

## SDSC Scientist Investigates How Drifting Icebergs Impact Global Warming

*Multi-institution Study Focuses on Antarctic Peninsula's NW Weddell Sea*

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San Diego Supercomputer Center scientist John Helly is set to study the influence of free-drifting icebergs on global warming trends. Comprised of 11 scientists from six institutions, the team will use advanced technology, combined with standard oceanographic sampling, to determine the iceberg sphere of influence based on a diverse set of physical, chemical and biological factors. This information will then be broadened in scale, giving researchers a better understanding of how these floating "islands" might influence global climate changes.

"The disappearance of ice shelves on the Antarctic Peninsula in the recent past has been a striking change," explained Helly. "When these ice shelves collapse, they create free-floating icebergs, especially in the area known as 'Iceberg Alley' in the Weddell Sea. By studying the geometrical, physical and biological properties of individual icebergs and correlating this information with regional and global-scale measurements from satellites, we hope to understand how these changes will affect the highly biologically productive Southern Ocean."

As opposed to icebergs frozen from seawater, continentally derived icebergs carry with them inorganic materials from the rock ground up within them as they make their way to the sea as glaciers. Once released, they develop their own biota. This occurs because the icebergs are so large that they act effectively as islands with entire food webs from algal mats on the underside to bird and mammal life on their surface and surround. As they melt, they deliver their contents, including fresh water, to the surface waters. This interaction is not well understood, but seems to be associated with blooms of chlorophyll, based on satellite imagery, suggesting an enhancement of biological productivity in association with the icebergs. There is also some evidence that these waters can affect the ocean-atmospheric heat exchange and this is important to global circulation.

The grant awarded to Helly, and his inter-disciplinary colleagues is headed by Principal Investigator, Ken Smith, at Scripps Institution of Oceanography. This funding will allow them to explore the structure, origin and history of these icebergs while answering questions about the relationships between the icebergs and the physical, chemical environment of the surrounding water column and the structure of the surrounding pelagic community.

This information will be collected using the SIOExplorer-in-a-Box digital library system ( <http://SIOExplorer.ucsd.edu> ). Helly will operate onboard the R/V Laurence M. Gould ( <http://www.polar.org/science/marine/lmg/> ) then transfer to the collections already stored at SDSC as part of the SIOExplorer data holdings. The data will provide the basis for visual modeling of the icebergs, using the new Synthesis Center at SDSC, and the beginning of a more general model of the overall impacts of iceberg melting in the Weddell Sea running on Teragrid resources.

"Information about organisms associated with icebergs has been limited because icebergs are difficult and dangerous to study," said Helly. "But it's critical that we gain an understanding of these communities given the increasing frequency of floating ice in the Southern Ocean over the past decade."

Helly's colleagues include scientists from the Scripps Institution of Oceanography, Woods Hole Oceanographic Institution, University of California, Irvine, Desert Research Institute, Monterey Bay Aquarium Research Institute, Moss Landing Marine Laboratories, San Jose State University and the University of California at San Diego. For more information, contact Dr. Helly.

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