STS-95

Mission Overview

Shuttle Mission STS-95 is a nine-day, multidisciplinary research mission. Seven crewmembers will conduct an array of experiments in the space environment as the shuttle orbiter *Discovery* circles the Earth more than 144 times. These experiments include commercial and government research in astronomy, biology, biotechnology, materials processing, fluid physics, space technology, and medical science.

Microgravity science research will explore fluid flow of heated liquids in a microgravity environment, assess the effects of microgravity on fine particles suspended in fluids (colloidal suspensions), gain new insights into atomic behavior, and investigate the structure and function of proteins. Sensor technology will also be used to detect vibration effects on payloads.

Life science research efforts will include assessments of the effects that microgravity has on balance and perception in humans and animals in space; immune system changes in microgravity and on Earth; the effects of microgravity on bone, muscle, and the body's metabolic rates; the potential use of a naturally occurring substance known as melatonin as a sleep aid; and cardiovascular processes. Insights gained in monitoring crew physiology in microgravity will play a key role in maintaining crew health during spaceflight and providing important data for medical research on Earth, particularly related to aging. Life science research will also explore microgravity cell growth and plant seed formation and reproduction, and will use a device for air quality detection.

Commercial researchers will use the microgravity environment to explore the development of improved optical properties in ultralight materials for applications such as specialized windows. Researchers will also conduct protein crystal growth in microgravity for enhanced understanding of proteins linked to disease, in order to develop better drug countermeasures. Other commercial researchers seek improved ways to encapsulate drugs to provide a more directed therapy against tumors. Plant research activities will range from efforts to develop hardier and more productive crop strains, to improved natural pharmaceutical products from plant compounds. Several flight hardware units on this mission were developed and built entirely by the private sector.

STS-95 will also be carrying four major space science payloads in *Discovery*'s cargo bay. The Spartan 201-5 spacecraft free-flyer will investigate physical conditions and processes of the hot outer layers of the Sun's atmosphere, or solar corona, and will gather measurements of the solar corona and solar wind. These observations will help scientists better understand the Sun's influence, which can affect satellites as well as communications and power distribution systems on Earth.

A second space science payload, the Hubble Space Telescope Orbital Systems Test platform, is being flown to validate key technologies and equipment to be installed during the next Hubble servicing mission in the year 2000. Included will be a state-of-the-art cryogenic cooling system to cool and extend the life of the Near Infrared Camera and Multi-Object Spectrograph; the Hubble Space Telescope 486 Computer, to test its susceptibility to radiation; a solid-state recorder to replace one currently on Hubble; and other equipment tests.

Two other science payloads are part of the space science program for STS-95. The cryogenic thermal storage unit contains a set of thermal control components that will be tested in space. The other is the International Extreme Ultraviolet Hitchhiker payload that will have a number of experiments, ranging from astronomical telescopes and communications experiments to a Get-Away Special student experiment examining the effects of space on the life cycle of the American cockroach.

In the spirit of international collaboration, experiments from several different nations with complementary research agendas will fly on STS-95. These research efforts will feature payloads sponsored by the European Space Agency (ESA), the Canadian Space Agency (CSA), and Japan's National Space Development Agency (NASDA).

STS-95 is also an example of domestic interagency collaboration. NASA and the National Institute on Aging of the National Institutes of Health have initiated a joint effort to examine the similarities in the effects of space-flight on the human body and the changes that people experience as they age. This research will continue on STS-95 with the participation of Senator John Glenn, who will provide observational information about the links between the effects of spaceflight and the aging process.

The STS-95 mission reflects an innovative business arrangement for NASA and its commercial and international partners. The commercially owned and operated SPACEHAB module provides substantial work space for experiments, cargo storage, and crew activities. In return for providing SPACEHAB with transportation into orbit in *Discovery*'s cargo bay, NASA will use a portion of the SPACEHAB module's volume and resources. Space not allocated to NASA, approximately 45 percent within the SPACEHAB module, was sold by SPACEHAB, Inc., to commercial and international customers.

STS-95 represents a diversity of science and commercial research efforts, as well as interagency and international collaboration, that will ultimately be the hallmark of the International Space Station.