MEETING

The Rising Pulse of the Atmosphere

Variability of the Global Atmospheric Circulation During the Past 100 Years; Monte Verità, Switzerland, 15–20 June 2008

PAGE 516

Understanding atmospheric circulation is fundamental not only to accurate weather prediction. Climate change leads to, proceeds through, and can be detected by changes in atmospheric circulation. Seasonal to interannual prediction means reproducing large-scale circulation responses. Progress in assessing climate change effects and climate prediction requires documenting and modeling the past variability of atmospheric circulation—and stringently comparing models with observations. The past 100 years, which reflect a range of forcings (both natural and anthropogenic) and different variability timescales, are ideal for testing our understanding.

A recent workshop in Switzerland addressed the variability of global atmospheric circulation (for more information, see http://www.iac.ethz.ch/groups/broennimann/workshop2008; selected contributions will be published in 2009 in *Meteorologische Zeitschrift*). The workshop highlighted the advances and challenges in documenting atmospheric variability. Different sets of observations and reanalyses do in fact differ in their large-scale energy flow even in the satellite era. At the same time, newly available historical reanalyses and reconstructions now allow studying global three-dimensional circulation variability back into the nineteenth century.

Several talks focused on extratropical circulation variability, which is often addressed in terms of variability modes. While useful as statistical simplification, the physical meaning of these modes is often debated. Workshop participants discussed whether it makes sense to predict variability modes or to calculate their contribution to climate trends. For example, the strong trend in the winter North Atlantic Oscillation, between around 1965 and 1995, has since reversed, and its contribution to climate trends correspondingly has faded. There are physical arguments for the existence of modes, but further progress requires bridging the gap between the timescales of weather and climate, workshop attendees agreed.

The difficulty of distinguishing physical and statistical manifestation also holds for multidecadal oceanic modes (e.g., the Atlantic Multidecadal Oscillation), which are important for climate prediction and analysis, because they interfere with the "greenhouse timescale." For instance, multidecadal modes might play a role in the Arctic, which experienced pronounced warmings from 1910 to 1945 and from the 1970s to the present. Both periods featured strong yet different circulation anomalies, suggesting different mechanisms, workshop speakers related.

The tropical circulation, especially El Niño–Southern Oscillation (ENSO), has global impacts that might affect trends. Methods to remove ENSO's signal from climate records were presented. How does global warming imprint itself on the circulation over the tropical Pacific? Participants showed that it does so in the form of a weakening Walker circulation and, perhaps, changing teleconnections. The Indian monsoon seems to have "lost" its relation to ENSO in recent decades, although there is little evidence for changing teleconnections to the extratropics. Model results suggest a future strengthening of ENSO effects in the North Atlantic sector.

Several presentations featured the Atlantic Ocean as a source of potential interannual to decadal predictability. Tropical Atlantic influences were found for droughts in North America, Europe, and the African/Indian monsoons. Is this a new trend or cold coffee? One hundred years ago, W. N. Shaw (The pulse of the atmospheric circulation, *Nature, 73*, 175–177, 1905) raised the question of "whether there is any definite and, shall I say, useful connection between the pulsations of the south-east trade wind [over the tropical Atlantic] and the rainfall in north-western Europe." Atmospheric scientists should finally tackle these questions—the pulse of the atmosphere is rising.

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BOOK REVIEW

Chasing Science at Sea: Racing Hurricanes, Stalking Sharks, and Living Undersea With Ocean Experts

Ellen Prager
University of Chicago Press; 2008; xv + 162 pp.; ISBN 978-0-226-67870-2; $22.50

PAGE 517

Ellen Prager's new book, *Chasing Science at Sea*, is a personal account of why fieldwork is so important in many areas of ocean science, and how exciting that fieldwork can be. Prager has interwoven her own story of studying carbonates at the interface between biology and geology with stories from friends and colleagues. Storm stories and up-close-and-personal encounters with ocean creatures such as reef squid, marine iguanas, and whales abound. Throughout the book, she emphasizes the idea that the combination of observations and serendipity plays a critical role in science, and she gives examples of where this combination has led to especially important discoveries (e.g., that of hydrothermal vent organisms).

It is difficult not to feel the enthusiasm in the stories Prager tells. Many deal with the challenges of working at sea and of overcoming obstacles to collecting samples and data. The forces of nature loom large in the stories. While they focus largely on marine biology, they illustrate the types of obstacles that all ocean scientists might face. One chapter deals particularly with the usefulness of underwater habitats and describes some of the history of their development. The chapter focuses on the U.S. National Oceanic and Atmospheric Administration's Aquarius Reef Base undersea research station in the Florida Keys, where Prager is chief scientist, on how useful the station has been in studies requiring many hours of scuba observation, and on how Aquarius has captured the public's imagination.

One thing that does not work so well in the book is the photographs. They are grainy black and white, and sometimes it is hard to see what is going on. Part of the reason that many of the photos are of poor quality may be because they are old and were not taken for publication, but they do illustrate the stories being told. Still, I wish some of them could have been clearer and brighter.

Prager concludes her story with a discussion of how the oceans are changing due to man's impact, and the importance of scientific research to understanding how these changes will affect our lives. She bemoans