Office of Biological and Environmental Research

The mission of the OBER is to develop the knowledge needed to identify, understand, and anticipate the long-term health and environmental consequences of energy production, development and use. This mission is carried out through research at DOE national laboratories, universities, and private institutions in the general areas of Life Sciences, Medical Sciences, and Environmental Sciences. Large-scale computing plays an important role in Life Sciences through the Human Genome, Structural Biology, and Microbial Genome research. In close cooperation with improved technologies, NERSC computational capabilities are focused on mapping, sequencing, and information management, toward characterizing the molecular nature of the human genome and the determination of protein structures and functions. In addition, genomes of microbes are being investigated for potential relevance to energy production/use, bioremediation, and global climate. Building on these successes, the Genomes to Life program will take the next step: to understand the composition and function of the biochemical networks and pathways that carry out the essential processes of living organisms.

DOE/OBER Global Change activities include the process research and modeling efforts needed to (1) improve understanding of factors affecting the Earth's radiant-energy balance; (2) predict accurately any global and regional climate change induced by increasing atmospheric concentrations of greenhouse gases; (3) quantify sources and sinks of energy-related greenhouse gases, especially carbon dioxide; and (4) improve the scientific basis for assessing the potential consequences of climatic changes, including the potential ecological, social, and economic implications of human-induced climatic changes caused by increases in greenhouse gases in the atmosphere and the benefits and costs of alternative response options. Research is focused on understanding the basic chemical, physical, and biological processes of the Earth s atmosphere, land, and oceans and how these processes may be affected by energy production and use, primarily the emission of carbon dioxide from fossil fuel combustion. A major part of the research is designed to provide the data that will enable an objective assessment of the potential for, and consequences of, global warming. The program is comprehensive, with an emphasis on the radiation balance from the surface of the Earth to the top of the atmosphere including the role of clouds and on enhancing the quantitative models necessary to predict possible climate change at the global and regional levels.