



Media Release

18 February 2008
Ref 08/24

Antarctic route highlights new ocean-climate links

A Hobart-Antarctic shipping route has generated the longest continuous record of temperature and salinity changes in the Southern Ocean for scientists studying how the ocean controls global climate.

Called *SURVOSTRAL* (*Surveillance of the Ocean Austral*), the joint Australian-French-US program has produced a 15-year dataset based on readings taken by the volunteers and crew of the 65-metre French ship, *L'Astrolabe*, on regular voyages between Hobart and the French base at Dumont D'Urville.

"*SURVOSTRAL* has given us a foundation for much of what is known about the way the ocean in this inhospitable and difficult-to-access region controls global climate," says the Program's Australian leader, CSIRO scientist Dr Steve Rintoul, from the Wealth from Oceans National Research Flagship and the Antarctic Cooperative Research Centre. "A record of 15 years along the same route may appear short but already that is an incredibly valuable resource."

The *SURVOSTRAL* research program involves scientists taking surface salinity and temperature measurements to a depth of 700 metres along the 2,700 kilometre, six-day route. A specially designed onboard laboratory also samples the ocean surface to identify how the ocean controls carbon dioxide and is part of the sister program, MINERVE. Programs like *SURVOSTRAL* are a key part of a strategy to observe the Southern Ocean and the largest ocean current in the world – the Antarctic Circumpolar Current (ACC).

L'Astrolabe departs this evening for its fifth voyage of the season. Research highlights include:

- The first description of how the Southern Ocean changes with the seasons, with insights into the formation of Southern Ocean water masses involved in the global overturning circulation;
- The first measurements of year-to-year changes in the ACC;
- New insights into the complex frontal structure of the ACC, including a demonstration that movements of the fronts drive changes in sea surface temperature, with possible feedbacks to the atmosphere;
- Temperature measurements revealed that the sea-level rise observed south of the polar fronts is due to deep subsurface warming, possibly linked to large-scale wind shifts;
- Repeated, high-resolution measurements of carbon dioxide and phytoplankton. The simultaneous measurements of physical, chemical and biological distributions collected by the *SURVOSTRAL* and MINERVE programs are helping to determine how much carbon dioxide is being absorbed by the Southern Ocean, and how this 'sink' may change in the future;
- A comparison of recent phytoplankton observations with measurements from the 1970s have revealed that warm water species are now found further south, consistent with warming of the Southern Ocean during this period.

Participating research agencies are CSIRO's Wealth from Oceans Flagship and the Antarctic Cooperative Research Centre, the French Polar Institute IPEV, the French oceanographic laboratory LEGOS, and the Scripps Institution of Oceanography.

Nearly 40 scientific papers are in press or have been published in the past 10 years that cite or are based directly on results from SURVOSTRAL research. The program links to the recently established Integrated Marine Observing System, based at the University of Tasmania and is partly-funded by the Australian Climate Change Science Program. The Wealth from Oceans Flagship is part of the National Research Flagships program initiated by CSIRO to provide science-based solutions in response to Australia's major research challenges and opportunities.

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