NASA co-sponsors ocean voyage to probe climate-relevant gases

by Stephen Cole

WASHINGTON - More than 30 scientists will embark next week on a research mission to the Southern Ocean. Researchers will battle the elements to study how gases important to climate change move between the atmosphere and the ocean under high winds and seas. NASA, the National Oceanic and Atmospheric Administration (NOAA), and the National Science Foundation are sponsoring the Southern Ocean Gas Exchange Experiment, a six-week research expedition aboard the NOAA ship Ronald H. Brown, departing Feb. 28 from Punta Arenas, Chile. The Ronald H. Brown is a state-of-the-art oceanographic research platform and the largest research vessel in the NOAA fleet.Scientists from dozens of universities and research institutions plan to measure turbulence, waves, bubbles, temperature and ocean color, and investigate how these factors relate to the air-sea exchange of carbon dioxide and other climate-relevant gases. The research will help improve the accuracy of climate models and predictions. The world's oceans are estimated to absorb about 2 billion metric tons of carbon from the atmosphere every year, which is about 30 percent of the total annual global emissions of carbon dioxide. Scientists know higher wind speeds promote faster exchange of gases, but there have been very few studies aimed at directly measuring these exchanges under real world conditions where other factors, such as breaking waves, can influence the process."NASA's ongoing effort to understand the global carbon cycle will benefit from the data this cruise will produce about the mechanisms that govern gas transfer in this remote part of the world's ocean," said Paula Bontempi, manager of NASA's ocean biology and biogeochemistry research program at NASA Headquarters in Washington. "NASA's global satellite observations of ocean color that reveal so much about the health of our oceans also will be improved in this region as we validate what our space-based sensors see with direct measurements taken at sea."

NASA's Aqua satellite makes ocean color observations over the Southern Ocean every few days with the Moderate Resolution Imaging Spectroradiometer. The satellite, launched in 2002, uses six instruments to make global measurements of the atmosphere, land, oceans, and snow and ice cover.The Southern Ocean covers a vast area and has some of the roughest seas on Earth. "It is the largest ocean region where the surface waters directly connect to the ocean interior, providing a pathway into the deep sea for carbon dioxide released from human activities," said Christopher Sabine, an oceanographer at NOAA's Pacific Marine Environmental Laboratory, Seattle, and co-chief scientist on the cruise. "Understanding how atmospheric carbon dioxide is absorbed into these cold surface waters under high winds speeds is important for determining how the ocean uptake of carbon dioxide will respond to future climate change.""We will be directly assessing the rate and mechanism by which the ocean is taking up carbon and releasing it," said cruise co-chief scientist David Ho of Lamont-Doherty Earth Observatory of Columbia University, Palisades, N.Y. "This is the first U.S.-led effort to use all the state-of-the-art tools that we have to quantify gas exchange in the Southern Ocean. After years of planning, it is extremely satisfying to see the experiment finally take place."