



Australian Government



THE PRIME MINISTER'S
PRIZES FOR SCIENCE

DR ADELE MORRISON

AUSTRALIAN NATIONAL UNIVERSITY

2022 MALCOLM MCINTOSH PRIZE FOR PHYSICAL SCIENTIST OF THE YEAR

Dr Adele Morrison is a physical oceanographer and ocean modeller. She is recognised globally for her investigations into the impact of changing ocean conditions on sea level rise and climate.

She uses high-resolution ocean models to understand what drives ocean circulation and how small-scale ocean processes – such as swirling currents known as eddies – impact climate and sea level.

Ocean warming is currently the primary factor driving Antarctic ice melt. A key focus of Dr Morrison's work is to understand how Antarctica is affected by the surrounding ocean circulation, given it is the largest ice sheet on the planet.

Dr Morrison's research explores how warm ocean currents in the Southern Ocean are contributing to the melting of the Antarctic ice sheet and rising sea level. Rising sea levels caused by the melting of the continent's ice sheets could raise global sea levels by up to 30 centimetres by the end of this century.

The ocean around Antarctica is a challenging region to observe due to its location, but it is crucial to accurately projecting rising sea level and our ability to mitigate and adapt to climate change.

Dr Morrison's high-resolution modelling has furthered our understanding of the complex system of ocean circulation around Antarctica, reducing the uncertainty of sea level rise predictions. This is hugely significant for Australia, where 85 per cent of the population live in areas that may be affected by rising sea levels during the next century.

Dr Morrison has also contributed to our understanding of how ocean circulation in the Southern Ocean region impacts the Earth's climate system.

The Southern Ocean absorbs large amounts of heat and carbon from the atmosphere. It helps control the rate at which the Earth's climate changes in response to global warming and greenhouse gas emissions. This is due to a process called upwelling, which causes cold, deep waters to rise to the surface of the ocean around Antarctica. This cooler water has the capacity to take up a large amount of heat from the atmosphere and thus limit atmospheric warming.

Dr Morrison's research into upwelling has helped unravel the complex dynamics of ocean circulation and how upwelling and ocean heat uptake will be affected by climate change.

Dr Morrison is a role model for all women in science, balancing parenthood with a flourishing career in her field.

Career highlights

- 2021-2022 Program Leader, Australian Centre for Excellence in Antarctic Science
- 2021-2022 Chief Investigator, Consortium for Ocean-Sea Ice Modelling in Australia
- 2020 Fellowship and grant recipient, L'Oréal-UNESCO For Women in Science program
- 2020-2022 International Ocean Model Development Panel Member, World Climate Research Program
- 2018 Meyers Medal, Australian Meteorological and Oceanographic Society
- 2014 Uwe Radok Award, Australian Meteorological and Oceanographic Society
- 2005 University Medal in Physics, the Australian National University