

# Call for Action

*Regime shift in Antarctic sea ice urgently demands comprehensive observational snapshot*

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Polar scientists are calling for urgent international action and commitment for the upcoming Antarctica InSync programme, a year-round observational campaign, as Antarctic sea ice is on track to a 2nd winter of extreme sea-ice deficit following from the one in winter 2023.

Arctic sea ice retreated drastically over the past two decades making it the “canary in the coalmine” of global warming. In contrast, Antarctic sea-ice extent remained relatively stable and even increased (2008–2014, known as the Antarctic paradox). However, variability has increased over recent years, first with low summer sea-ice extent, culminating in record low Antarctic sea-ice extent throughout most of the year 2023. The sea-ice area lost would rank as the 10th largest country in the world, which has major consequences for the Earth system. This loss is detrimental to ecosystems and biodiversity and affects numerous climate processes, including the oceanic overturning and increased glacial erosion, ultimately leading to global sea-level rise.

Earth is undergoing the 13th consecutive month of record high temperature. Particularly concerning is the substantial difference between the temperature of these last 13 months and the preceding temperature records. This considerable difference of recent global temperatures to the data record is a close analog to the recent dramatic year-round deficit of Antarctic sea ice compared to the record. Currently about 2.19 Million square kilometers of Antarctic sea ice are missing compared to the record, leading to major warm anomalies over parts of the Southern Ocean. There are too few observations, especially during the southern hemisphere winter, to provide a reliable outlook for the remainder of 2024. Similarly, models were not able to predict this recent sea-ice decline due to a lack of data and understanding.

To increase knowledge of the Antarctic and Southern Ocean coupled system, the United Nation’s Ocean Decade endorsed a year-round observational programme during 2027–2029, Antarctica InSync, which aims at conducting synchronous scientific observations across the Southern Ocean and Antarctica. The scientific community pools their efforts to understand some of the most pressing questions concerning the future of the Earth, in this unprecedented international collaboration. The programme aims to better understand, predict, and protect the Antarctic and Southern Ocean system as a whole by studying its heat and carbon budgets, the melting of the glacial ice shelves, the unique ecosystem, the anthropogenic footprint, as well as the rapid Antarctic sea-ice decline.

The polar scientists call for well-defined observational protocols and broad buy-in for the observational phase from all nations and subsequent research to step up our understanding of critical processes driving the observed decline of Antarctic sea ice and melting of the Antarctic ice shelves and their role within the coupled global climate system.

A multi-national design and coordination are required to ensure circum-Antarctic and year-round observations, and a joint research synthesis is needed to deliver robust and impactful outcomes. Effective integration of the full suite of observations from *in situ*, autonomous and remotely sensed methods will be essential, as well as early networking between observational and numerical modelling experts to agree on a basic set of sea-ice and other relevant observables to be obtained during individual Antarctica InSync initiatives. These will include Essential Climate Variables (ECVs) and provide a snapshot of the Antarctic sea-ice and land-ice regions at the time of rapid change, and will be critical to interpret future science including that to be conducted during the 5<sup>th</sup> International Polar Year in 2032/33.

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<https://www.antarctica-insync.org>; <https://oceandecade.org/actions/antarctica-insync/> & <https://oceandecade.org/news/one-planet-polar-summit-new-ocean-decade-programme-announced-for-antarctica/>

