Sally K. Ride Papers - Climate Change Committees /Speeches [including a few by Ride]

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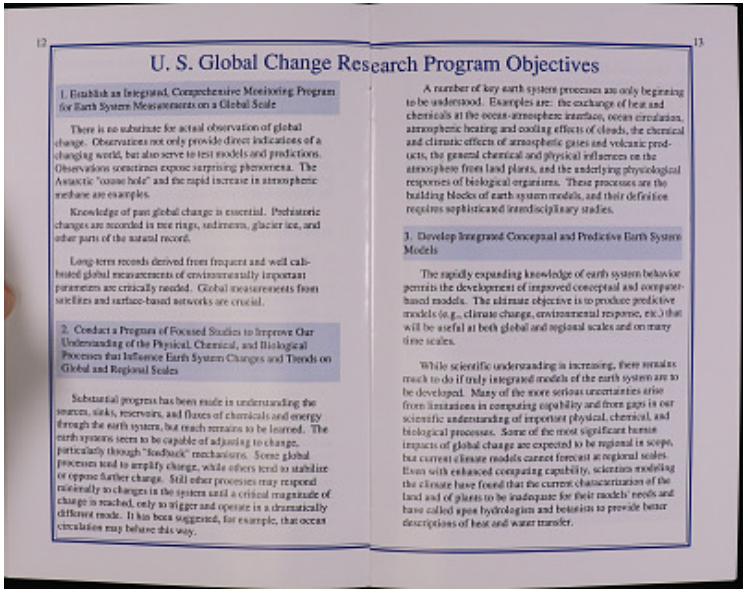
U.S. Global Change Research Program Objectives



Substantial progress has been made in understanding the sources, sinks, reservoirs, and fluxes of chemicals and energy through the earth system, but much remains to be learned. The earth systems seem to be capable of adjusting to change, particularly through "feedback" mechanisms. Some global processes tend to amplify change, while others tend to stabilize or oppose further change. Still other processes may respond minimally to changes in the system until a critical magnitude of change is reached, only to trigger and operate in a dramatically different mode. It has been suggested, for example, that ocean circulation may behave this way.

A number of key earth system processes are only beginning to be understood. Examples are: the exchange of heat and chemicals at the ocean-atmosphere interface, ocean circulation, atmospheric heating and cooling effects of clouds, the chemical and climatic effects of atmospheric gases and volcanic products, the general chemical and physical influences on the atmosphere from land plants, and the underlying physiological responses of biological organisms. These process are the building blocks of earth system models, and their definition requires sophisticated interdisciplinary studies.

3. Develop Integrated Conceptual and Predictive Earth System Models

The rapidly expanding knowledge of earth system behavior permits the development of improved conceptual and computer-based models. The ultimate objective is to produce predictive models (e.g., climate change, environmental response, etc.) that will be useful at both global and regional scales and on many time scales.

While scientific understanding is increasing, there remains much to do if truly integrated models of the earth system are to be developed. Many of the more serious uncertainties arise from limitations in computing

capability and from gaps in our scientific understanding of important physical, chemical, and biological processes. Some of the most significant human impacts of global change are expected to be regional in scope, but current climate models cannot forecast at regional scales. Even with enhanced computing capability, scientists modeling the climate have found that the current characterization of the land and of plants to be inadequate for their models' needs and have called upon hydrologists and botanists to provide better descriptions of heat and water transfer.

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