Making the Ocean a Quantitative Science

Bruce Cornuelle
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CURRENT RESEARCH

Combining oceanographic models with data for more accurate predictions

Within the scientific community, there is a great deal of modelling occurring around the world, from climate and weather models to oceanographic models, all of which are designed to make useful predictions of future events. Both meteorology and oceanography are transitioning from an "art," where experienced scientists can predict what will happen better than computers, to a science, where the equations that determine the behavior can be solved on a computer for better understanding and testing. These models have become much better over the past 20 years and are increasing in accuracy, but the possibility of useful atmospheric forecasts beyond a week or two is still under study. Dr. Bruce Cornuelle is dissecting and analyzing oceanographic models to identify their flaws and improve them so that they may be used to make accurate predictions at ranges longer than a few weeks. Whereas the atmosphere has a "short-term memory" because minor disturbances can have great effects down the road (Butterfly effect), the ocean moves much more slowly and has a longer memory. The oceans store most of the heat that the earth receives from the sun, and can move that heat around the world, possibly exerting tremendous influence over global climate and weather. The ability to predict events quantitatively on a longer time scale would be extremely valuable, with applications in a number of fields and disciplines. Suppose, for example, that we could inform farmers in the midwest that they can expect a drought in the upcoming months, or, conversely, excess rain. This information could let them plant crops consistent with the expected rainfall, and could enable reservoir management to save water for droughts or...

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AFFILIATION

University of California, San Diego

EDUCATION

- Ph.D., in Physical Oceanography (Joint Program), 1983,Massachusetts Institute of Technology - Woods Hole Oceanographic Institution
- B.A., in Physics, 1978,Pomona College

AWARDS

- Acoustical Society of America Medwin Prize for Acoustical Oceanography, Fellow, ASA Editor's Citation for Excellence in Refereeing (JGR Oceans), 2007
- NSF Graduate Fellowship, Mellon Foundation Postdoctoral Fellow, 2002

RESEARCH AREAS

Environment, Atmospheric / Space, Oceanic, Natural Disasters / Emergency

FUNDING REQUEST

Your contributions will ensure Dr. Cornuelle has the necessary computing equipment to perform his analyses. Currently, he is working with an older computer system, so salary expenses of maintenance professionals is a large part of his budget. Larger donations could enable the acquisition of a more advanced computer system with broader and faster computational abilities. Your contributions would also enable Dr. Cornuelle to expand his expertise to atmospheric models.