



OCEAN:ICE



Ocean-Cryosphere Exchange in Antarctica: Impacts on Climate and the Earth System

National Antarctic Scientific Center, Ukraine – contribution to the project

Speaker: Olena Marushevskya, Anastasiia Chyhareva
Event: Annual project meeting
Date: 23 September 2024



OCEAN:ICE is co-funded by the European Union, Horizon Europe Funding Programme for research and innovation under grant agreement Nr. 101060452 and by UK Research and Innovation

Joining a great project

- 2023 – submitting WISH-OI project using hop-on mechanism

WISH-OI enhances the existing OCEAN:ICE (O:I) project in Horizon Europe by the addition of the National Antarctic Science Centre (NASC) of Ukraine to the consortium.

- 1 April 2024 – signing the agreement

Thanks for Ruth Mottram, Andrew Meijers and Chiara Bearzotti!

The infographic is titled "Україна долучилася до міжнародного дослідження Антарктичної криги" (Ukraine joins international research of the Antarctic region). It features the logos of the Ministry of Education and Science of Ukraine and the National Antarctic Science Centre (NASC). The background shows a large ice formation with a small boat in the water.

МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ

Україна долучилася до міжнародного дослідження Антарктичної криги

Роль НАНЦ

- Запуск профілюючих буйів та збір додаткової польової інформації
- Моделювання впливу опадів (снігопаду і дощу) на баланс маси льоду шельфового льодовика

Назва

«Обмін між океаном і криосферою в Антарктиді: вплив на клімат і Землю загалом (OCEAN:ICE)»

Мета

Оцінити вплив на Землю ключових процесів, які відбуваються на Антарктичному льодовиковому щиті та в Південному океані

Територія досліджень НАНЦ

Центрально-західна частина Антарктичного півострова

БІЛЬШЕ ТУТ

<https://ocean-ice.eu/>

зразок профілюючого бую

Our work packages

- NASC expertise will add **new observations and analysis** as well as innovative numerical modelling to ocean and atmospheric processes and regions not presently represented in the project.

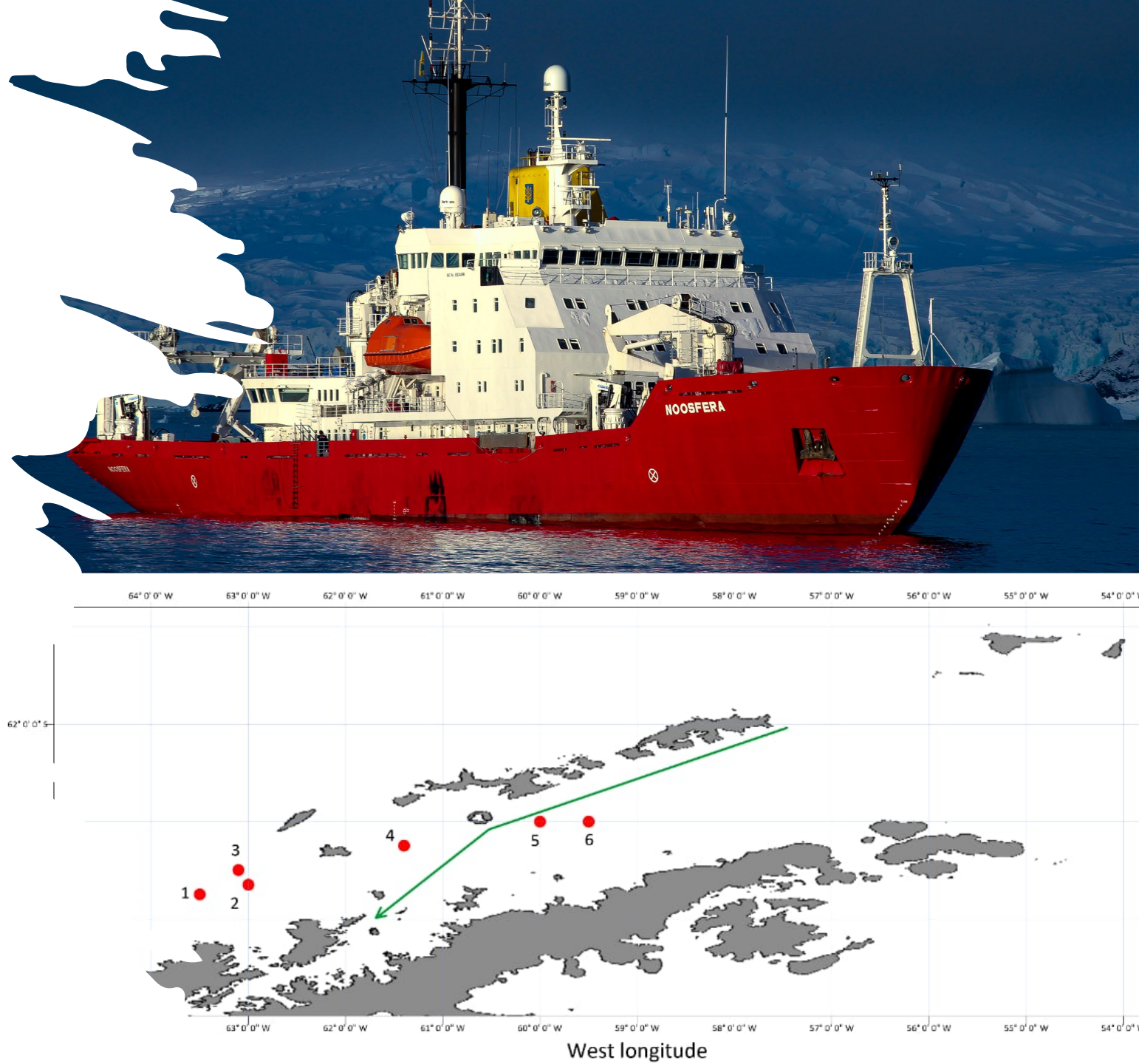
Work package 10 - Subpolar circulation, heat delivery and water mass export - this is the add on the existing Work Package 1

- 6 agro floats (ARVOR 1) are purchased;
- 30th of September 2024 – a joint workshop on float deployment
- Floats will be deployed in Bransfield Strait in March 2025

+ adding data from **Ferry box** placed at Ukrainian fishery vessel "More sodruzhestva"

“Noosfera” and float deployment

- NASC logistical support will expand existing O:I observations to areas not covered by O:I around Antarctica, allowing us to close the gap and become a truly circumpolar project.
- Issue: detailed map of the Bransfield Strait



Work package 11 - Atmosphere and ocean dynamics

(this is the add on the existing WP3)

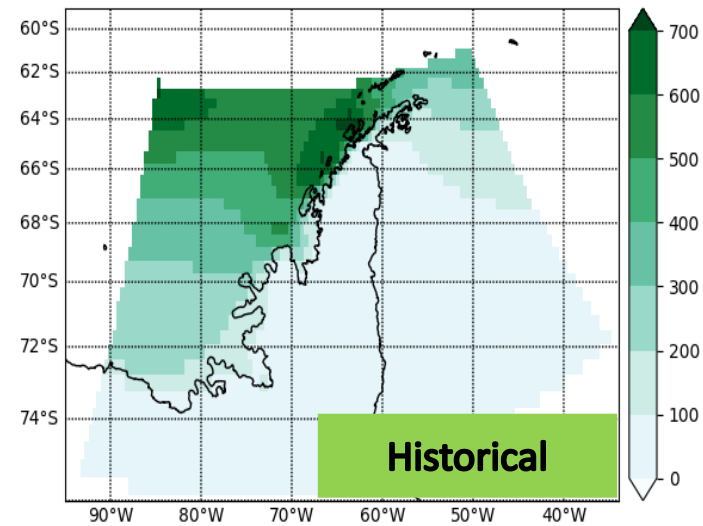
- Assessment of importance of rain and snow precipitation in Southern Ocean and the occurrence of extreme events over the Antarctic Peninsula region using high resolution climate downscaling. Analysis of historical precipitation extremes in downscaled ERA5 by RCM from Polar CORDEX within PolarRES
- High resolution PolarWRF modelling (9-3-1km) with two-moment microphysics parameterizations to compare with observations of precipitation during extreme events.

Climate characteristics assessments

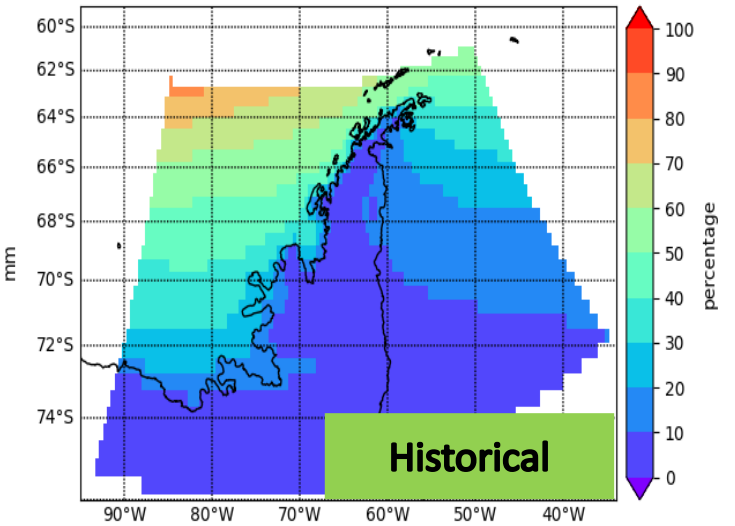
Previous studies are based on **Antarctic CORDEX Models' Ensemble (CMIP5)** for the RCP 4.5 and RCP8.5 for 2041-2060 and 2081-2100 periods. **Chyhareva & Krakovska (2022)**

- The highest rain annual amount is over the north-west coast of the Antarctic Peninsula (between Vernadsky and Rothera stations)
- Rain fraction of total precipitation will increase over the whole Antarctic Peninsula region
- Highest changes are projected for the region to the west of the Antarctic Peninsula Mountains

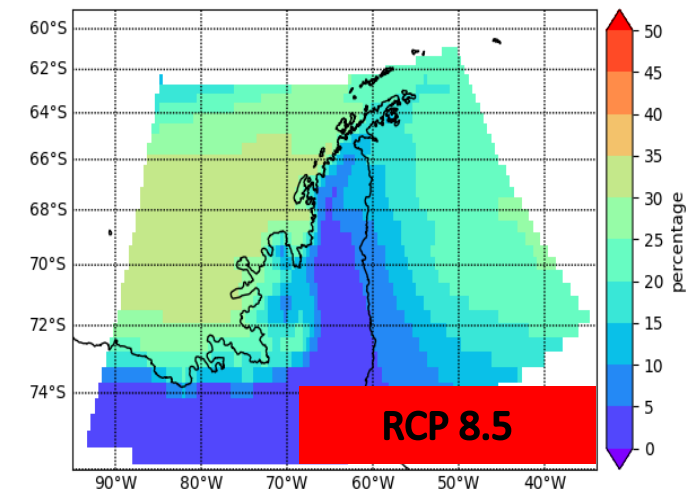
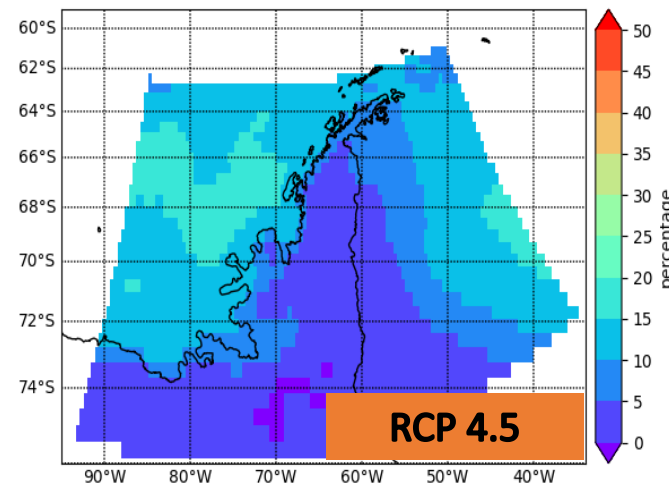
Yearly Liquid Precip Total



Fraction of Rain in Total Precip



Change of fraction of rain in total precipitation 2081-2100 vs 1986-2005

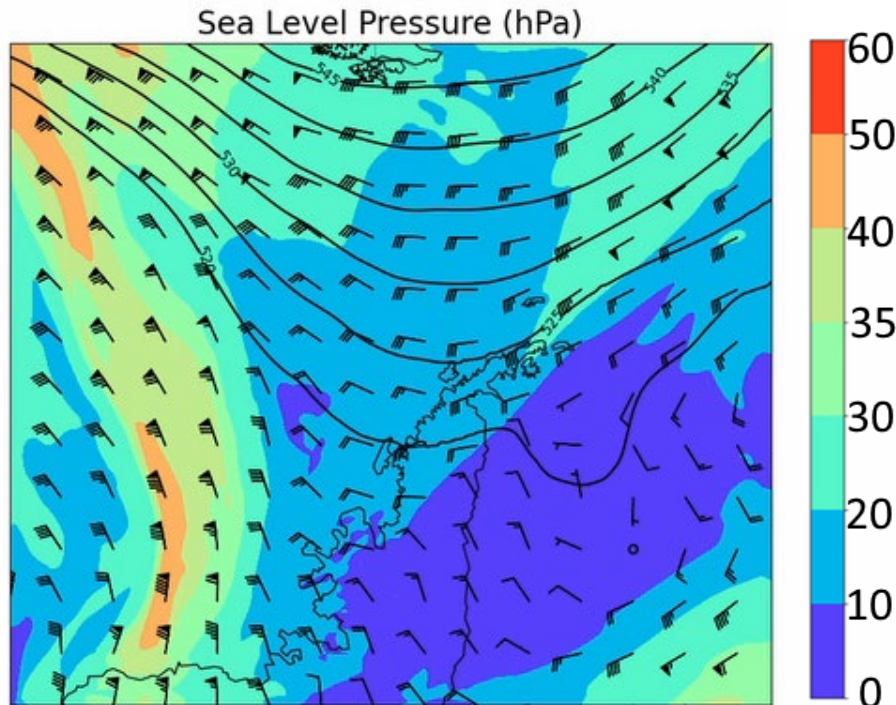


Regional high resolution weather modelling

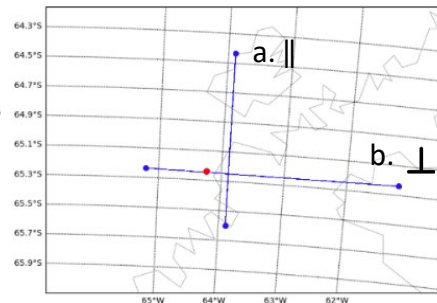
Tool that is used *The Weather Research and Forecasting (WRF) Model* is a state of art mesoscale numerical weather prediction system designed for both atmospheric research and operational forecasting applications.

Winter intense precipitation event

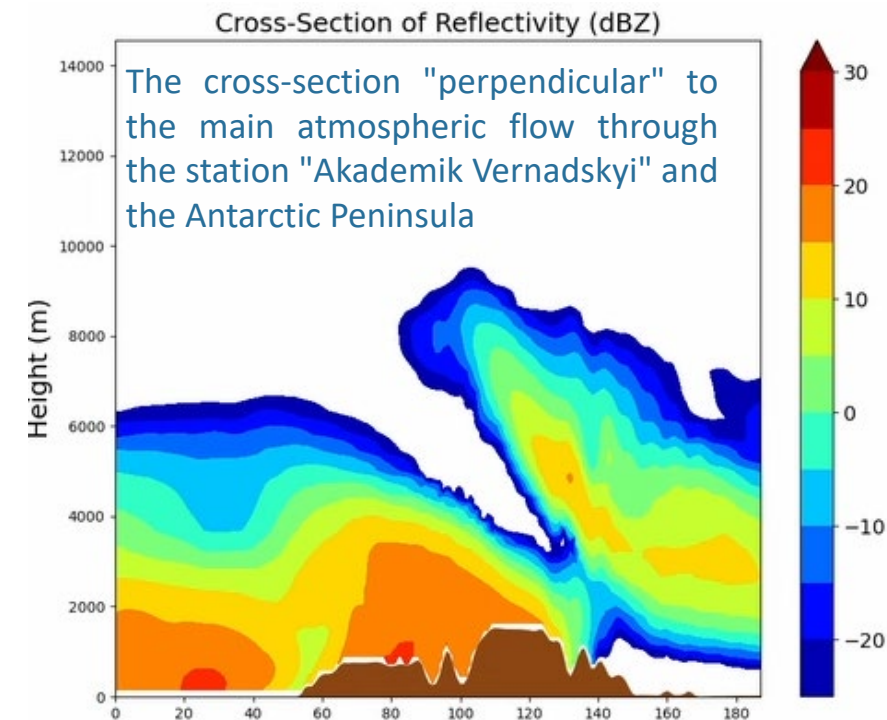
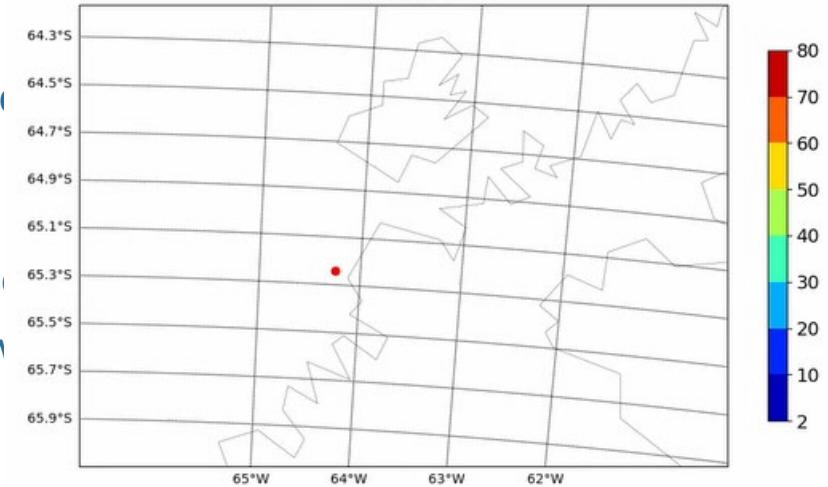
- The maximum intensity of precipitation at the Vernadsky station is up to 8 mm/h
- Formation of a deep cyclone in the Amundsen Sea with several centers of minimum values up to 940 hPa; associated with warm moist air intrusion;
- Maximum velocities at an altitude of 500hPa exceed 40 m/s.



WRF simulation data

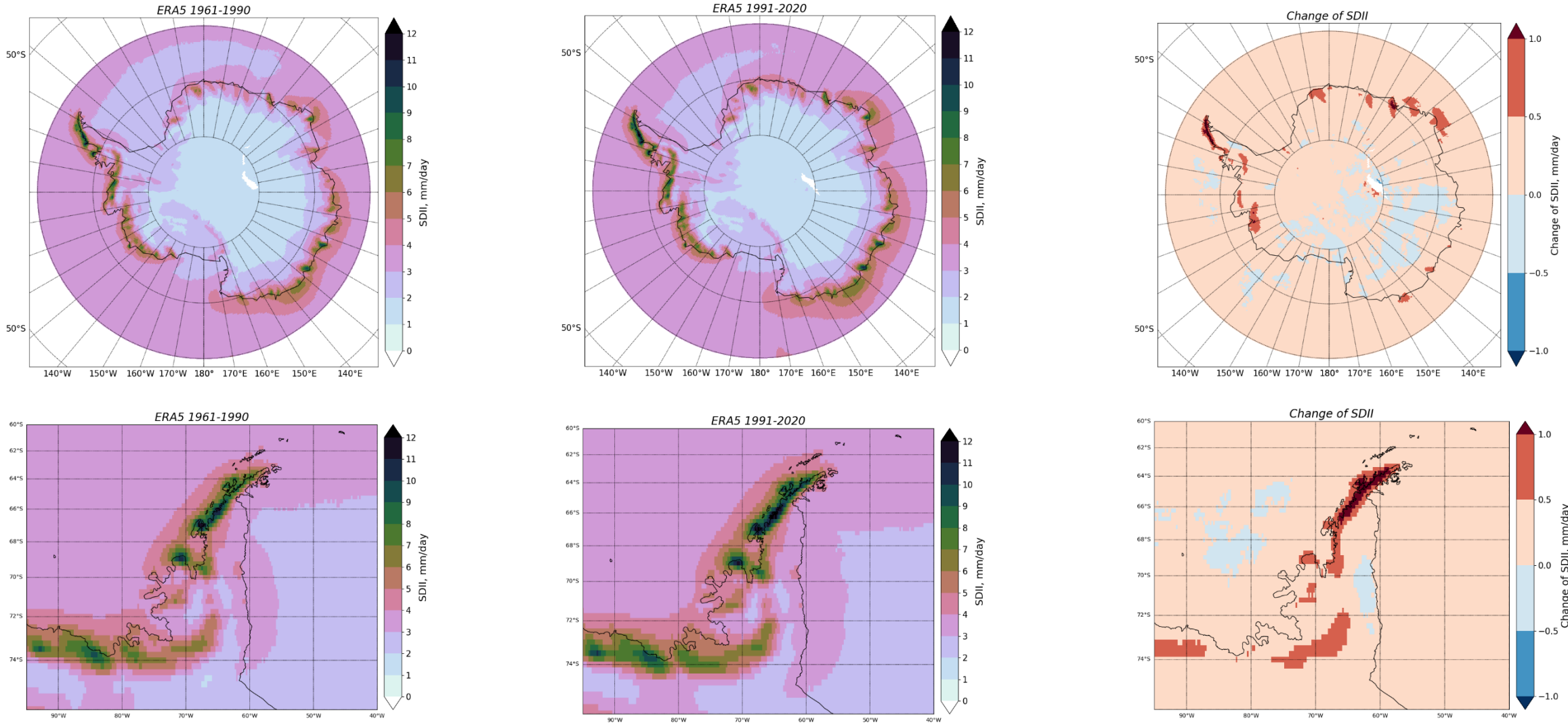


Accumulated runoff, mm



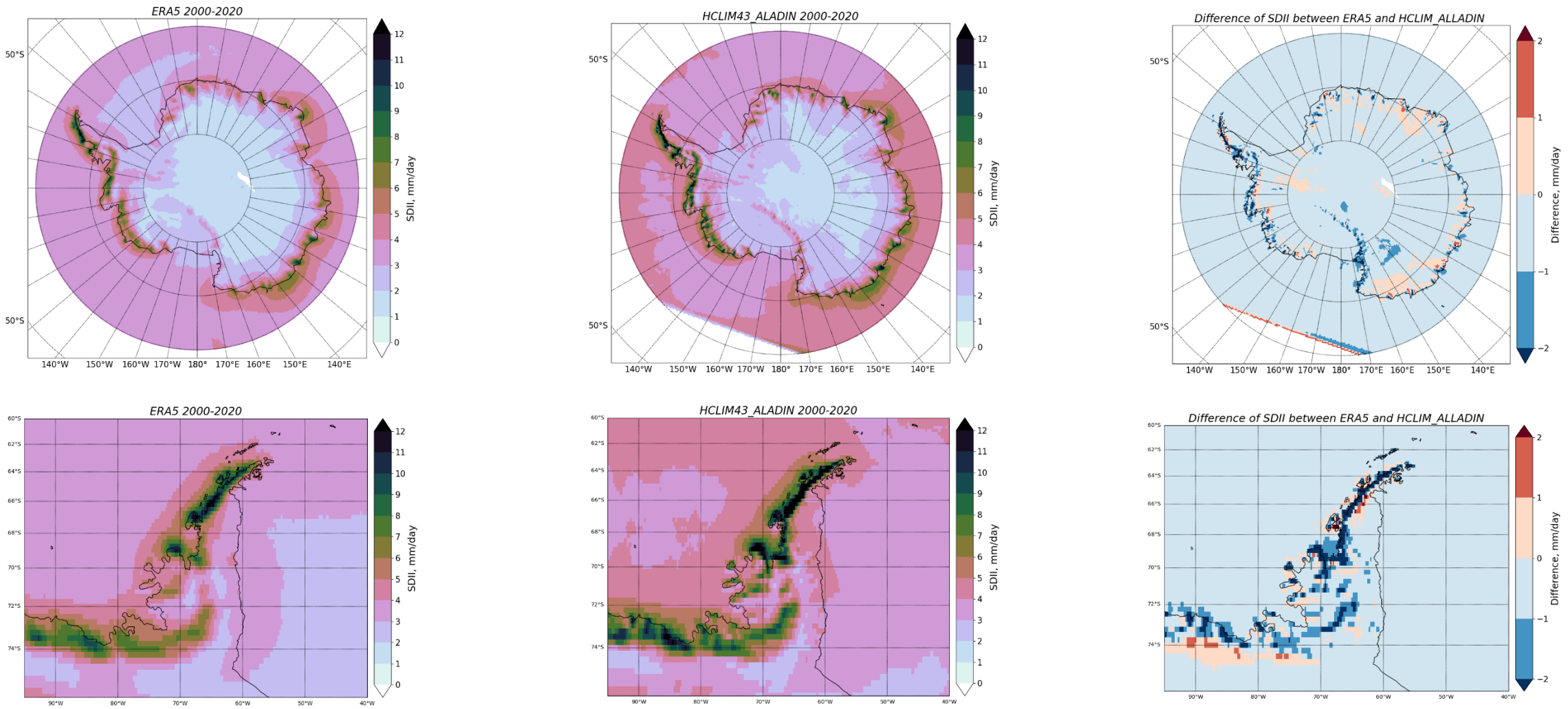
Study within OCEAN:ICE (since middle 2024)

Based on ERA-5 reanalysis data was assessed precipitation simple daily intensity index for 1961-1990 and 1991-2020 to examine region that possibly will be impacted the most by climate change



Study within OCEAN:ICE (since middle 2024)

Preliminary verification of **HCLIM_ALLADIN vs ERA5** made for precipitation SDII. Further analysis of ECA precipitation climate indices is planned for PolarRES RCMs ensemble.

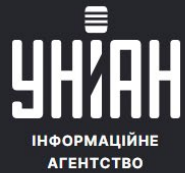


Summary and future plans

- Next Antarctic summer season - **field campaign in the region of Antarctic Peninsula**
- Based on gained observational data – **high resolution ocean and atmospheric modeling.**
- Assessment of precipitations, their type, intensity and impact on the sea ice will be divided in two parts: **climatological assessment and regional weather modeling.**
- ***ECMWF ERA5 Reanalysis*** will be used for the historical precipitation assessment. Preliminary examination of precipitation changes and their spatial distribution allow distinguish regions that will be impacted the most by climate change.
- ***CMIP6 Antarctic-CORDEX models ensemble*** will be used for the future projections analysis. Preliminary verification of HCLIM_ALLADIN has shown that the model overestimate precipitation amount with regard to ERA5. However further analysis of ensemble is required.

Our work packages

- **Work package 12 - Project management, data management, dissemination, communication, engagement**



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"Льодові таємниці": Україна долучилася до важливого дослідження

Лариса Козова 11:43, 07.05.24 ⌚ 4 хв. 👁 16422

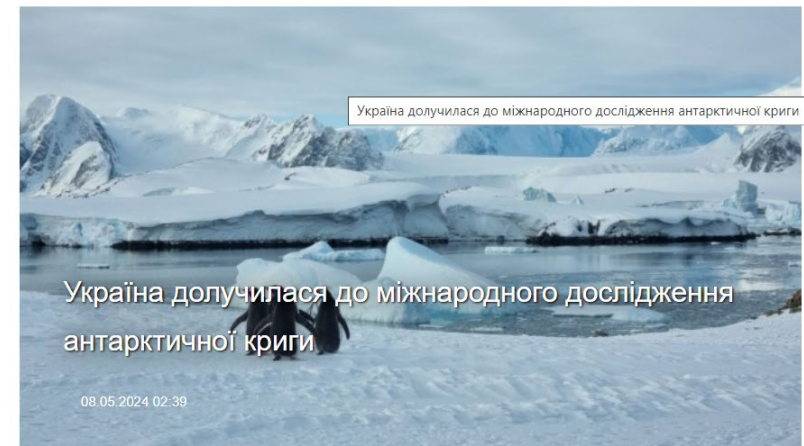
За допомогою спеціальних буїв вчені вивчатимуть напрямок і швидкість течії, температуру та солоність води на різних глибинах океану.



Головна Передплата Фотобанк Пресцентр Релізи Анонси Звіти

УКРІНФОРМ

Засновано у 1918 році



Our core team

- Evgen Dykyi, Director
- Yulia Kryvytska, Financial manager
- Viktor Komorin, WP 10 leader
- Anastasia Chigareva, WP 11 leader
- Svitlana Krakovska, WP 11 consultant
- Olena Marushevskya, WP 12 leader



Policy outreach

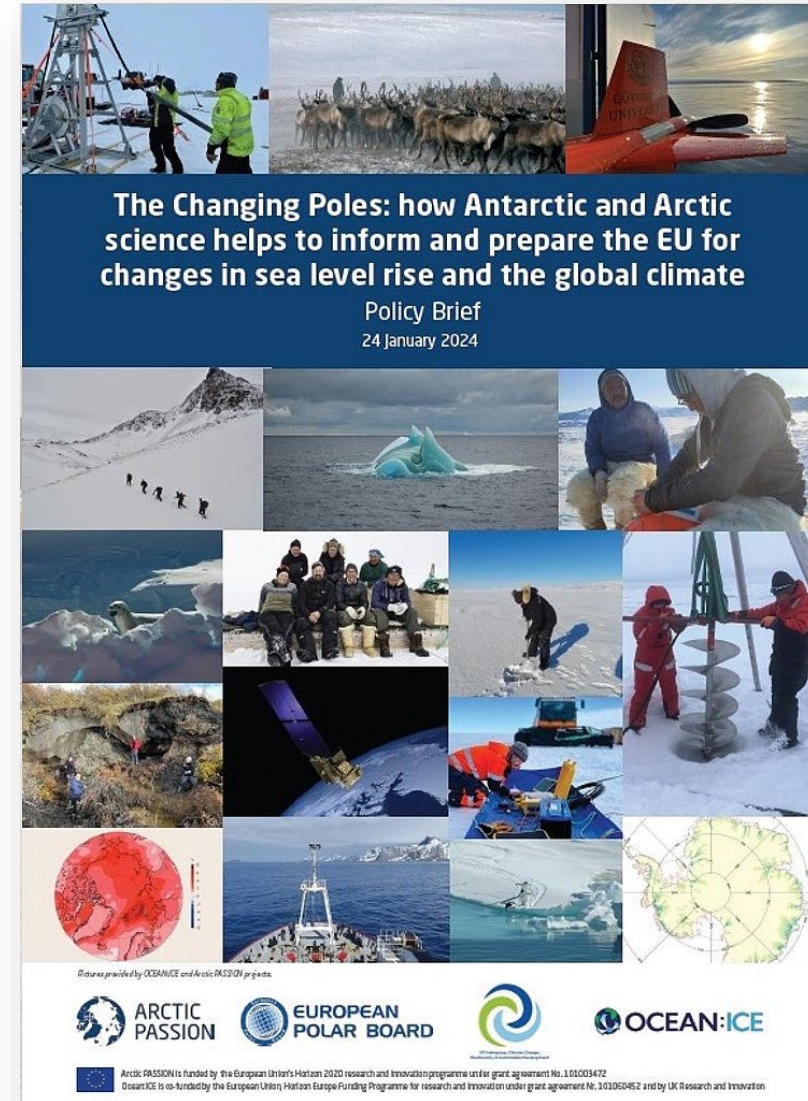
The EPB's role is to contribute expertise in coordination of European polar research, and between science and policy:

- Connecting with relevant clusters and projects: EU Polar Cluster, EU-PolarNet 2, All Atlantic Ocean Research Alliance (AANCHOR) and others.
- Dissemination of results via policy briefs and webinars.

Deliverable:	Due (month)	Update
9.6 Report on first Policy briefing	15	Finished
9.7 Report on second Policy briefing	45	To be done
9.8 Report on Webinar series	40	In process

Policy Briefing

- Organised by the EPB with assistance from the European Parliament Intergroup European Bureau for Conservation and Development (EBCD) on behalf of OCEAN:ICE and Arctic PASSION, hosted by MEP Urmas Paet
- 24th January 2024 at the European Parliament in Brussels
- Video recording: Policy Brief on Zenodo:



Webinars

- Organised by the EPB with OCEAN:ICE WP leads

Available on YouTube:



- OCEAN:ICE
Introductory Webinar
(23 March 2023)



- OCEAN ICE WP3 Webinar -
Antarctica: Ice Sheet Mass
Balance, Forcing and Dynamics
(27 June 2024)

