7th IOCCG Summer Lecture Series

Frontiers in Ocean Optics and Ocean Colour Science

https://ioccg.org/what-we-do/training-and-education/ioccg-sls-2026/

Institute of Marine Sciences (ISMAR) from the Italian National Council of Research (CNR) and the Venice International University (VIU)
San Servolo, Venice, Italy,
5 – 19 July 2026



In addition to recurrent support from all IOCCG contributing agencies, specific additional contributions are acknowledged for the 2026 edition, from the following agencies and institutions:

Our hosts

CNR ISMAR ISTITUTO DI SCIENZE MARINE

Venice International University

Our sponsors

IOCCG International Ocean Colour Coordinating Group

esa

PROGRAMME OF THE EUROPEAN UNION Copernicus Europe's eyes on Earth

IMPLEMENTED BY EUMETSAT

OCB Ocean Carbon & Biogeochemistry

MERCATOR OCEAN INTERNATIONAL

International Science Council SCOR Scientific Committee on Oceanic Research

BIODIVERSITY GATEWAY

It is also noted that all lecturers provide their time as in-kind, which special acknowledgement to their respective institutions (as listed in Appendix I)

Table of contents

1 Introduction

2 Student selection

3 Course organisation

4 Course evaluation

5 Conclusion

6 Acknowledgments

7 Appendix I – Lecturers

8 Appendix II – Selected students

9 Appendix III – Course Schedule

1 Introduction

The Institute of Marine Sciences (ISMAR) from the Italian National Council of Research (CNR) and the Venice International University (VIU), located in Venice, Italy, hosted the seventh edition of the International Ocean Colour Coordinating Group (IOCCG) Summer Lecture Series (SLS) in July 2026.

The IOCCG SLS is an advanced, 2-week course dedicated to training in the fundamentals of ocean optics, bio-optics, and ocean colour remote sensing. The course was coordinated by Dr. Vittorio Ernesto Brando and Dr. Maria Laura Zoffoli (CNR-ISMAR) with assistance from the IOCCG Project Office and input from course lecturers, listed in Appendix I. All are gratefully acknowledged for their contribution to the planning of SLS 2026.

2 Student selection

A total of 105 applications were received from 40 countries (Fig. 1) spread across 46 nationalities. The number of applications were approximately evenly split between male (49 applications or 47%) and female (56 or 53%).

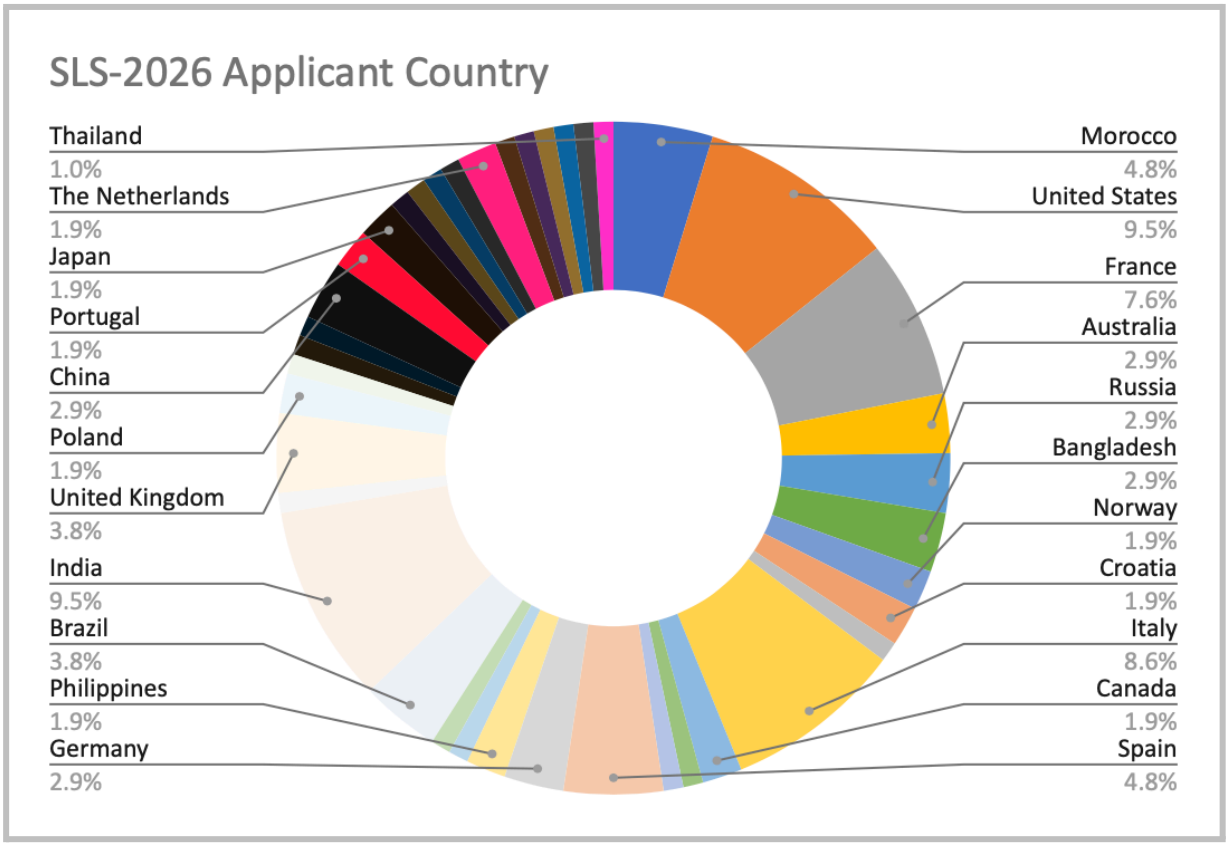


Fig. 1: Distribution of applications by the country of residence based on the location of the applicant's associated institution.

Applications were reviewed by 4 volunteer reviewers from the IOCCG (Emmanel Devred, Corinne Bourgault-Brunelle, Frederic Melin, and Maria Laura Zoffoli) that formed the SLS 2026 Selections Committee. The selection of candidates was based on their motivation

statement, evidence of knowledge of remote sensing, their current area of research, previous training opportunities, and their potential to apply the knowledge and skills that they would gain from the SLS to their future research and/or teaching. Thirty (30) students from 18 countries were finally selected and agreed to attend the 2026 SLS (Appendix II). This number was the same as for the 6th edition due to the larger capacity of the venue than in years prior to 2024, while still ensuring good interaction among all the SLS participants.

3 Course organisation

The format of the SLS has typically been a series of lectures and open discussion sessions on pre-arranged topics and hands-on practical sessions to allow interaction between the students and lecturers. This was continued for 2026, with a few changes: 1) an assignment beforehand to watch two previously recorded lectures by Dariusz Stramski (which were delivered virtually in recent past editions) on *Interaction of Light and Matter*, and *The Nature and Properties of Light*, with a dedicated discussion session at the event with Emmanuel Boss; 2) the addition of LiDAR to the lecture schedule; 3) the removal of practicals with the spectral absorption and attenuation sensor (AC-S); and 4) a field excursion in the Venice Lagoon.

As was typical, the SLS started with the fundamentals in optics, bio-optics and ocean colour science, including the inherent and apparent optical properties of seawater to lay the groundwork for all students to adequately understand and benefit from lectures that follow on inversion techniques, and applications. A copy of the lecture schedule is available in Appendix III.

The course opened with a welcome from the course coordinators, Vittorio Brando and Laura Zoffoli, and introductory summaries of activities of IOCCG and CNR-ISMAR. Students introduced themselves so that participants could share their academic backgrounds, their current positions, and their experiences. As not all lecturers were in attendance for the start of the SLS, this same information from the selected students' applications were shared with the lecturers by email.



Fig. 2: Group photo of students and lecturers taken during the first week of SLS2026.



Fig. 3: Photo of students and lecturers during part of the field excursion in the Venice Lagoon.

4 Course evaluation

At the end of the course, students and lecturers were given the opportunity to share their experience on various aspects of the lectures and practical course organization via an online anonymous feedback questionnaire. These forms are valuable for future planning and organization of the SLS, helping to understand which lectures were most effective, and where gaps and weaknesses exist.

Most students agreed that the course offered a good balance between theoretical lectures, practical exercises, and student projects, and that it progressed naturally from basic optical concepts to more advanced inversion methods, remote sensing applications, and current research topics. Some lectures covering topics outside students' primary research areas, such as atmospheric correction, polarization, LiDAR remote sensing, and advanced scattering theory, were more challenging to follow. Nevertheless, they were still considered valuable introductions to areas with which students had little previous experience, and demonstrated the value of the course to a diverse set of participants. A few lectures involving advanced theoretical derivations or highly specialized instrumentation required additional concentration, but remained understandable overall. These more challenging topics also encouraged students to further explore the underlying concepts after the course.

Participants found that the lecture content met or exceeded their expectations, but that practicals (where they were applicable) could have been spread more evenly throughout the week. Discussions were seen as very valuable, and a majority of participants adequately utilized (and praised) the breaks in the schedule and the availability of the lecturers for facilitating further discussion beyond their allotted times in the schedule, which was indeed the idea of having everyone together for two weeks of course time.

Students requested more content on how to make IOP in situ measurements, as well as additional topics such as connecting data from BGC-Argo bio-optical measurements, satellite calibration and validation, and application-based topics (machine learning, habitat mapping, Bayesian statistics in the analysis of OC products, non-phytoplankton blooms [e.g. Sargassum], more examples with other hyperspectral missions [e.g., PRISMA, HICO, EnMAP, CHIME]).

The field trip was introduced in the SLS schedule for the first time and it was very positively received. Students appreciated the opportunity to gain hands-on experience in the field, particularly as some of them do not frequently participate in field activities. Both students and lecturers, however, agreed that future field trips would benefit from clearer instructions, better definition of individual tasks, and closer coordination with the vessel crew to ensure that the activities run more smoothly and efficiently.

The use of the strategy of watching prerecorded lectures followed by live Q&A sessions was also introduced for the first time in the SLS schedule. Most students evaluated it positively. They appreciated the flexibility of watching the lectures at their own pace, pausing and revisiting difficult concepts, and then using the in-person session to clarify specific questions. The format was considered particularly suitable for foundational and introductory topics and also helped free up time during the course for other activities. A smaller group of students, around one quarter of respondents, would have preferred dedicated in-person lectures, mainly because of the value of direct interaction with the lecturer. In future invitation letters it could make sense to suggest to participants watching some prerecording lectures on topics they are not familiar with, even if the full lecture will be scheduled in person.

Opinions on the mini-projects were more divided. Some students enjoyed the opportunity to work collaboratively and apply the concepts and methods introduced during the course to a concrete problem. Others felt that the time available was too limited, making the exercise stressful and leaving insufficient time to fully explore the data, discuss methodological choices, and develop the final results.

Both students and lecturers enjoyed the community and networking that are characteristic of the SLS, and all students indicated that they would recommend the course to a colleague.

5 Conclusion

The 2026 IOCCG Summer Lecture Series was held for the first time in Venice, Italy hosted by CNR-ISMAR and VIU. Students and lecturers enjoyed the venue, discussions, and interaction, and all gave valuable feedback for future editions of the SLS.

As with previous editions, all shared lecture material is available online on the SLS 2026 webpage: ioccg.org/what-we-do/training-and-education/ioccg-sls-2026

6 Acknowledgments

The IOCCG thanks the staff and faculty at VIU and CNR-ISMAR who hosted the 2026 SLS, as well as all the lecturers and participants for their contributions, cooperation, and enthusiasm for sharing knowledge. All institutions of the lecturers (Appendix I) are gratefully acknowledged for their in-kind contributions of lecturers' time for planning and executing SLS2026. Valuable contributions from all sponsoring organizations is also gratefully acknowledged.

The 2026 SLS was sponsored by:

- The Institute of Marine Sciences (ISMAR) from the Italian National Council of Research (CNR) and Venice International University (VIU), for providing funding for accommodation, ground transportation, facilities, and staff.
- EUMETSAT (European Organisation for the Exploitation of Meteorological Satellites), The Copernicus Programme of the European Union and European Space Agency (ESA) for providing funding for students and lecturers from the EU.
- Mercator Ocean International for providing funding for accommodation, ground transportation, facilities, and travel.
- Biodiversity Gateway of the National Biodiversity Future Center for providing funding for facilities.
- Ocean Carbon & Biogeochemistry (OCB) Project Office, Woods Hole, MA, USA for providing financial support to students from the USA.
- Scientific Committee on Oceanic Research (SCOR) for providing funding for students from developing nations.
- International Ocean Colour Coordinating Group (IOCCG) for providing staff support and travel funding for lecturers and some students.
- All lecturer institutions (Appendix I) for lecturers' time provided in-kind, and travel funding where provided.

IOCCG would also wish to thank the following key people for their help in the organization and their support during the course:

- The SLS2026 Coordinators Vittorio Ernesto Brando & Maria Laura Zoffoli for planning and overseeing the SLS in Venice, including organizing the logistics of transportation, food, and accommodation, developing the agenda, and selecting the invited lecturers.
- The SLS2026 Selections Committee for careful review and ranking of the 105 SLS2026 applications.
- Raisha Lovindeer, IOCCG Scientific Coordinator for management of the SLS website and email communication, and administration of financial support for students and lecturers, including administering funding from SCOR, and for 7 students and 7 lecturers funded by IOCCG.
- Emily Twigg for administering support from SCOR to fund travel for 2 students.
- Heather Benway and Mary Zawoysky, Ocean Carbon & Biogeochemistry Program, for management of OCB financial support to 4 students.
- Emmanuel Boss for handling and shipping of instruments for practicals from Maine, USA.

- The staff of VIU (Silvia Casalini, Alessandro Spezzamonte, Igor Nash and Nicoletta Rossi) for their valuable assistance and support with the administrative, logistical, and organizational aspects.
- The staff of the restaurant and accommodation facilities for their warm hospitality, attentive service, and valuable support.
- All the lecturers for their time and support during the course

7 Appendix I – Lecturers

Lecturer	Institution	Country
David Antoine	Curtin University	Australia
Emmanuel Boss	University of Maine	United States
Vittorio Ernest Brando	CNR-ISMAR	Italy
Bob Brewin	University of Exeter	United Kingdom
Ivona Cetinic	NASA	United States
Francesco D'Amico	EUMETSAT	Germany
David Dionisi	CNR-ISMAR	Italy
Claudia Giardino	CNR-IREA	Italy
Pierre Gernez	Nantes Université	France
John Hedley	Numerical Optics Ltd.,	United Kingdom
ZhongPing Lee	Xiamen University	China
Ben Loveday	EUMETSAT	Germany
Mike Twardowski	Harbor Branch Ocean. Inst. Florida Atlantic University	United States
Quinten Van Hellemont	RBINS	Belgium
Jeremy Werdell	NASA	United States
Maria Laura Zoffoli	CNR-ISMAR	Italy

8 Appendix II – Selected students

1. Tomás Acuña Ruz, Sorbonne University, France
2. Mariam Ayad, University of California, Santa Cruz, USA
3. Brittany Barreto Martinez, San Diego State University, USA
4. Zoé Besnard, ISOMer – Nantes University, France
5. Amir Chegoonian, University of Waterloo, Canada
6. Bruno Nicolas Cremella Palmerini, Laboratoire d'Océanographie de Villefranche, CNRS/Sorbonne Université, France
7. Madhusmita Dash, Leibniz Institute for Baltic Sea Research Warnemünde (IOW), Germany
8. Jeniffer De Maligaya, Philippine Space Agency, Philippines
9. Ivan Farace, CNR – ISMAR / Sapienza University of Rome, Italy
10. Congju Fu, CNR – ISMAR / Sapienza University of Rome, Italy
11. Mauro Gonzalez Vera, Comision Nacional de Actividades Espaciales (CONAE), Argentina
12. Vinícius Guimarães, National Institute for Space Research, Brazil
13. Jong-Seok Lee, Korea Institute of Ocean Science & Technology, South Korea
14. Mengyu Li, CNR-ISMAR, Italy
15. Xu Li, Xiamen University, China
16. Maria Lima, University of Algarve, Portugal
17. Thainara Lima, Mississippi State University, USA
18. Jutarak Luang-on, Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan
19. Adam Lucas, University of North Carolina Wilmington, USA
20. Amihan Manuel, National University of Singapore, Singapore
21. Antonija Matek, University of Zagreb, Croatia
22. Munawaroh, National Research and Innovation Agency of Republic of Indonesia, Indonesia
23. Winnie Owoko, King's College London, UK
24. Mirna Pohorylow, CESIMAR CENPAT CONICET, Argentina
25. Muhammad Prasetyo, Tohoku University, Japan
26. Brynn Presler-Marshall, University of Strathclyde, United Kingdom
27. Rebekah Shunmugapandi, Indian Institute of Science Education and Research, India
28. Md Shahin Hossain Shuva, Curtin University, Australia
29. Xavier Warren, University of Connecticut, USA
30. Wenlong Xu, Jiangsu University of Science and Technology (JUST), China

9 Appendix III – Course Schedule

WEEK #1		
Date	**Subject**	**Lecturer(s)**
Sunday 5 Jul 2026	Participants arrive at San Servolo	
OPENING - 7th IOCCG Summer Lecture Series		
Monday 6 Jul 2026		
09h00 - 09h10	Welcome to the course	Vittorio Brando / Laura Zoffoli
09h10 - 09h30	Presentation of IOCCG	Laura Zoffoli
09h30 - 10h00	Presentation of ISMAR	Vittorio Brando
10h00 - 10h15	introduction by the lecturers (2 min each, no slides)	lecturers on site
10h15 - 10h45	Coffee Break	
10h45 - 12h30	Brief student presentations (~3 min each, 2 slides); group photo before lunch!	Students
12h30 - 14h00	Lunch break	
14h00 - 15h00	Questions and answers on pre-recorded videos (The nature and properties of light, Interaction of light and matter)	Emmanuel Boss
15h00 - 15h30	Coffee Break	
15h30 - 17h30	Practical: playing with light	Emmanuel Boss
17h30 - 19h30	Welcome drink (hosted)	
Tuesday 7 Jul 2026		
09h00 - 10h30	Optics of Marine Particles	Mike Twardowski
10h30 - 11h00	Coffee Break	
11h00 - 12h30	Radiometry and apparent optical properties (AOPs), fundamentals	David Antoine
12h30 - 14h00	Lunch break	
14h00 - 15h30	Fundamentals of IOPs and their relationship with AOPs	Zhongping Lee
15h30 - 16h00	Coffee Break	
16h00 - 17h30	Ocean Scattering	Mike Twardowski
Wednesday 8 Jul 2026		
09h00 - 10h30	Radiometry, apparent optical properties, measurements & uncertainties	David Antoine
10h30 - 11h00	Coffee Break	
11h00 - 12h30	Introduction to Radiative Transfer Modelling	John Hedley
12h30 - 14h00	Lunch break	

14h00 - 15h30	IOPs Inversion and applications	Zhongping Lee
15h30 - 16h00	Coffee Break	
16h00 - 17h30	Optical properties of phytoplankton	Pierre Gernez
19h00 -	Pizza together (non-hosted)	
Thursday 9 Jul 2026		
09h00 - 10h30	Past, present and future of satellite OCR	Vittorio Brando
10h30 - 11h00	Coffee Break	
11h00 - 12h30	Atmospheric corrections of satellite OCR observations (1/2)	David Antoine
12h30 - 14h00	Lunch break	
14h00 - 15h30	Inexpensive but robust approaches for determining optical and biogeochemical properties	Mike Twardowski / Emmanuel Boss / Bob Brewin
15h30 - 16h00	Coffee Break	
16h00 - 17h30	Ocean biogeochemical cycles	Bob Brewin
Friday 10 Jul 2026		
09h00 - 10h30	Atmospheric corrections of satellite OCR observations (2/2)	David Antoine
10h30 - 11h00	Coffee Break	
11h00 - 12h30	Primary production, export production and climate-driven changes	Bob Brewin
12h30 - 14h00	Lunch break	
14h00 - 15h30	HABs	Pierre Gernez
15h30 - 16h00	Coffee Break	
16h00 - 17h00	Practical ==>preparation for field excursion	Mike Twardowski / Emmanuel Boss / Bob Brewin / Vittorio Brando / Laura Zoffoli
17h00 - 18h00	Preparation for field excursion: The Venice Lagoon	Giovanni Cecconi
Saturday 11 Jul 2026		
08h30 - 12h30	Field excursion in the Venice Lagoon	Mike Twardowski / Emmanuel Boss / Bob Brewin / Vittorio Brando / Laura Zoffoli
12h30 - 14h00	Lunch break	
Afternoon	FREE	

WEEK #2		
Date	**Subject**	**Lecturer(s)**
Sun 12 Jul	FREE	
Mon 13 Jul 2026		
09h00 - 11h00	Practical ==> post field excursion (data processing and/or briefing)	Mike Twardowski / Emmanuel Boss
11h00 - 11h30	Coffee Break	
11h30 - 13h00	Perspectives on hyperspectral optics and remote sensing	Jeremy Werdell
13h00 - 14h30	Lunch break	
14h30 - 16h00	Fundamentals on shallow water remote sensing	John Hedley
16h00 - 16h30	Coffee Break	
16h30 - 18h00	Tools for shallow water mapping	Claudia Giardino / Laura Zoffoli
Tues 14 Jul 2026		
09h00 - 10h00	Introduction to practical sessions and expectations for mini-projects. Formation of groups of 3 students	Vittorio Brando
10h00 - 11h00	Practical Session - HydroLight Lab	John Hedley
11h00 - 11h30	Coffee Break	
11h30 - 12h30	Practical Session - HydroLight Lab	John Hedley
12h30 - 14h00	Lunch break	
14h00 - 15h30	Principles of LiDAR	Davide Dionisi
15h30 - 16h00	Coffee Break	
16h00 - 17h30	Phytoplankton community composition derived from remote sensing	Ivona Cetinic
17h30 - 18h30	time for mini-projects	students + lecturers
Wed 15 Jul 2026		
09h00 - 10h30	AC for turbid and complex waters	Quinten Van Hellemont
10h30 - 11h00	Coffee Break	
11h00 - 12h30	Inland waters	Claudia Giardino
12h30 - 14h00	Lunch break	
14h00 - 15h30	Practical on application of PACE data	Jeremy Werdell / Ivona Cetinic
15h30 - 16h00	Coffee Break	
16h00 - 17h30	Practical on application of PACE data	Jeremy Werdell / Ivona Cetinic
17h30 - 18h30	Time for mini-projects	students + lecturers

Thurs 16 Jul 2026		
09h00 - 10h30	Applications of LiDAR to ocean color science	Davide Dionisi
10h30 - 11h00	Coffee Break	
11h00 - 12h30	OC multi-sensor	Vittorio Brando
12h30 - 14h00	Lunch break	
14h00 - 15h30	Practical on Copernicus datasets	Ben Loveday
15h30 - 16h00	Coffee Break	
16h00 - 17h30	Practical on Copernicus datasets	Ben Loveday
17h30 - 18h30	Time for mini-projects	students + lecturers
Fri 17 Jul 2026		
09h00 - 10h30	Fine scale satellite - applications to turbid waters	Federica Braga
10h30 - 11h00	Coffee Break	
11h00 - 12h30	Practical on ACOLITE	Quinten Van Hellemont
12h30 - 14h00	Lunch break	
14h00 - 15h30	Practical on Copernicus datasets	Ben Loveday
15h30 - 16h00	Coffee Break	
16h00 - 16h45	Integration of young scientists to the scientific community	Emmanuel Boss
16h45 - 17h30	time for mini-projects (finalising and uploading)	students + lecturers
18h30 - 19h00	Visit to Italian Biodiversity Gateway	Vittorio Brando / Laura Zoffoli
19h00 -	Group dinner at Palazzina Canonica (hosted)	
Sat 18 jul 2026		
09h00 - 10h30	presentation of mini-projects by students groups (10x6 minutes per group - 2 slides)	
10h30 - 11h00	Coffee Break	
11h00 - 12h30	General discussion, wrap-up, feedback lecturers and students	All together
12h30 - 14h00	Lunch break	
Afternoon	FREE	
Evening	Festa del redentore in Venice	
CLOSURE: 7th IOCCG Summer Lecture Series		