

Dr Jessica Melbourne-Thomas

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Dr Jess Melbourne-Thomas is a Research Scientist with the Australian Antarctic Division and a Project Leader with the ACE CRC. She uses mathematical models of marine ecosystems to understand how these systems function and how they might respond to climate change and other human activities. She is highly engaged in the translation of science into decision-making.

Jess is a Lead Author on the IPCC's Special Report on the Oceans and Cryosphere in a Changing Climate. She was named one of Australia's 30 Superstars of STEM in 2017 and Tasmania's Young Tall Poppy of the Year in 2015 for her excellence in research, science communication and policy engagement. She was a Rhodes Scholar at the University of Oxford from 2003-2005.



Professor Nathan Bindoff

Professor of Physical Oceanography

Head, Oceans and Cryosphere Program, IMAS, Australia

Nathan is physical oceanographer, specializing in ocean climate and the earth's climate system, with a focus on understanding the causes of change in the oceans. He was the coordinating lead author for the ocean chapter in the Inter-Governmental Panel on Climate Change Fourth Assessment Report and Fifth Assessment reports. Nathan and colleagues documented some of the first evidence for changes in the oceans in the Indian, North Pacific, South Pacific and Southern Ocean's and the first evidence of changes in the Earth's hydrological cycle from ocean salinity. His most recent work is on documenting the decline in oxygen content of the oceans and dynamics of the Southern Ocean. He also leads the award winning on climate futures program and its impacts of climate change on Australian climate, in particular, on extreme temperatures, rainfall, runoff, agriculture and ecosystems. He has published more than 115 peer reviewed papers and more than 44 reports.



Changing ecosystem forces on Southern Ocean biota

Jess Melbourne-Thomas, Nathan Bindoff

Understanding how environmental change drives biological change in the oceans provides a basis on which to relate high level strategic policy (e.g. on emissions targets) to tactical decision making (such as fisheries management). Under climate change, there is likely to be increased pressure on marine living resources in the Southern Ocean because of

displaced fishing effort in other regions, and a need to meet global food demand. While there is some evidence that productivity will increase at high latitudes in the Southern Ocean (south of 65°S), interacting physical and chemical drivers mean that there is a broad range of plausible futures for target species populations, the foodweb, and the ecosystem generally. This range of plausible outcomes translates to increased risk for ecosystem services, which needs to be addressed in policy making.

In this presentation we summarize current knowledge on physical, chemical and biological change, including timeframes for change and the likelihood that critical thresholds might be exceeded. We also describe the aims of the IPCC's special report on the oceans and cryosphere in a changing climate that is currently being prepared, including the assessment of ecosystem and potential policy responses to environmental change.



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