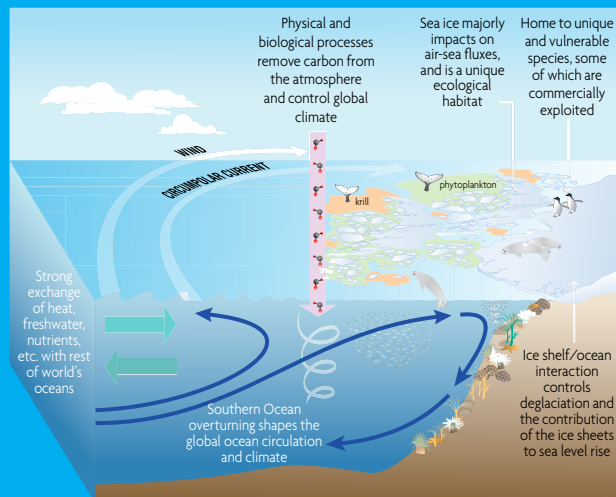


Why do we need SOOS?

The Southern Ocean influences climate, sea level, biogeochemical cycles and biological productivity on a global scale. Many of the most difficult and pressing issues faced by society – mitigation and adaption to climate change and sea-level rise; managing the effects of ocean acidification; conservation of marine resources and biodiversity – cannot be addressed without an improved understanding of Southern Ocean processes, feedbacks and their sensitivity to change. The Southern Ocean Observing System (SOOS) provides the sustained, integrated, multi-disciplinary observations required to meet these challenges.



Mission

SOOS is an international initiative to coordinate and expand the efforts of all nations that gather data from the Southern Ocean. SOOS is developing a coherent and efficient observing system to deliver the observations required to address key scientific and societal challenges.

SOOS will

- Design and implement a comprehensive and multi-disciplinary observing system for the Southern Ocean
- Advocate and guide the development of new observation technologies
- Unify current observation efforts and leverage further resources
- Effectively integrate and coordinate national and international projects and programmes, across traditional disciplinary boundaries and between nations
- Facilitate and develop a data system that provides seamless access to essential data products for the Southern Ocean.



SOUTHERN OCEAN OBSERVING SYSTEM

The full SOOS Initial Science and Implementation Strategy is available on the SOOS website

www.soos.aq

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SOOS

SOUTHERN OCEAN
OBSERVING SYSTEM

Coordinating and enhancing
global Southern Ocean observations

SOOS will focus efforts on collecting data that will address the six most compelling scientific and societal challenges that relate to the Southern Ocean:

1

The role of the Southern Ocean in the planet's heat and freshwater balance



Substantial uncertainty exists with regard to Southern Ocean contributions to the global heat and water cycles, the sensitivity of these to climate change and variability, and the global impact of any changes. In addition to air-sea fluxes of heat and water and their movement within the ocean, freshwater fluxes from melting sea ice and ice shelves need to be comprehensively measured into the future.

4

The future and consequences of Southern Ocean carbon uptake



There is urgent debate concerning the future uptake of carbon by the Southern Ocean in a changing climate. Air-sea carbon flux measurements, and full water column sections of carbon, oxygen, nutrients and physical variables are needed to track the evolving inventory of anthropogenic CO₂. Further, the uptake of carbon by the ocean results in acidification and changes in carbonate chemistry, and sustained ocean observations are required to determine the biogeochemical and biological consequences of these.

2

The stability of the Southern Ocean overturning circulation



The Southern Ocean overturning circulation exerts a strong control on global biological productivity and carbon cycling, and changes in circulation strength have been linked to changes in the ocean uptake and release of CO₂. Sustained observations of temperature, salinity, stratification and ventilation are needed to detect changes in the overturning in response to changes in atmospheric forcing. Observations must span the entire water column, and need to include a range of geochemical and biogeochemical tracers in addition to physical measurements.

5

The future of Antarctic sea ice



Sea ice influences climate through its contribution to the freshwater balance, water mass formation, albedo, and modulation of air-sea exchanges of heat and gases. It also provides important habitat for Antarctic organisms and influences ocean productivity. Strong regional changes have been detected, and models predict a future decline in sea-ice extent and volume. A sustained observing system for Antarctic sea ice will rely heavily on remote sensing, with in situ observations for validation and algorithm development in addition to process studies.

3

The role of the ocean in the stability of the Antarctic Ice Sheet and its future contribution to sea-level rise



There is great uncertainty in defining the contribution of the polar ice sheets to future sea-level rise. Basal melting of ice by warming ocean waters will play a key role in determining the future behaviour of ice sheets and glaciers buttressed by floating ice shelves. Sustained observations of ocean temperatures near the ice shelves are needed to assess basal melt rates, and salinity and stable isotope measurements are needed to detect meltwater input and its impact on ocean stratification.

6

Impacts of global change on Southern Ocean ecosystems



A better understanding of the impact of global change on Southern Ocean ecosystems is essential. Our ability to predict changes in marine resources and biodiversity, assess ecosystem resilience, and determine feedbacks between food webs and biogeochemical cycling depends on sustained, integrated observations of key physical, chemical and biological parameters. Studies of predator species not only reveal “hot spots” of foraging activity, but also changes in foraging and demographic parameters, reflecting changes in lower trophic levels that are difficult to observe directly.