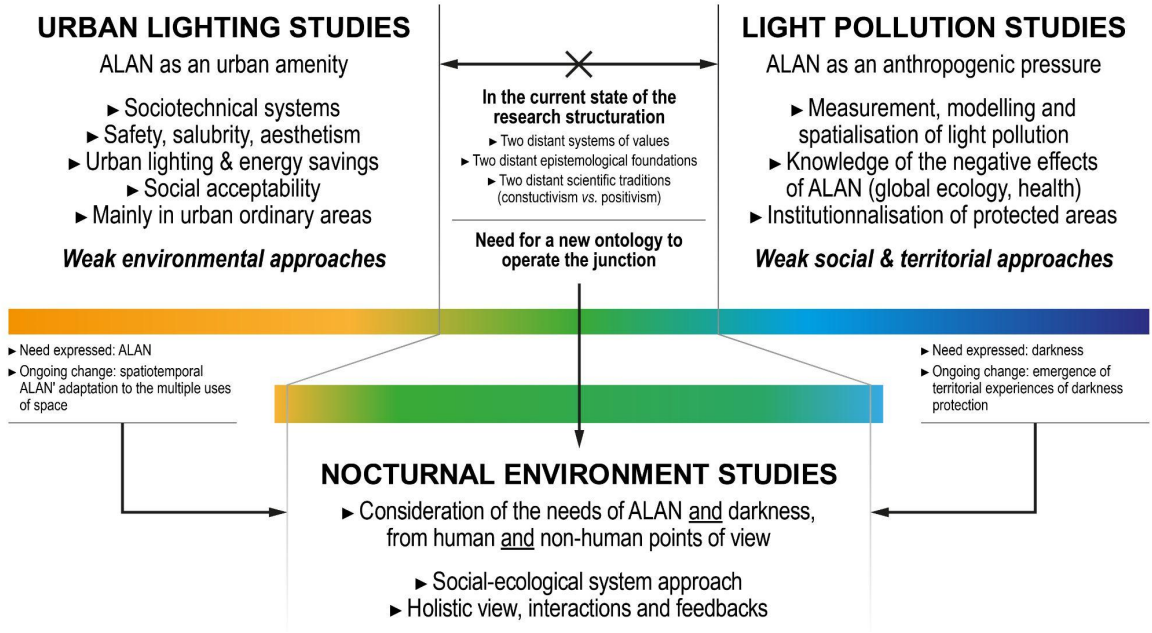


The nocturnal environment, a new object for a transdisciplinary approach



2023

Science, special issue, 16 June 2023.

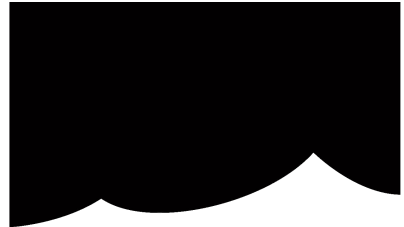


Need for interdisciplinary & participatory approaches to integrate and create new links with reality (Stengers, 1997)



The Nocturnal Environment Observatory (NEO), a device to enable, facilitate and organize interdisciplinarity

- Created in 2021, **23 members** from 4 CNRS Institutes
- 3 axes around **nocturnal socio-ecological systems** :
 - Socio-territorial approaches*
 - Ecology, metrology and modeling*
 - Support for territorial initiatives to preserve the nocturnal environment*



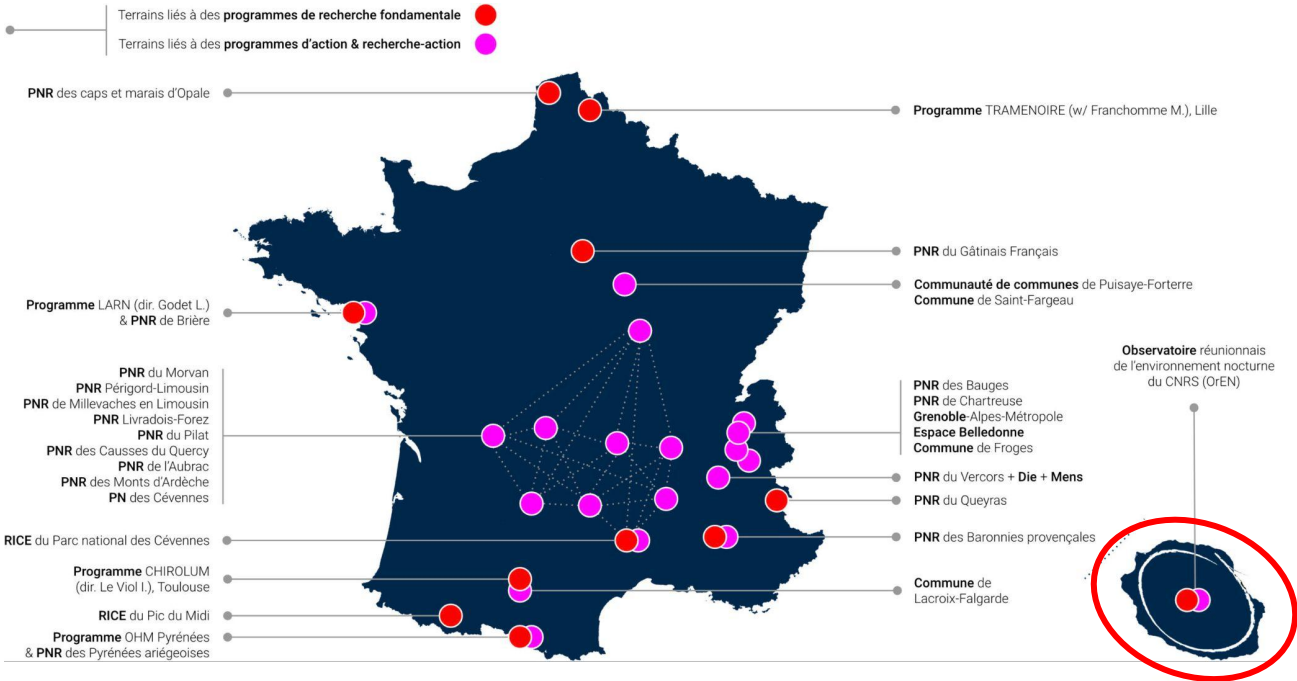
OBSERVATOIRE ENVIRONNEMENT NOCTURNE

-  SCIENCES HUMAINES & SOCIALES
-  ÉCOLOGIE & ENVIRONNEMENT
-  TERRE & UNIVERS
-  SCIENCES INFORMATIQUES



A device in direct touch with the territories of preservation of the nocturnal environment

- Type 1: **environmental protection areas** (regional and national nature parks)
- Type 2: (peri-)urban and rural **“ordinary spaces”**
- Type 3: **larger territorial units**, a kind of **“workshop areas”** for NEO’s activities





An example of "workshop area" for NEO: Reunion Island

- **Historically, a monodisciplinary approach** focused on nocturnal avifauna
- To enrich the repertoire of public action: **cultural relations to darkness specific to Reunionese populations**
- *Fenwar* as a soundscape?





An example of “workshop area” for NEO: Reunion Island

- Implementation of transdisciplinary **workshops** around the “nocturnal soundscapes”
- **Step 1:** Meet the inhabitants, explain the method and distribute pre-programmed acoustic recorders



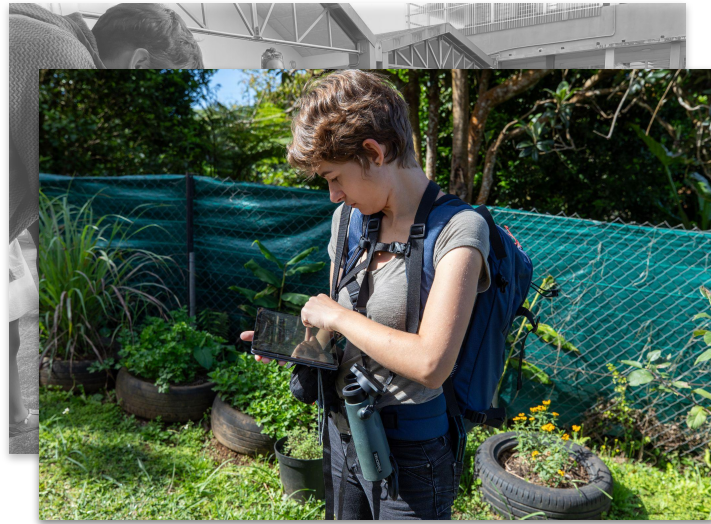
MITI
Mission pour les Initiatives Transverses et Interdisciplinaires

The **OUTRENOIR** program has received financial support from the CNRS through the MITI interdisciplinary programs.



An example of “workshop area” for NEO: Reunion Island

- Implementation of transdisciplinary **workshops around the “nocturnal soundscapes”**
- **Step 2:** Retrieve recorders, carry out an in situ ecological & landscape diagnosis

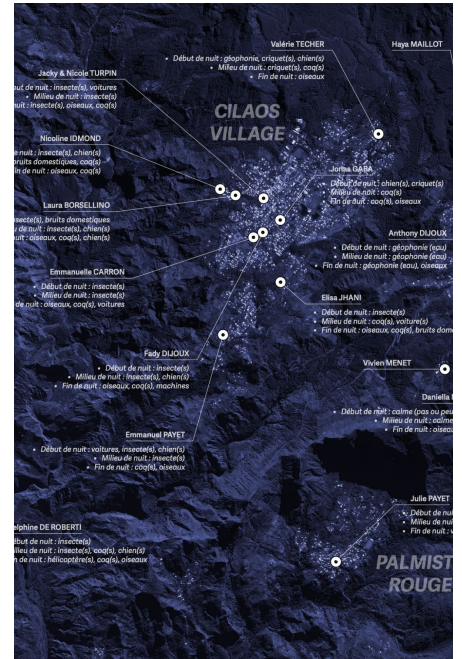
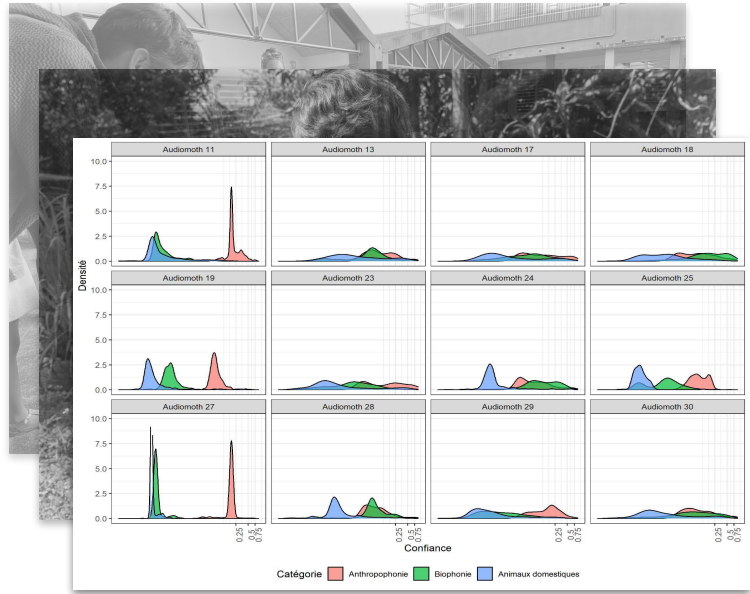


The **OUTRENOIR program** has received financial support from the CNRS through the MITI interdisciplinary programs.



An example of "workshop area" for NEO: Reunion Island

- Implementation of transdisciplinary **workshops** around the "nocturnal soundscapes"
- **Step 3:** Data pre-processing through AI recognition and classification of sound events



The **OUTRENOIR** program has received financial support from the CNRS through the MITI interdisciplinary programs.



An example of “workshop area” for NEO: Reunion Island

- Implementation of transdisciplinary **workshops** around the “nocturnal soundscapes”
- **Step 4:** Listen, annotate and play around nocturnal soundscapes — *Where? When? With whom?* (human & non-human otherness)

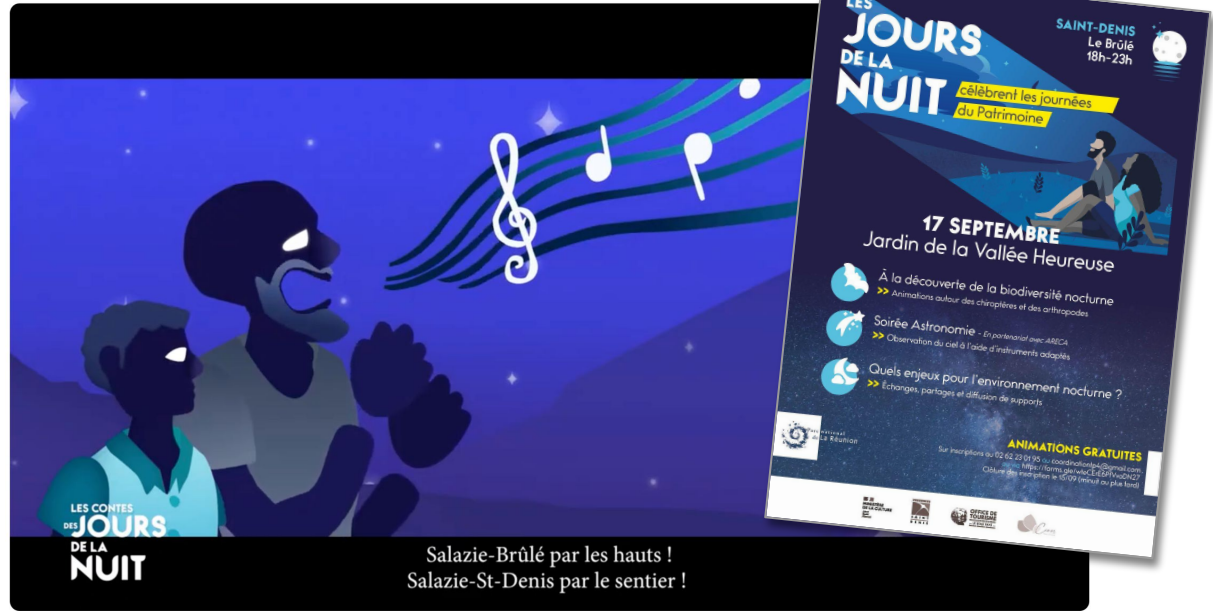


The **OUTRENOIR** program has received financial support from the CNRS through the MITI interdisciplinary programs.



What effects will this transdisciplinary research have on the territory?

- **Appropriation of the theme** by La Réunion National Park
- Training of the Park staff
- Implementation of “The Days of the Night”, an event program built on a **social-ecological approach to the nocturnal environment**



Salazie - Brûlé par les hauts, un conte des Jours de la Nuit



Parc national de La Réunion
388 abonnés

S'abonner



Partager

Télécharger

Enregistrer



Source: Reunion Island National Park (2022).



science & innovation

Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



National
Research
Foundation

AfAS
African Astronomical Society

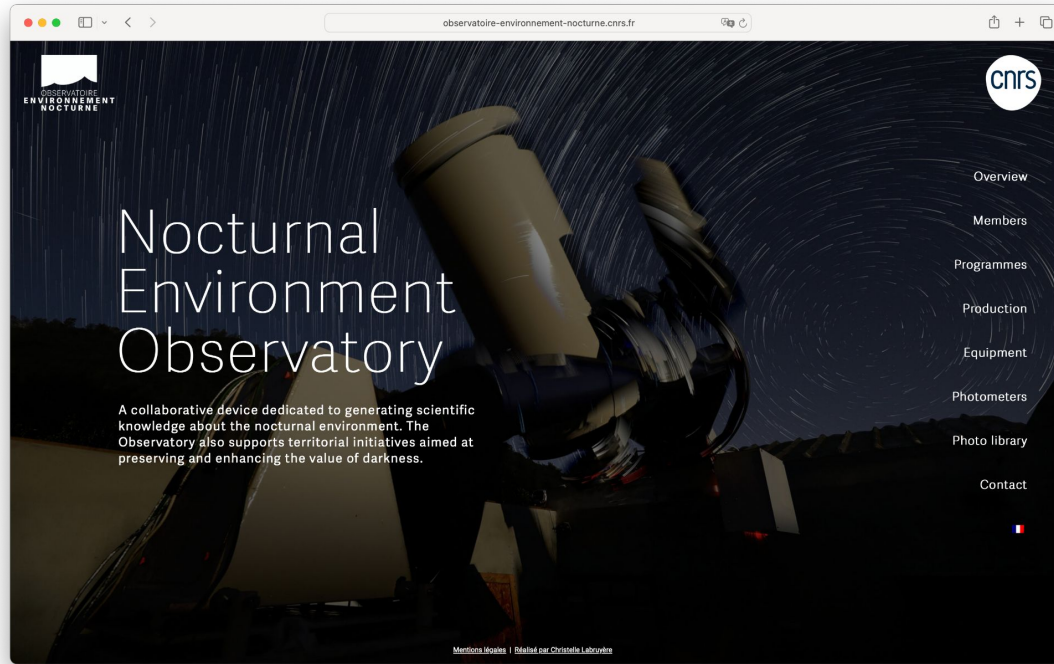


XXXII IAU GENERAL ASSEMBLY

CAPE TOWN, SOUTH AFRICA, 2024

Thank you for your attention!

Interested in our work? Please feel free to use the contact form at:



science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA



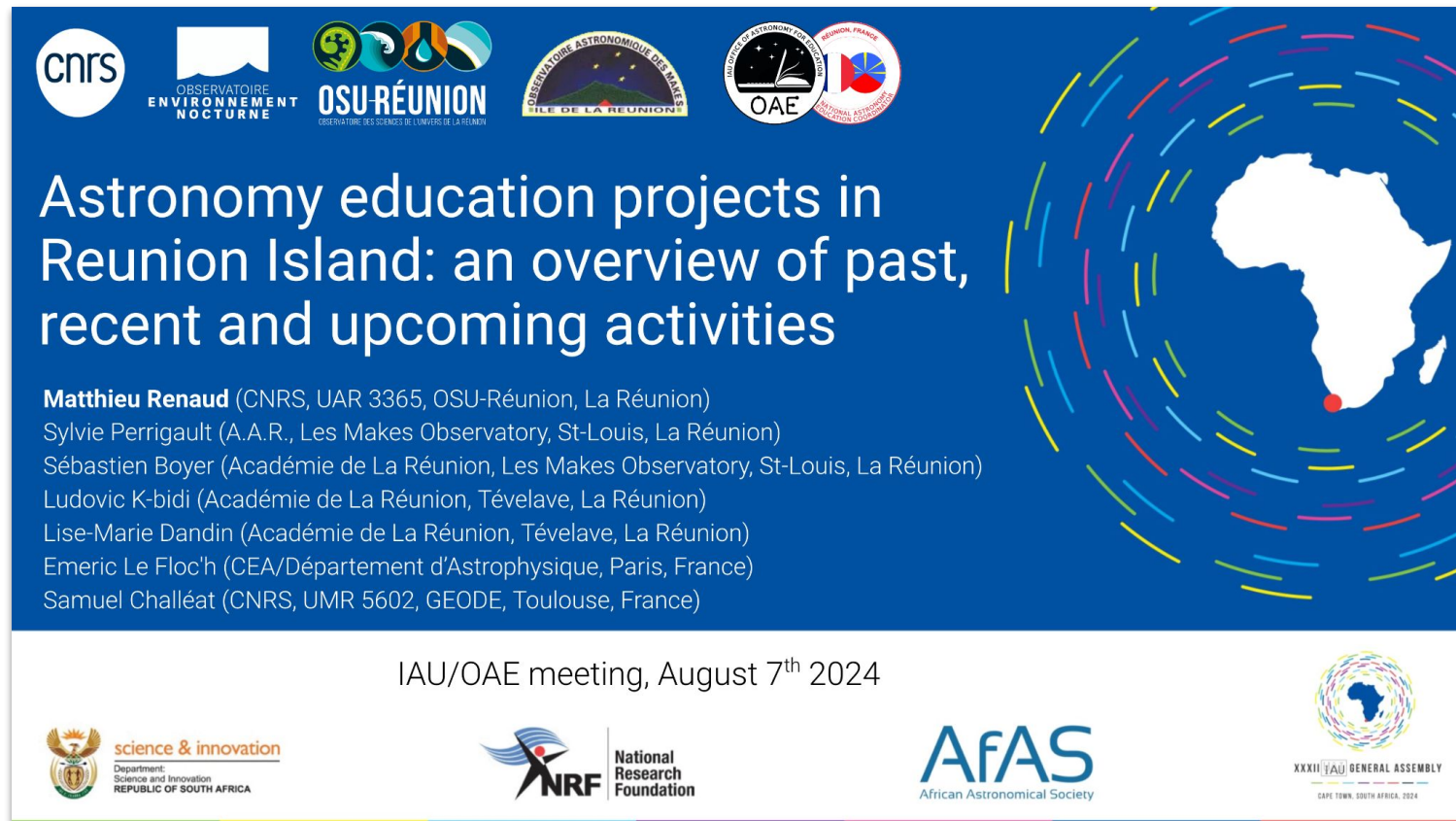
**National
Research
Foundation**



XXXII IAU GENERAL ASSEMBLY

CAPE TOWN, SOUTH AFRICA, 2024

For more information on the educational activities carried out by the Nocturnal Environment Observatory on Reunion Island, see the communication by Renaud et alii:




The slide features a dark blue background with a white map of Africa on the right side, surrounded by concentric, multi-colored dashed lines representing celestial orbits. A red dot is placed on the southern tip of the African continent. At the top left, there are several logos: CNRS, Observatoire Environnement Nocturne, OSU-Réunion, Observatoire Astronomique des Makes Ile de la Réunion, OAE, and the logo of the Réunion France Regional Astronomy Commission. The main title is in large white font, and the list of authors is in smaller white font below it. At the bottom, there are logos for the Republic of South Africa (Department of Science and Innovation), NRF (National Research Foundation), AfAS (African Astronomical Society), and the XXXII IAU General Assembly (Cape Town, South Africa, 2024).


cnrs **OBSERVATOIRE ENVIRONNEMENT NOCTURNE** **OSU-RÉUNION** **OBSERVATOIRE DES SCIENCES DE L'UNIVERS DE LA RÉUNION** **OBSERVATOIRE ASTRONOMIQUE DES MAKES ÎLE DE LA RÉUNION** **OAE** **RÉUNION FRANCE COMMISSION ASTRONOMIQUE RÉGIONALE**

Astronomy education projects in Reunion Island: an overview of past, recent and upcoming activities


Matthieu Renaud (CNRS, UAR 3365, OSU-Réunion, La Réunion)
Sylvie Perrigault (A.A.R., Les Makes Observatory, St-Louis, La Réunion)
Sébastien Boyer (Académie de La Réunion, Les Makes Observatory, St-Louis, La Réunion)
Ludovic K-bidi (Académie de La Réunion, Tévelave, La Réunion)
Lise-Marie Dandin (Académie de La Réunion, Tévelave, La Réunion)
Emeric Le Floc'h (CEA/Département d'Astrophysique, Paris, France)
Samuel Challéat (CNRS, UMR 5602, GEODE, Toulouse, France)

IAU/OAE meeting, August 7th 2024

 **science & innovation**
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

 **NRF** | **National Research Foundation**

AfAS
African Astronomical Society

 **XXXII IAU GENERAL ASSEMBLY**
CAPE TOWN, SOUTH AFRICA, 2024