

Associate Professor Matthew England is an oceanographer and climate scientist who has been examining global-scale ocean circulation and its influence on regional climate in time-scales of seasons to centuries. As the recent recipient of a Federation Fellowship for elite researchers, much of his current work will focus on how Australia's climate is affected by the Southern and Indian Oceans.

Matthew England (*BSc (Hons) '87, PhD '92 Syd*) has always been a keen surfer and swimmer. His undergraduate degree was based around maths, physics and chemistry, but much as he was passionate about science, he had no clear vocational direction until chance delivered a revelation. "I literally stumbled across a new course in a handbook – physical oceanography. I hadn't even realised that there was a profession behind such a study," said Matthew England.

After spending his honours year looking at the El Niño Southern Oscillation, the best known example of how the oceans affect climate, Matthew was pleasantly surprised to find that his new area of research involved a great deal of travel and research cruises, as well as the joy of discovery.

Oceanography is a relatively young science, with few studies predating 1900. It wasn't until the early 1970s though, when an El Niño event was linked to the grounding of the Peruvian fishing fleet, that great interest was sparked in the fundamental role of the oceans in the world's climate system.

"El Niños have been around for thousands of years, regulating our climate long before people made the connection with warmer water and fewer fish. This was a particularly significant El Niño however, and with the advent of more advanced observing systems which could capture the global climate for the first time, people began to realise that

dramatic temperature changes in the Pacific had an enormous impact on climate and fisheries.

"During the 1980s, countries with an interest in El Niño focused on the tropical Pacific Ocean. Then from 1990 to 2002, the groundbreaking World Ocean Circulation Experiment (WOCE) was

Matthew England

conducted to measure the global ocean circulation in its entirety, and to obtain a baseline dataset against which future change could be assessed.

"Climate change is now uppermost in people's minds. We're facing serious increases in greenhouse gases and it's projected that storms and cyclones will be more intense. Even if that's the only change, it will have a devastating impact. On top of storms there are likely to be problems with droughts and rising sea levels."

Australia is surrounded by the Indian, Pacific and Southern Oceans and for the past 15 years, Matthew England has maintained a strong focus on the Southern Ocean which, unlike the Pacific and Indian Oceans, has remained poorly understood despite its potentially large impact on Australia's climate. During his PhD, Matthew began looking at simulations of the Southern Ocean and has since spent much of his research working to improve them to the point

where they now reproduce the Southern Ocean remarkably well, offering a greater capacity for climate change prediction.

Matthew England was also the first oceanographer to use measurements of chlorofluorocarbons (CFCs) to assess global climate models, resulting in last year's Australian Academy of Sciences Frederick White Prize.

More recently, he and his team have been looking at the role

of the Indian Ocean in controlling West Australian rainfall. They have established a pattern of sea temperature over the Indian Ocean that characterises extreme wet and dry years over the southwest region of Western Australia.

"We'll now extend this study to the coastal fringe of the whole of southern Australia. This is a big project, but with support from the ARC and the University, the research team involved will grow to 15 or 20 people. These climate research projects involve so much work that without a team of this size, they simply wouldn't happen."

Note: See also *Question: Research @ UNSW Issue 4, p19* for more of Matthew England's work.

FUNDING

Australian Research Council, Australian Antarctic Science Program, UNSW.