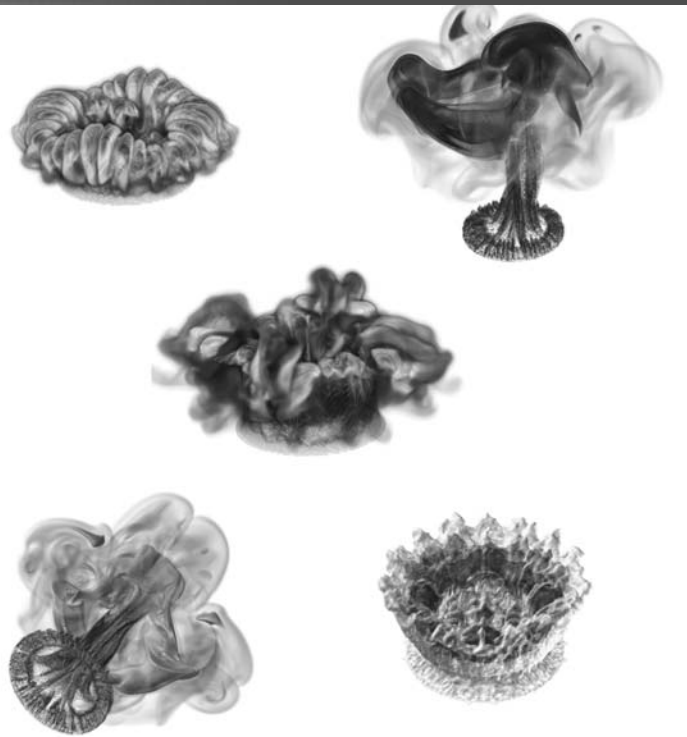


THE SHAPES OF FIRE: Images from simulations of a spreading heptane-pool fire show 3-D dynamics of fire temperatures (darker areas hottest). Generated from data by the Center for the Simulation of Accidental Fires and Explosions (C-SAFE), part of DOE/NNSA's Advanced Simulation and Computing (ASCI) program. C-SAFE's aim is to use high-end modeling techniques to improve understanding of fire and explosive processes to aid emergency planning and response activities. Details on page 50.

INTRODUCTION

> "The role of government is not to create wealth. The role of our government is to create an environment in which the entrepreneur can flourish, in which minds can expand, in which technologies can reach new frontiers."
>
> – President George W. Bush

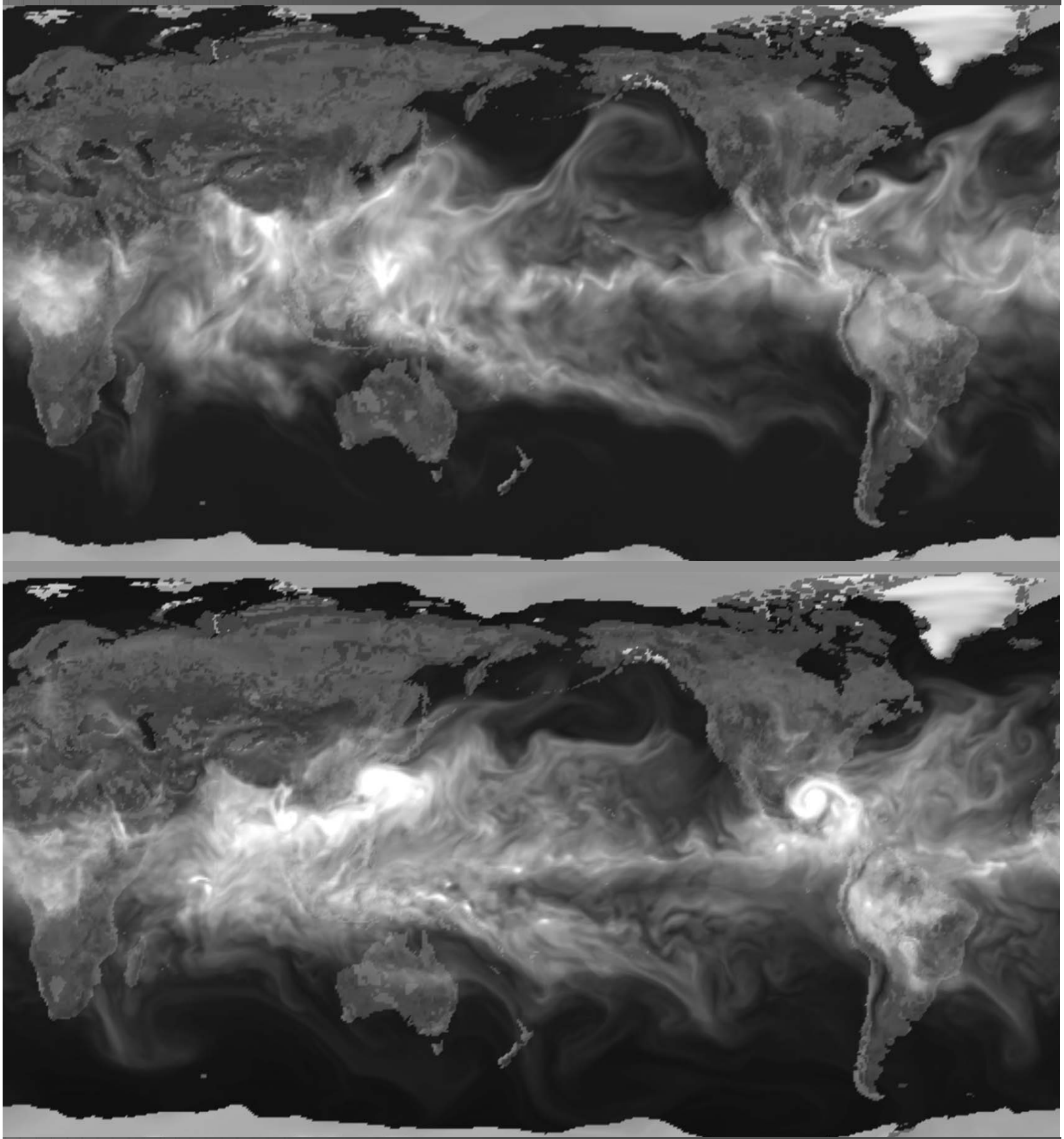
The American imagination, challenged to invent new technologies to meet vital national needs, launched and powered a digital revolution that ultimately swept around the globe. Today U.S. ingenuity is extending advances in computing, networking, software, and information management technologies to a vast array of new applications and devices that are shaping national defense and national security capabilities, driving rising economic productivity, supporting leading-edge scientific and medical research, and adding powerful new dimensions to the ways citizens work, learn, communicate, and interact with government.

The Federal agencies whose fundamental information technology (IT) research is described in this document sponsored many of the scientific breakthroughs that set the foundations for the information age (see timeline on front-cover foldout). Working collaboratively in the multiagency Federal Networking and Information Technology Research and Development (NITRD) Program, these agencies continue to foster an unrivalled U.S. capacity for innovation – the Nation's most vital resource for national security, economic development, and continuous improvements in living standards for all Americans.

This Supplement to the President's Budget for Fiscal Year (FY) 2004 summarizes the NITRD agencies' coordinated research activities and FY 2004 plans, as required by the High-Performance Computing Act of 1991. The FY 2004 Supplement, also known as the Blue Book, focuses in particular on the critical role of fundamental IT research in providing advanced foundations for innovation in every dimension of the national interest.

Networking and computing technologies are often called "enabling" technologies because their utility – and broader significance – are realized in the human advances and capabilities they make possible. It is these advances that are the focus of the report's main sections – Foundations for National Security, Foundations for Scientific Leadership, Foundations for Research and Learning, and Foundations for 21st Century Society. The broad-based impacts of the NITRD Program cited in this document represent achievements not only of the NITRD research community, but also of other Federal programs, public-private partnerships, and the private sector. The FY 2004 Blue Book places Federal NITRD research in its context as a strategic national resource, which provides the essential technological underpinning for far-reaching innovations that will influence the Nation's development over the course of the 21st century.

For an overview of the NITRD Program, please see pages 2 and 3. Additional details about the NITRD agencies' specific research interests, proposed research activities for FY 2004, and NITRD Program budgets are presented on pages 35-41.



HUMIDITY, NOT CLOUDS: Visualizations of computed specific humidity from a high-resolution run of the general circulation model (GCM), which simulates global atmospheric dynamics. The GCM is a joint effort of NASA and the NSF-supported National Center for Atmospheric Research. GCM data play a central role in climate research and weather prediction. Technical details on page 50.