

2023 Report of Working Group 46: Joint PICES/ICES Working Group on Ocean Negative Carbon Emissions (ONCE)

1. Activities undertaken in 2023

The first WG co-chairs meeting of 2023 was held virtually on 10th May 2023.

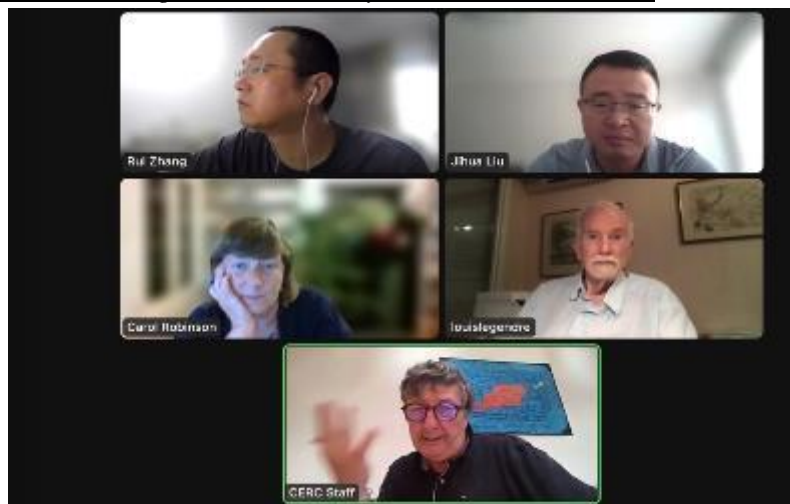
The co-chairs of WG 46 reviewed the priority actions that need to be taken to achieve the Terms of Reference (ToR). They also discussed the final report of the 3-year WG, which needs to be arranged in the next 12 months. Additionally, they planned the activities of the WG, as well as international activities related to ONCE for the year 2023. This meeting also discussed and decided the planned deliverables of the working group including:

- 1) research papers, journal special issues or sections, and reviews of the science related to ocean-based negative carbon emission approaches,
- 2) a proposal for future research directions in ocean-based negative carbon emissions,
- 3) an outreach product for the general public and
- 4) a final report for PICES and ICES summarizing the results of the working group.

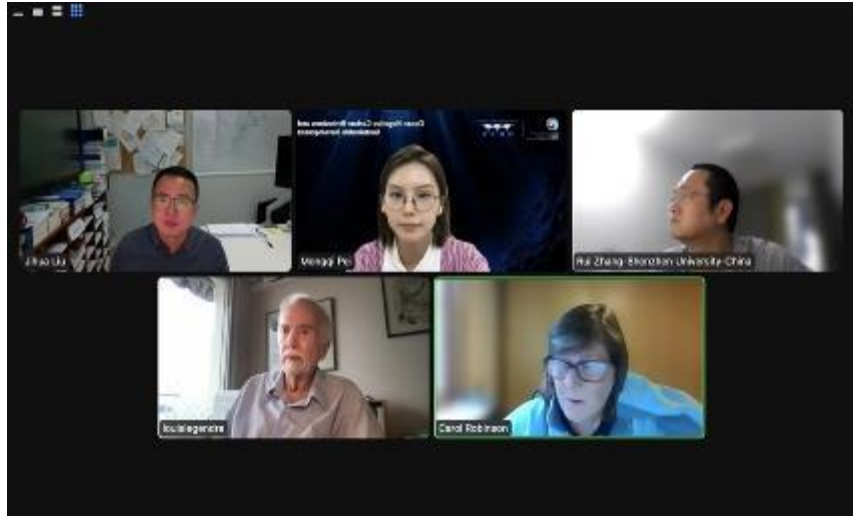


The second WG co-chairs meeting was held virtually on 28th July 2023.

The third WG co-chairs meeting was held virtually on 18th October 2023.



In order to discuss preparations for the 2023 WG 46 annual meeting and related Global ONCE meetings, two virtual co-chair meetings were held. The meetings were attended by PICES co-chair Prof. Nianzhi Jiao, ICES co-chair Prof. Louis Legendre, co-chair Prof. Doug Wallace, and co-chair Prof. Carol Robinson. During the meeting, the attendees discussed the specifics of the annual meeting and Global ONCE Open Science Conference, including their structures, arrangements, and duration. Prof. Nianzhi Jiao provided updates on the progress of ONCE in China.



The WG held an “Ocean Negative Carbon Emissions (ONCE) for Carbon Neutralization” Workshop on October 24 in Seattle during the 2023 PICES Annual Meeting.

The chief scientist of Global ONCE, Prof. Nianzhi Jiao delivered the opening remarks, joined by Enrique N. Curchitser, Chair of the PICES Governance Committee, Jörn Schmidt, Chair of the ICES Science Committee, and Sanae Chiba, Executive Deputy Secretary of PICES, who expressed their acknowledgment and support for ONCE's achievements over the past year. Prof. Curtis Suttle, Fellow of the Royal Society of Canada, along with ONCE Working Group member Prof. Jung-Ho Hyun, presented reports during the workshop. The event facilitated academic discussions among experts, scholars, early-career professionals, and students from the UK, US, South Korea, Canada, China, and other countries.



The WG annual meeting was held in Xiamen 5-7 November

The 2023 Annual meeting of the Joint PICES/ICES Working Group on Ocean Negative Carbon Emissions (WG 46) was held in Xiamen, China and online from November 5 to 7, 2023. The meeting was chaired by the four co-chairs, namely, Prof. Nianzhi Jiao, who is Global ONCE's co-chair and Chief Scientist, Prof. Carol Robinson from the University of East Anglia and Global ONCE's co-chair, Dr. Douglas Wallace, who is a Fellow of the Royal Society of Canada, and Prof. Louis Legendre, who is a Fellow of the European Academy of Sciences. There were 12 members plus 3 observers (WG 46 Endnote 1) in attendance. During the meeting, past activities and ToR of the WG were reviewed. Updates on the progress made by each task team were provided, and two joint reports were discussed and work began on drafting them. The agenda for the meeting is presented as WG 46 Endnote 2. The first joint report focuses on "Advancements in Ocean Negative Carbon Emissions Research: What is Happening, and What Comes Next?" The second report addresses "Environmental Changes Potentially Caused by mCDR.



2. Progress towards achieving the Terms of Reference

The main objectives of WG 46 are to:

- Identify current knowledge gaps in negative carbon emission in the oceans; and
- Propose future research directions and applications to the enhancement of negative carbon emissions including the items below:
 - Developing additional long-term time series stations to observe carbon sequestration in representative coastal and offshore waters;
 - Proposing integrated experimental studies to better understand carbon sequestration under paleo-, current and future oceanic conditions;
 - Proposing an international collaborative project or program dedicated to ocean negative carbon emission.

The objective to propose an international collaborative program was achieved. The Global Ocean Negative Carbon Emissions (Global-ONCE) Program was established and approved by the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational Scientific and Cultural Organization (UNESCO). It is in the framework of the United Nations Decade of Ocean Science for Sustainable Development. The program aims at developing a sustainable and equitable ocean economy, programme, protecting and restoring ecosystems and biodiversity, and unlocking ocean-based solutions to climate change.

The Joint PICES/ICES Working Group 46 has made the decision to commence the writing of the final report. The report will be prepared in accordance with the timeline set by the PICES organization. This step is crucial to ensure the timely delivery of the report and to meet the expectations of members in Working Group 46.

WG 46 Endnote 1

ICES/PICES WG 46: Annual meeting participation list

Members

In person:

Nianzhi Jiao (PICES Co-chair, China)

Doug Wallace (PICES Co-chair, Canada)

Carol Robinson (ICES co-chair, UK)

Louis Legendre (ICES co-chair, France)

Curtis Suttle (Canada)

Rui Zhang (China)

Bei Su (China)

Helmuth Thomas (Germany)

Jung-Ho Hyun (Korea)

Online:

Debby Ianson (Canada)

Youhei Yamashita (Japan)

Jihua Liu (China)

Members unable to attend

Phil Renforth (UK)

Jianfang Chen (China)

Elizabeth Shadwick (Australia)

Jack Middelburg (Netherlands)

Greg Rau (USA)

Lihini Aluwihare (USA)

Galen McKinley (USA)

Shucheng Xie (China)

Jingfeng Fan (China)

Andrea Fassbender (USA)

Mar Fernandez Mendez (Germany)

Meg Estapa (USA)

Pavel Ya Tishchenko (Russia)

Observers

Mengqi Pei (China)

Hongjian Li (China)

Zhao Zhao (China)

Xilin Xiao (China)

Sonakshi Mishra (UK)

WG 46 Endnote 2

ICES/PICES WG 46: Annual meeting agenda

Sunday Nov. 5th, 2023		
Time	ICES/PICES WG 46 Workshop	Chair
9:00-10:00	Welcome and self-introductions of WG members	Nianzhi Jiao
10:00-10:20	Brief report on WG advances	Rui Zhang
10:20-10:40	Introduction to the proposed collective paper(s)	Doug Wallace & Louis Legendre
10:40-11:00	Coffee Break	
11:00-12:00	Introduction to the proposed collective paper(s)	Doug Wallace & Louis Legendre
12:00-14:00	Lunch Break	
14:00-15:00	Discussion of PICES final report	Rui Zhang
15:00-16:00	Parallel meetings of the paper writing groups	
16:00-16:20	Coffee Break	

16:20-18:00	Parallel meetings of the paper writing groups	
18:00	End	

Monday Nov. 6th, 2023		
Time	ICES/PCES WG Workshop	Chair
9:00-9:30	Feedback of the writing groups and discussion	Co-chair
9:30-10:30	Parallel meetings of the paper writing groups	
10:30-10:50	Coffee Break	
10:50-12:00	Parallel meetings of the paper writing groups	
12:00-14:00	Lunch Break	
14:00-14:30	Feedback of the writing groups and discussion	Co-chair
14:30-16:00	Parallel meetings of the paper writing groups	
16:00-16:20	Coffee Break	
16:20-18:00	Parallel meetings of the paper writing groups	Co-chair
18:00	End	

Tuesday Nov. 7th, 2023		
Time	ICES/PCES WG Workshop	Chair
9:00-9:30	Feedback of the writing groups and discussion	Co-chair
9:30-10:30	Parallel meetings of the paper writing groups	
10:30-11:00	Coffee Break	
11:00-12:30	Parallel meetings of the paper writing groups	
12:30-14:00	Lunch Break	
14:00-14:30	Feedback of the writing groups and discussion	Co-chair
14:30-16:00	Parallel meetings of the paper writing groups	
16:00-16:20	Coffee Break	
16:20-17:00	Parallel meetings of the paper writing groups	Co-chair
17:00-18:00	Plans for completing the writing of the manuscript(s)	Co-chair
18:00	End	