

## **Consortium for the Application of Space Data To Education**

CASDE is funded by the National Aeronautics and Space Administration Mission to Planet Earth to promote the use of space-derived, remotely sensed data and information. Focused on K-12 education, CASDE has accepted the challenge to help make such data easily and intuitively available

to students and educators. CASDE's goal is to allow users to use space data without being preoccupied with the nuances of tools and esoteric data formats.

The core concept for CASDE educational resources is the curriculum Building Block. Our hope is that

educators will use these sample lessons as "starting points" for developing their own lessons using

the data provided on this CD.

Building blocks are structures which contain tools, data, applications and assessments. The blocks are available as "starting points" for users to generate their own lessons and to produce and evaluate learner outcomes.

CASDE promotes the use of space-derived, remotely sensed data and information. Focused on K-12 education, CASDE has accepted the challenge to help make such data easily and intuitively available to teachers. The core concept for CASDE educational resources is Curriculum Building Blocks.

DataSlate is part of the CASDE educational tools that facilitates intuitive, graphical search of large image, map, and other visual data sets. It allows the quick comparison of data of different types covering the same region. DataSlate's power derives from a data structure that co-registers data of different types. As one moves about a particular dataset, all other datasets are kept in spatial synchronization. The user can click from a natural color image to an infrared image or to a radar image and examine the same region at these different points in the spectrum.

## **Digital California**

Digital California provides a repository of satellite images, maps and supplementary data types covering the State of California. The goal is to make the data easily retrievable for use by the public, specifically educators and students. Digital California provides low resolution AVHRR images to identify patterns in weather or agriculture, medium resolution Landsat images to identify large-scale features such as freeways, golf courses, parks and some schools and stadiums, and high resolution topographic maps and digital orthoquads to identify streets, schools and houses. Digital elevation data will be available at each level to support 3D rendering. Digital California uses a storage structure called DataStruct, a binned, hierarchical quad-tree structure. This structure can be navigated with DataSlate, a Java-based display tool for viewing and comparing large datasets, or with a web-browser.

Data access to the medium and high resolution images is through either a SimpleServer web browser or a DataSlate client viewer. The SimpleServer browser is used to traverse the contents of any SimpleStruct and is navigated via three paths. The text view allows browsing or searching by region, county, city or zip code; the geographic view allows searching by latitude and longitude; and the graphical view allows zooming in on a map or image view. The DataSlate client viewer, a Java application developed at JPL, also allows one to traverse the contents of any SimpleStruct, yet has multi-channel capabilities as well as several analysis tools, such as a measurement tool, a GPS tool and so on.

## **Geomorphology From Space: A Global Overview of Regional Landforms**

Geomorphology From Space, published in 1986, discusses various Earth and planetary landforms and landscapes, including their description, classification, origin and development, illustrated with a rich collection of space images.

The core of the book is a gallery of space imagery consisting of 237 Plates, each treating some geographic region where a particular landform theme is exemplified. In one sense, this gallery stamps Geomorphology from Space as mainly an atlas-like collection of images, except that the emphasis in the commentaries is centered on the scientific information content of the primary image. The arrangement of the gallery is by geomorphic theme: (1) Tectonic (Structural), (2) Volcanic, (3) Fluvial, (4) Delta, (5) Coastal, (6) Karst and Lakes, (7) Eolian, (8) Glacial, and (9) Planetary Landforms. This last topic is in keeping with the current awareness of the importance of (comparative) planetary geomorphology to the NASA space exploration program in general and with the growing realization that understanding of formative processes of surface features on other planets has obvious feedback effects on recognizing many terrestrial counterparts.

## **Winds of Change**

NASA Scatterometer (NSCAT) is a specialized microwave radar that will measure the speed and direction of winds over the global ocean surface. The instrument will gather information to help understand and predict global weather patterns and climate systems.

One of NASA's main goals is to provide educational resources about its programs in an effort to encourage students to consider careers in science and engineering. This compact disk from the NSCAT project presents a novel curriculum called Global Climate that focuses on Earth Science activities.

## **Ways of Seeing**

Ways of Seeing is an interactive CD-ROM designed as a science curriculum resource for middle school teachers. However, it is suitable for student explorations as well.

The disc focuses on the topic of the electromagnetic spectrum and ways of seeing. In addition, it presents information about the spacecraft Cassini and its mission to explore Saturn and its moon Titan.

The CD contains images, QuickTime movies, and text information written by professional curriculum writers. Text information is organized into Background information files that describe in detail a particular topic, Classroom Activities that can be used to accompany the teaching of any topic.

The disk is unique in that it does not impose a rigid structure or syllabus for how the curriculum resources are to be used in the classroom. The purpose of the CD-ROM is a teaching resource. With it, you can put together your own lectures, lesson plans, or experiments.

## **Visit to an Ocean Planet**

See attached!

## **Perspectives on an Ocean Planet**

In 1979, NASA's Jet Propulsion Laboratory began planning TOPEX, an Ocean Topography Experiment that would use a satellite altimeter to measure the surface of the world's oceans. At the same time the French space agency CNES was designing an oceanographic mission called Poseidon, named for the Greek god of the sea. The two space agencies decided on a cooperative effort and pooled their resources to form a single mission. The result is the highly successful TOPEX/Poseidon which has achieved science objectives beyond expectation and at a lower cost than either mission would have achieved separately.

During the Primary Observation and Extended Observation phases of the mission, the satellite continuously observes the surface currents of the ocean, and provides a valuable long-term, global dataset unprecedented in the history of oceanography. This in turn allows researchers to calculate ocean currents, identify climate trends, and improve weather forecasting.

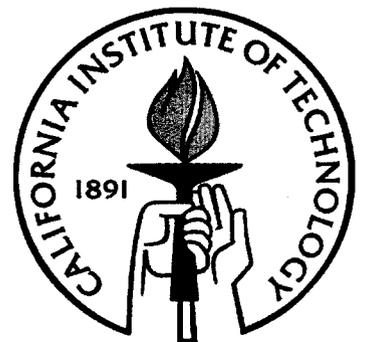
The objective of the TOPEX/Poseidon mission is to obtain an ongoing global view of earth's ocean topography with sufficient accuracy to improve models designed to forecast global ocean circulation. By meeting this objective, scientists are: determining ocean circulation and variability; learning to understand the wind's role in circulation; developing the descriptions of the nature of ocean dynamics; contributing to the understanding of the transport of heat, mass, nutrients, and salt through the oceans; determining geocentric ocean tides; investigating the interaction of currents with waves; improving our knowledge of the marine geoid, and increasing our understanding of lithosphere and mantle processes.

## **Welcome to the Planets**

See attached!

# **EXPLORING EARTH AND PLANETARY DATA VIA INTERACTIVE AND MULTIMEDIA CD-ROMS**

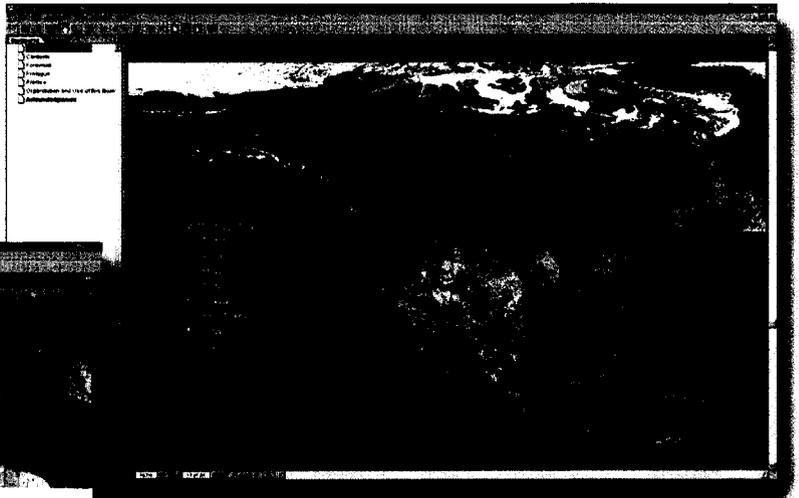
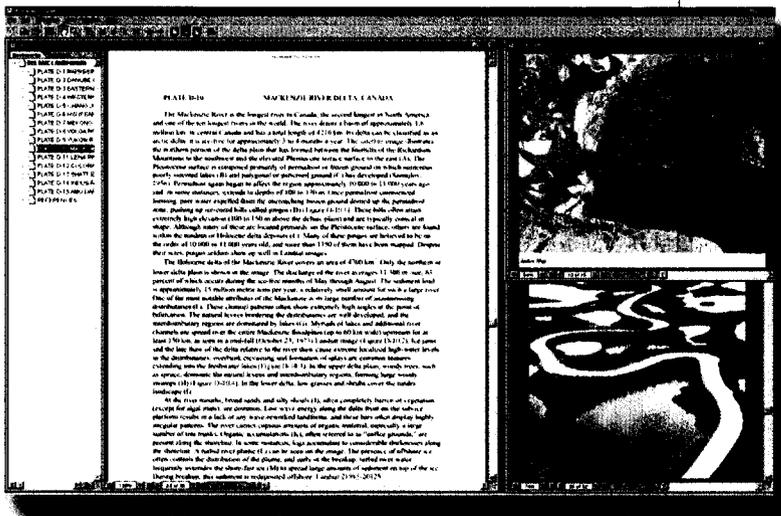
**Cynthia Hall Atkinson  
Michael D. Martin  
Betty J. Sword  
Jet Propulsion Laboratory  
California Institute of Technology**



The increasing pace of discoveries in science and the rapid progression in technology have presented educators and scientists with the challenge of getting scientific information and data out to the students and public in an intuitive and interesting manner. The Data Distribution Lab at the Jet Propulsion Laboratory/California Institute of Technology has attempted to do this by presenting some of NASA's exciting datasets through a series of educational and/or informational CD-ROM products. These titles, to name a few, include "Welcome to the Planets" (1994), a collection of the greatest planetary images with captions; "Geomorphology From Space" (1997), a digital version of a beautiful NASA Special Publication of remotely sensed images; "Visit to an Ocean Planet" (1998), an interactive educational CD-ROM that covers many details about the TOPEX/Poseidon satellite, how it measures ocean topography, and what the oceans tell us about our Earth and its climate. "Ways of Seeing" (1999) highlights the Cassini mission to Saturn and features science curriculum resources focusing on the electromagnetic spectrum and remote sensing. The "DataSlate Plus" (1999) educational CD-ROM features 12 curriculum modules and the DataSlate viewer to explore intriguing earth and space data. "Digital California", currently in production, provides a collection of various types of high resolution imagery allowing users to zoom into and analyze their houses and schools. The CD's include exciting graphics, such as QuickTime VR representations of the spacecraft, and interactive games, such as planning an expedition to the Gulf of Mexico or selecting the proper orbits for various satellites. These activities make teaching and learning science and technology a more fascinating experience. Most products not only come with planetary or earth science data and statistics but also come with a stand alone graphical user interface, narration, images and movies. Some products also come with classroom activities that have been aligned with accepted curriculum standards, such as the National Science Education Standards and the California Science Framework.

# GEOMORPHOLOGY FROM SPACE: A Global Overview of Regional Landforms

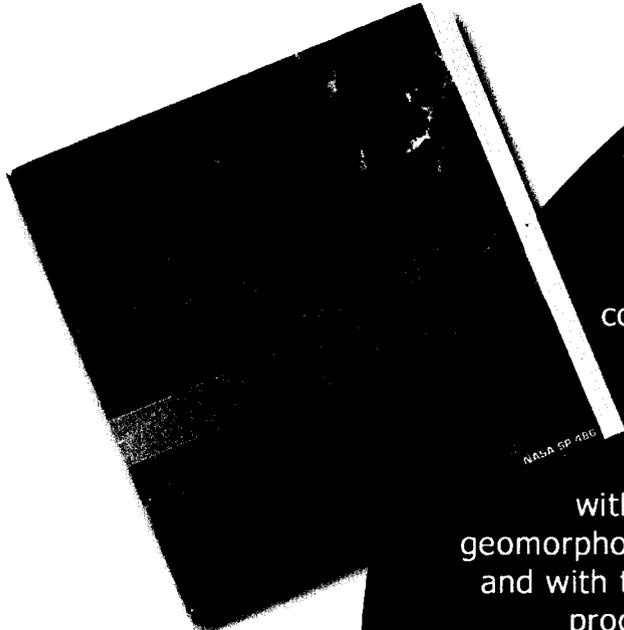
Geomorphology From Space, published in 1986, discusses various Earth and planetary landforms and landscapes, including their description, classification, origin and development, illustrated with a rich collection of space images.



Geographic location of each plate in a geomorphic theme. Pushpins serve as links to the appropriate plate.

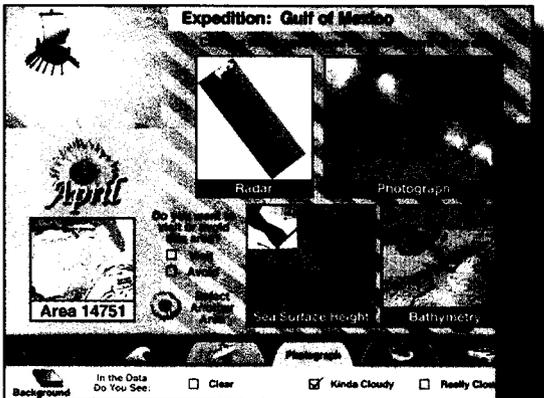
## Geomorphology From Space CD-ROM

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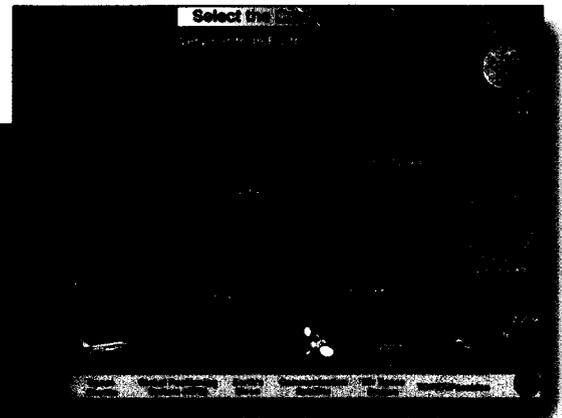


# TOPEX/Poseidon

## Visit to & Perspectives on an Ocean Planet



Plan a scientific cruise to the Gulf of Mexico to study whales, explore El Niño 1997, or meet the Oceanographers.



Discover many details about the TOPEX/Poseidon mission and learn about the previous and future missions.

Visit to an Ocean Planet

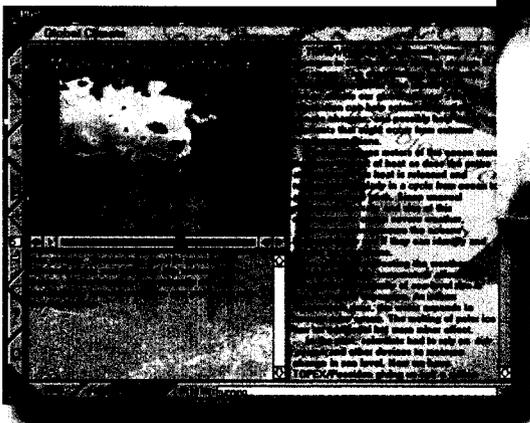
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The CD-ROM is divided into seven sections: History and Background, Mission, Description, Spacecraft, How the Measurement System Works, Mission Operations, What We've Learned, and Science Data.



The CD-ROM contains over an hour of digital video, audio, images, and text captions which describe everything from the impetus for the mission to the science results obtained in the first three years.

TOPEX/POSEIDON



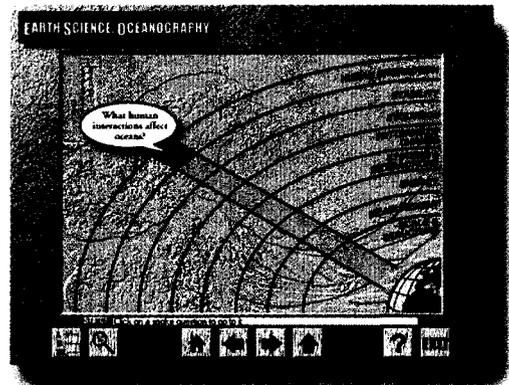
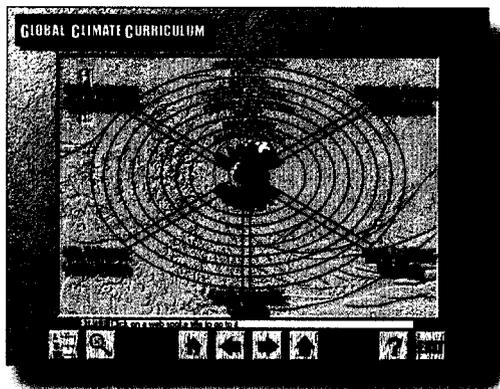
# WINDS OF CHANGE

## The NASA Scatterometer Project

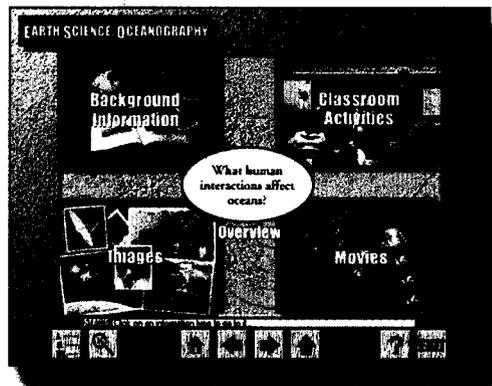


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Ellipses represent the themes of the science framework, and intersecting "spokes" represent the various "discipline" areas. Each intersection of ellipse and spoke, called a "bubble," contains a broad-based question. By accessing a specific bubble, teachers and students will find summaries or concepts, text, activities, images, and illustrations or "movies."

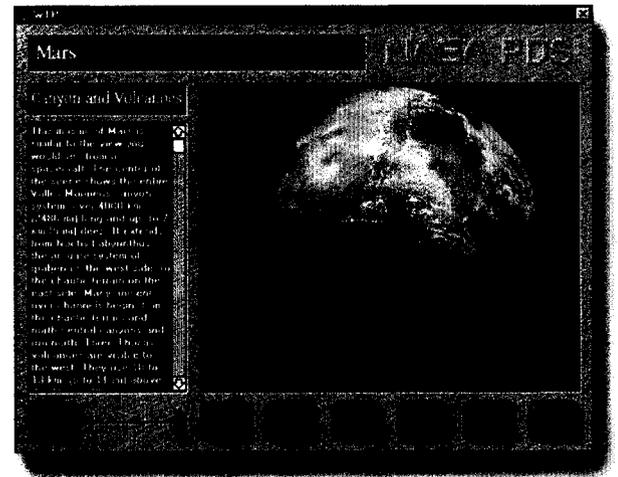


# WELCOME TO THE PLANETS

## A Collection of Space Imagery



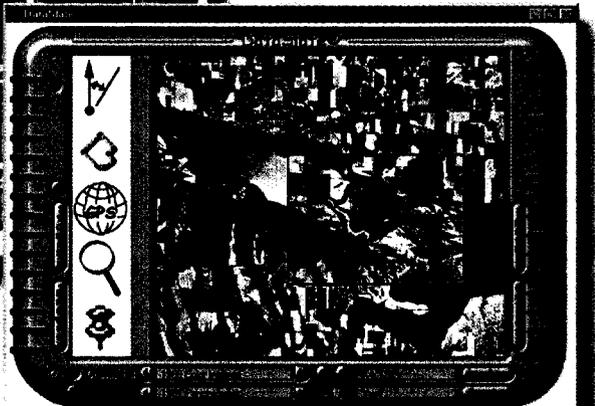
Welcome to the Planets, Version 1.5 consists of 190 selected images acquired over approximately 20 years of NASA planetary exploration. Each image is accompanied by information about Solar System bodies and various spacecraft that explored them.



# DATASLATE® PLUS DIGITAL CALIFORNIA



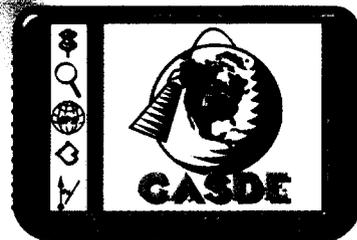
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**DataSlate® Plus**

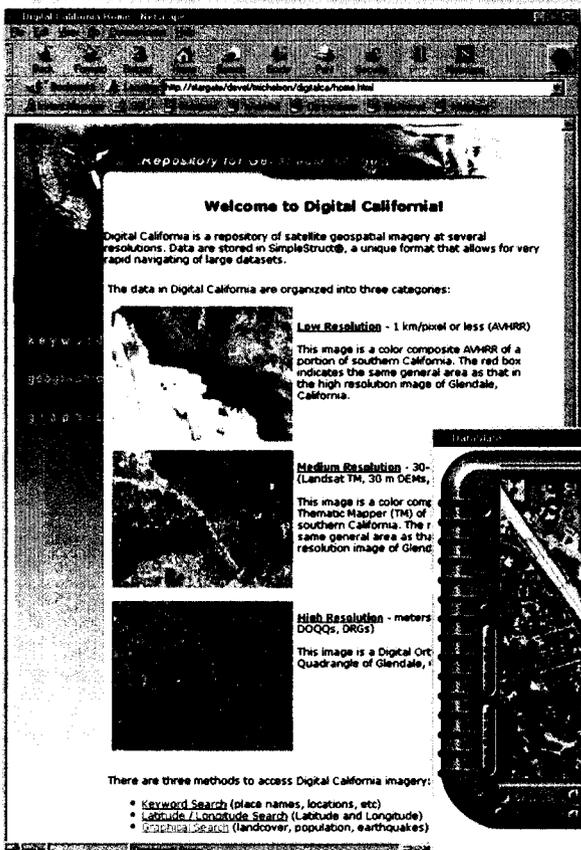
Consortium for the Application of Space Data to Education

Tools & Educational Building Blocks  
for exploring the Universe

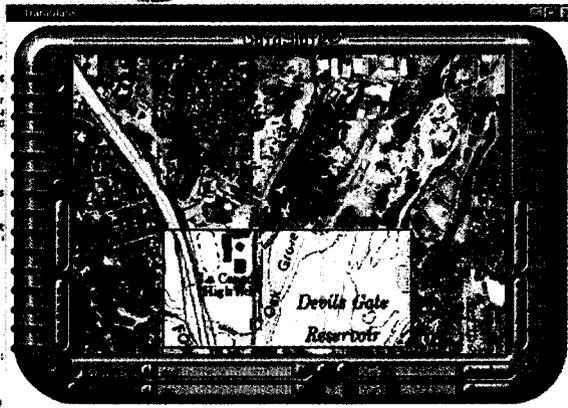


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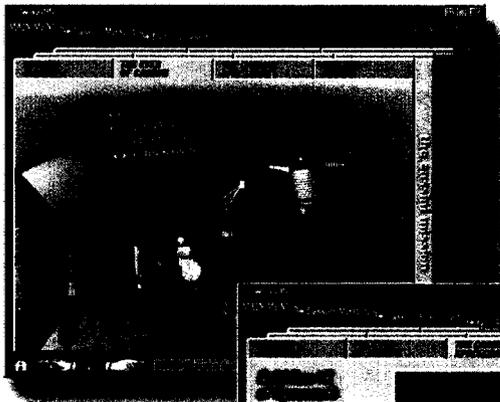
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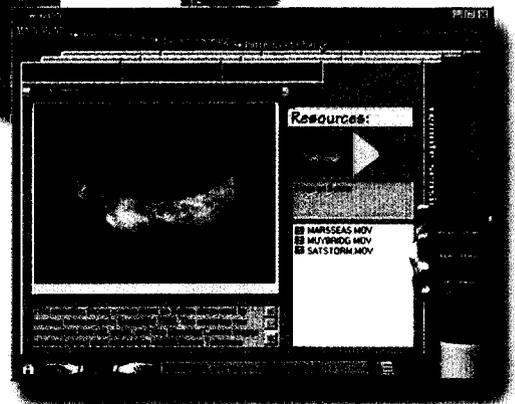
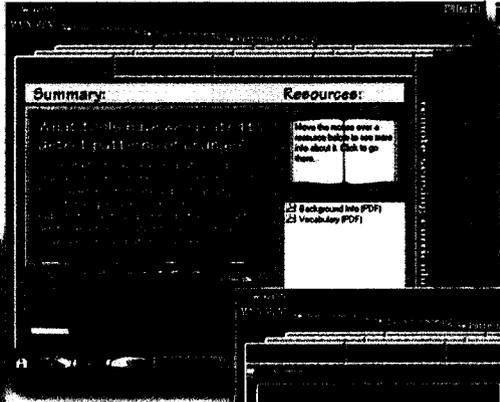
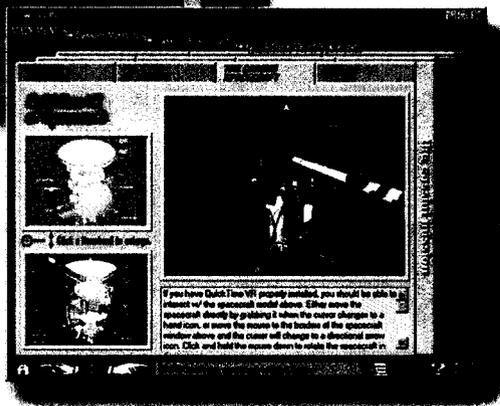
# WAYS OF SEEING

## The Cassini Program

The curriculum material on the CD-ROM is aligned with state and national teaching standards so that it can easily be incorporated into a teacher's regular curriculum.



Users get an inside look at the Cassini spacecraft through realistic 3-D graphics and Quicktime VR.



## Ways of Seeing

In October 1997, the 2.5-story-tall Cassini robotic spacecraft began a journey of nearly 7 years to reach, and 4 additional years to explore, the vast Saturn realm. Attached to the side of Cassini is the Huygens probe that will parachute through the hazy atmosphere of Saturn's large moon Titan, searching for clues to the makeup and evolution of this cold, but intriguing, world. After delivery of the probe, the Cassini mothership will spend the remaining 3.5 years in a remarkable, gravity-assisted tour of Saturn itself, its extensive ring system, its magnetosphere, Titan, and its many ice satellites.

Ways of Seeing is an interactive CD-ROM designed as a science curriculum resource for middle school teachers. The disk focuses on the topic of the electromagnetic spectrum and ways of seeing. In addition, it presents information about the spacecraft Cassini and its mission to explore Saturn and its moon Titan. The CD contains images, QuickTime movies, and text information written by professional curriculum writers. Text information is organized into Background information files, and Classroom Activities that can be used to accompany the teaching of any topic.

