



FINAL

**National Aeronautics and
Space Administration
Jet Propulsion Laboratory
California Institute of
Technology
Pasadena, California**

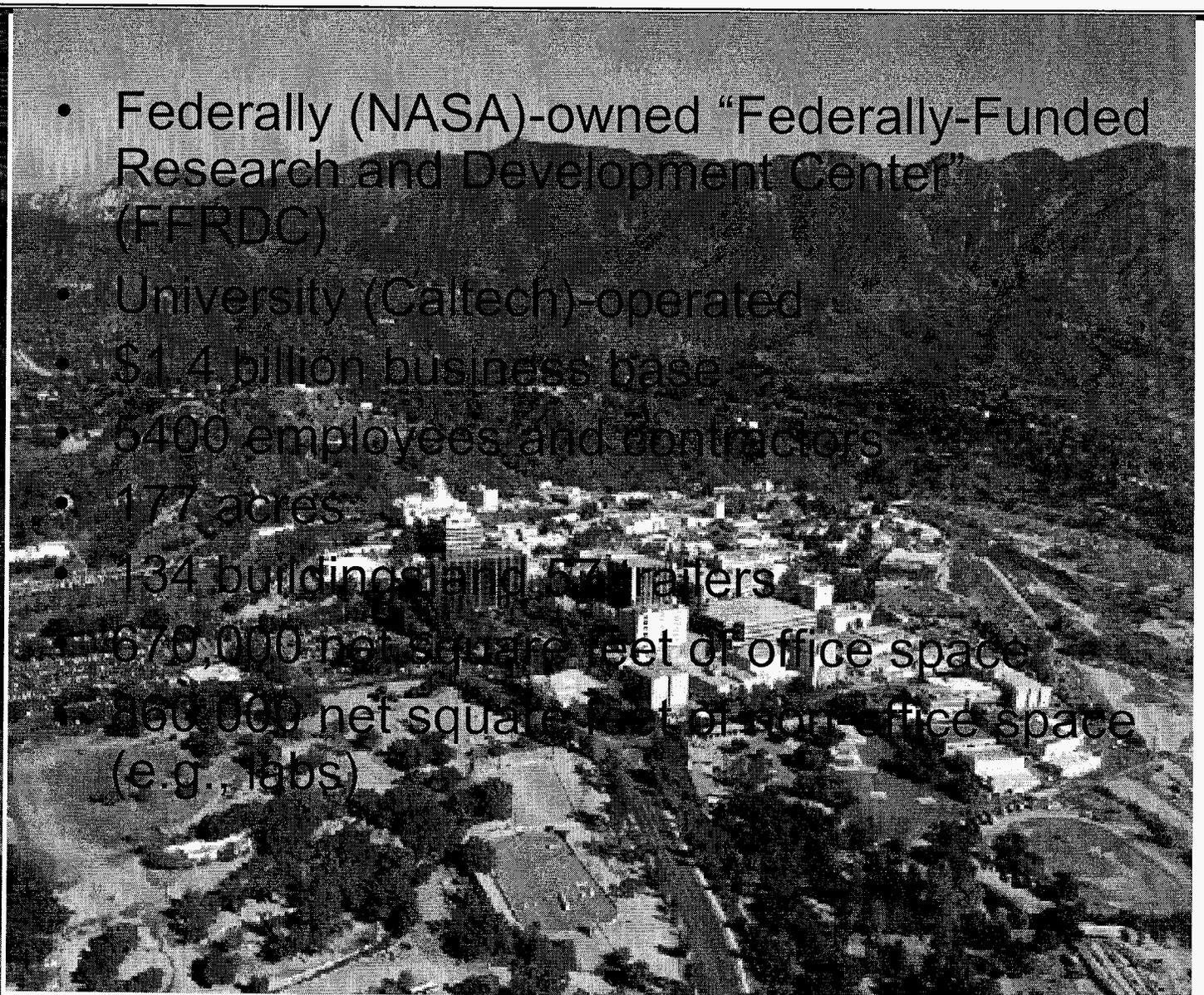
**Applied Technologies for
Homeland Security
March 6, 2005**

Erich Corduan, Program Manager
Information Technologies and
Homeland Security
Jet Propulsion Laboratory



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

JPL Is Part of NASA and Caltech

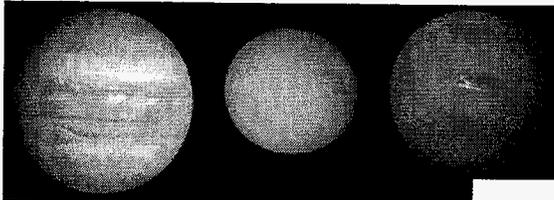


- Federally (NASA)-owned “Federally-Funded Research and Development Center” (FFRDC)
- University (Caltech)-operated
- \$1.4 billion business base
- 5400 employees and contractors
- 177 acres
- 134 buildings and 54 trailers
- 6,700,000 net square feet of office space
- 260,000 net square feet of non-office space (e.g., labs)

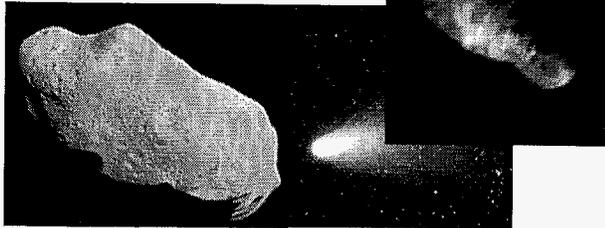


National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

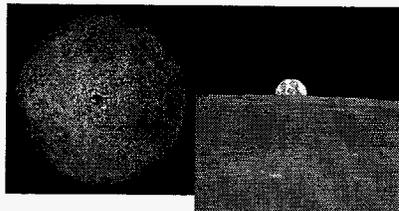
Forty Years of Exploration



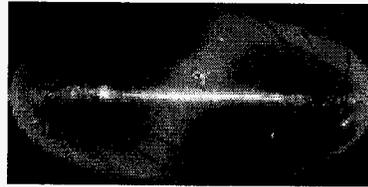
Giant Planets



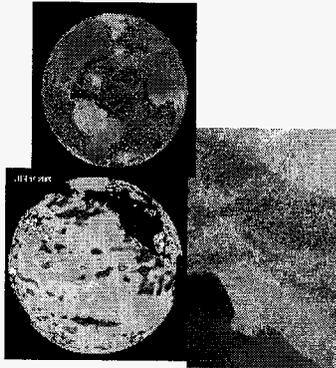
Small bodies



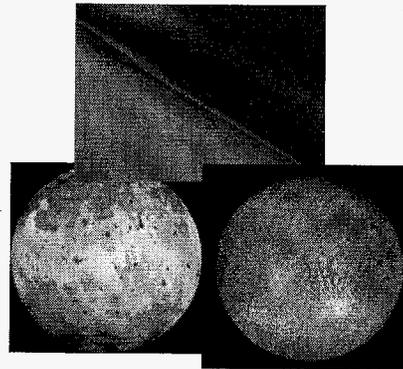
Earth's moon



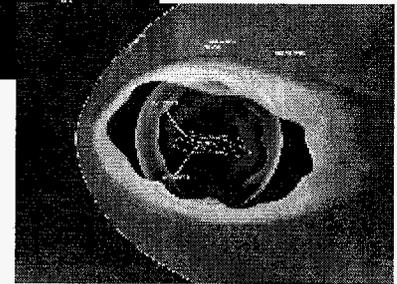
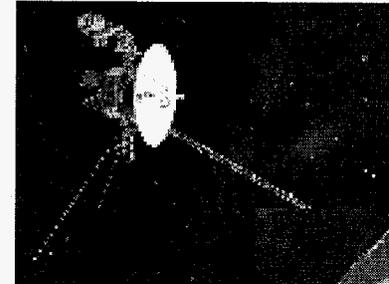
Astrophysics



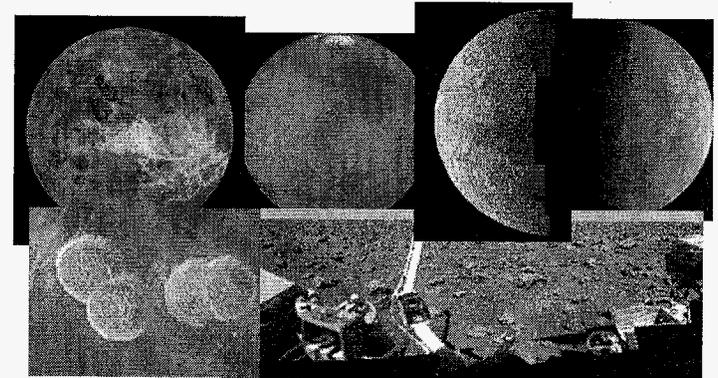
Earth



Planetary satellites



Interstellar space



Terrestrial planets



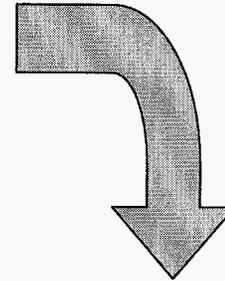
National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

The Linkage



The NASA Mission

To understand and protect our home planet
To explore the Universe and search for life
To inspire the next generation of explorers
.... as only NASA can



JPL's Mission Flows from the NASA Mission

We enable the nation to explore space for the benefit of humanity.

Our Mission is :

- 1. To explore our own and neighboring planetary systems;**
- 2. To search for life outside the Earth's confine;**
- 3. To further our understanding of the origins and evolution of the Universe
and the laws that govern it;**
- 4. To make critical measurements to understand our home planet and help
protect its environment;**
- 5. To apply JPL's unique skills to solve problems of national
significance**
- 6. To inspire the next generation of explorers**



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

DHS Themes for FY 06



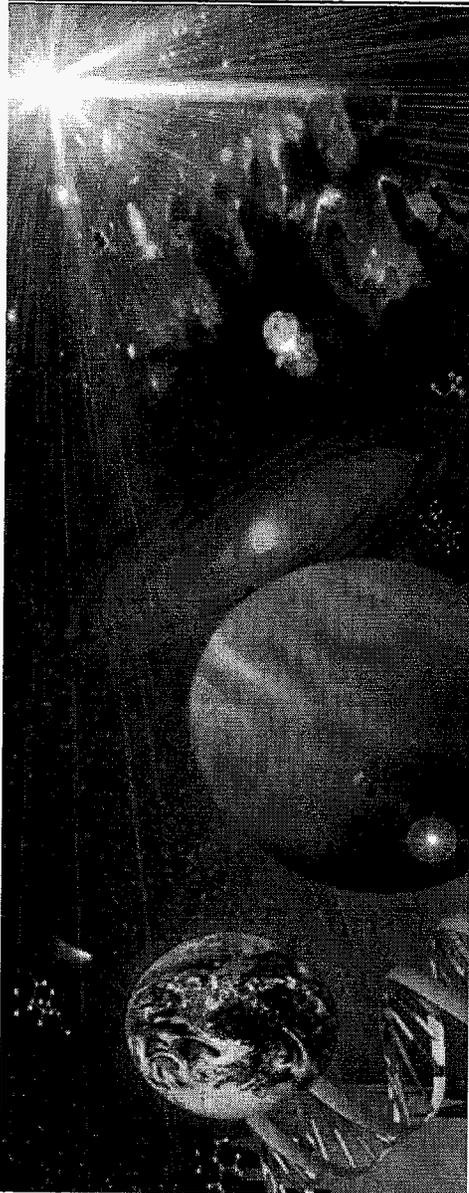
-
- Revolutionizing our Borders
 - Strengthen Law Enforcement
 - Improving National Preparedness and Response
 - Leveraging Technology
 - Creating a 21st Century Department

Comments from Press Conference with Acting Secretary
of Homeland Security Admiral James Loy on the FY 2006 Budget



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Synergistic Areas of Interest

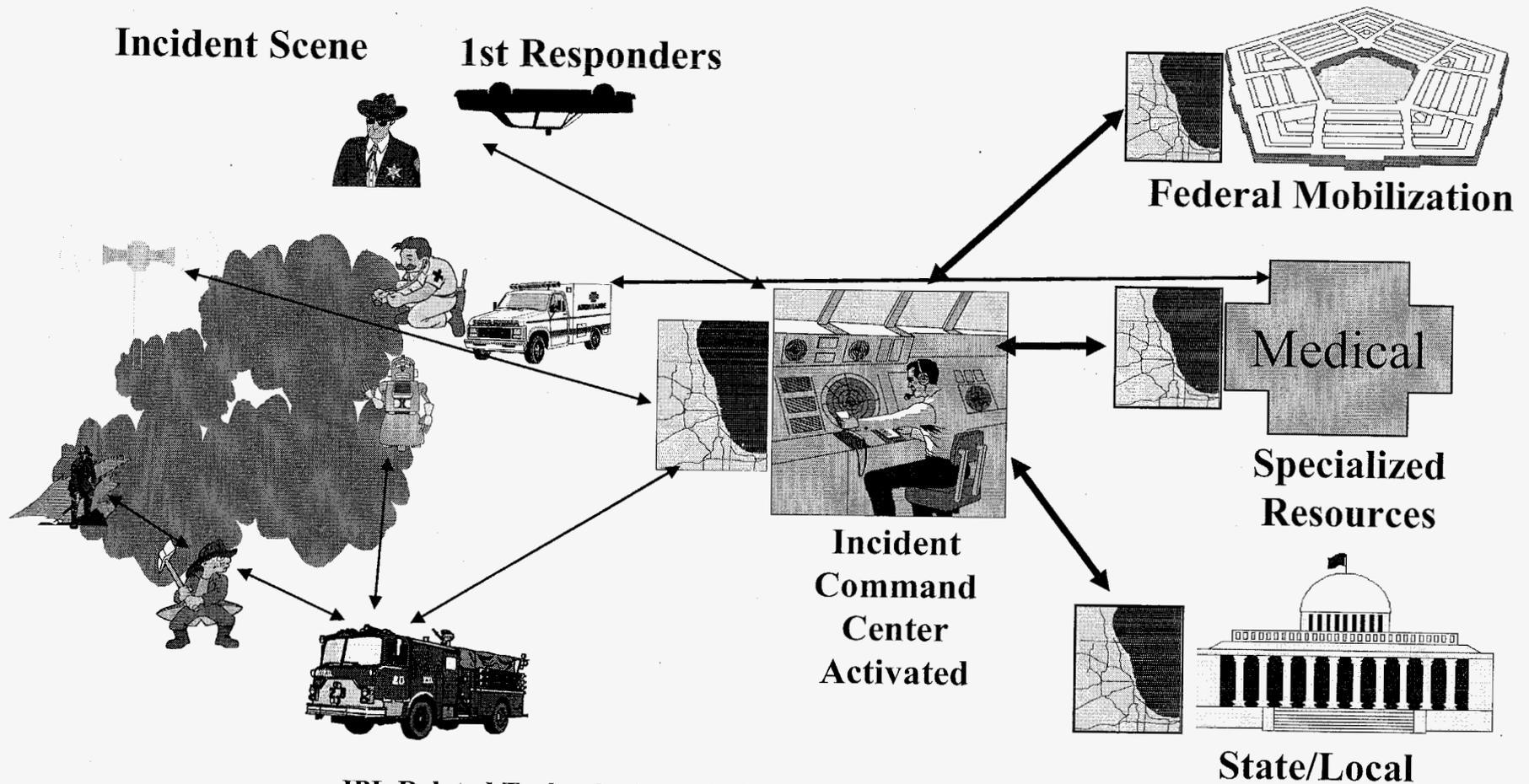


- **Civil Space Sector (including Homeland Security)**
 - Advanced Communications
 - Bio sensors & detectors
 - Space-based global sampling
 - Remote sensing
 - Robotics, in-situ



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Information Sharing



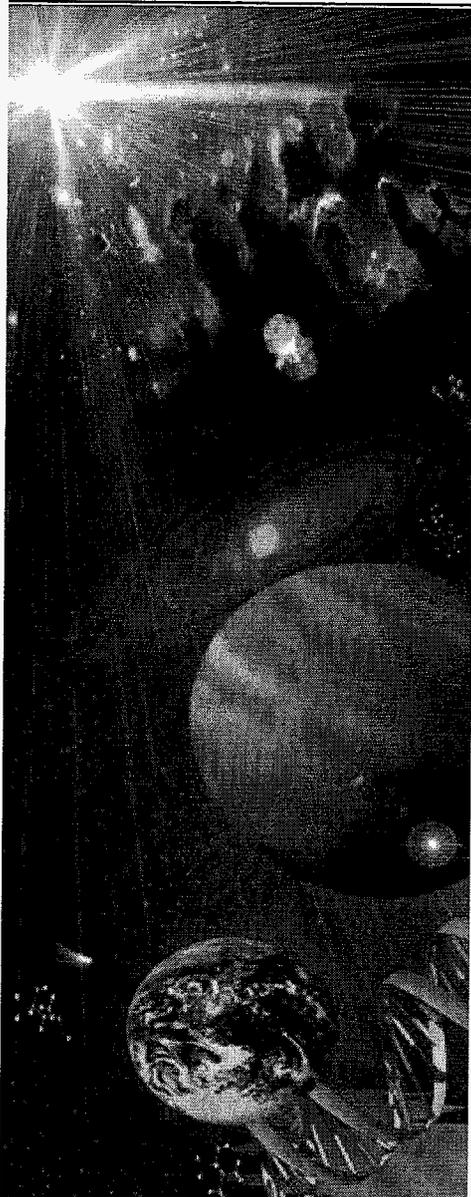
JPL Related Technologies - All Space Proven and Available Now

Sensors, Robotics, Low Data Rate Wireless Communications, Data Retrieval, Image Processing, Geographical Information Systems, Data Distribution, Knowledge Management, Intelligent Agents



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Issues for Applied Homeland Security Technologies



- Cost is a major element
- Ease of operation - user community needs
- Must have multiple applications, no 'one trick pony'
- No (or low level) "FALSE-POSITIVE/NEGATIVE"
- Think 'bottom line' ROI



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Concerns Being Addressed



- Improvised Explosive Devices (IED)
- First Responder Safety Issues
- CBRNE-IA (Chemical, Biological, Radiation, Nuclear, Explosives, Information Assurance)
- Border Control
- Improved Law Enforcement support



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Winning Proposals



- Low Cost of Procurement and Ownership
- Research/Development Combined With Industry Partners for Production - Life-cycle Maintenance
- Innovation Is Nice, Technology Has to Demonstrate a Realistic “Concept of Operations”



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

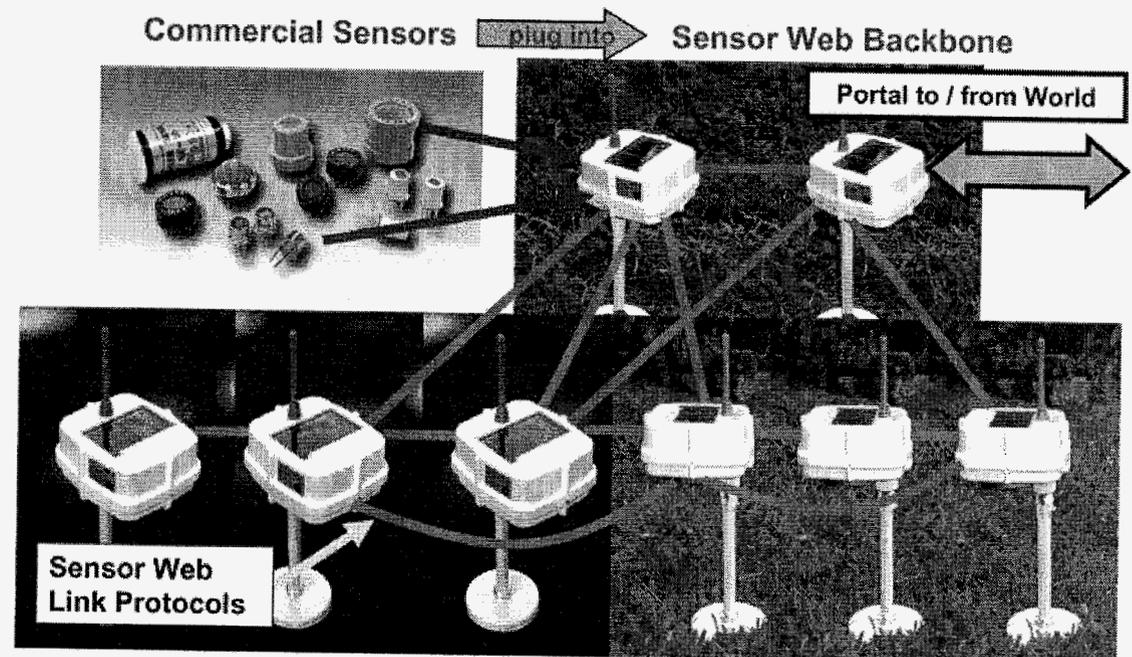
A Sensor Web



The Sensor Web is a new class of instrument that creates a

- rapidly deployable
- scaleable
- robust
- long-lived
- self-forming

wireless network of interacting detection sensors over a wide geographic area that can interpret external conditions and react and adapt to the environment.



The Sensor Web is a Dynamic Infrastructure for Sensors
Goal is to synthesize knowledge from data.

<http://sensorwebs.jpl.nasa.gov>



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

NASA Sensor Web: Sensors Attached to Pods



Multiple Sensors and Types per Pod Allowed

Already Demonstrated:

- **Light (visible)**
 - **Temperature (air, soil, water)**
 - **Relative Humidity**
 - **Soil Moisture**
 - **Water Conductivity (total dissolved solids)**
 - **H₂S (hydrogen sulfide) Gas Sensor**
 - **Oxygen Gas Sensor**
 - **Sonic Pinger for Water/Snow depths**
 - **Smoke Detector**
 - **Radiological Detector (radon)**
 - **Tiltmeter for Security Ops**
 - **BTEX (organic contaminants) for Remediation Ops**
 - **ClO₂ (chlorine dioxide) Gas Sensor for Decontamination Ops**
- ... and many others are possible**

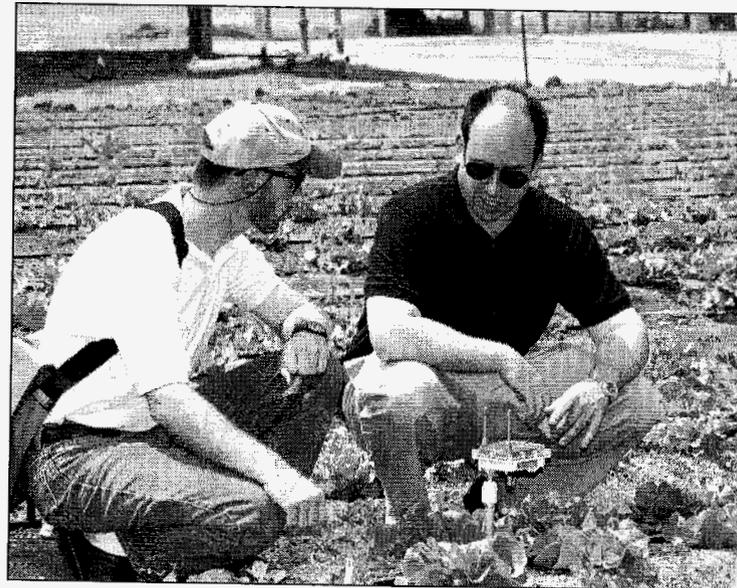
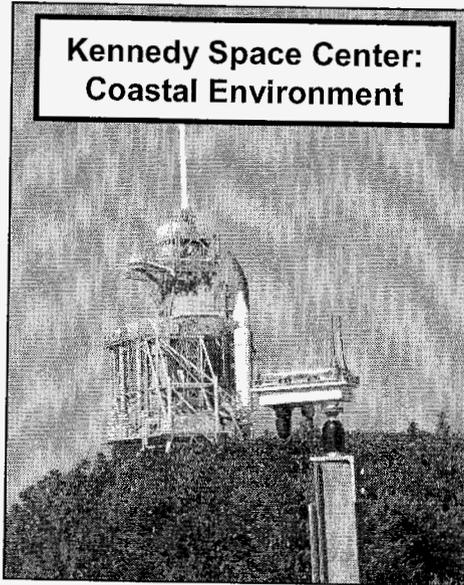


National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

NASA Sensor Web: A Field-Tested Technology



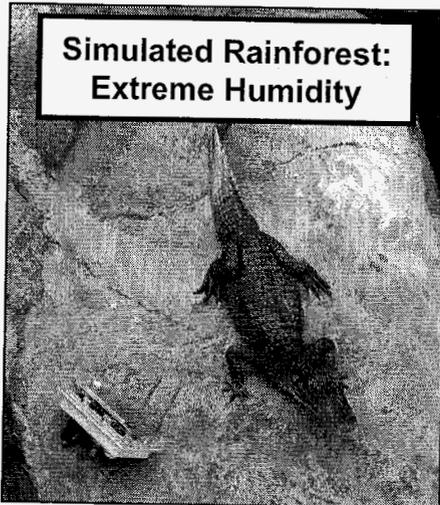
**Kennedy Space Center:
Coastal Environment**



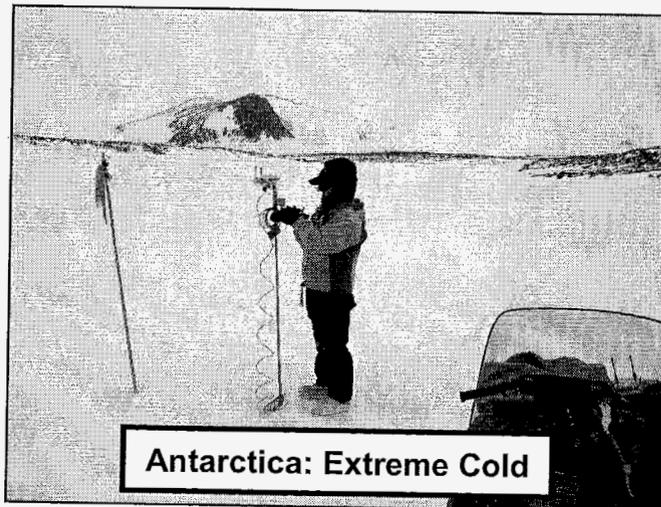
**New Mexico Desert:
Extreme Heat**



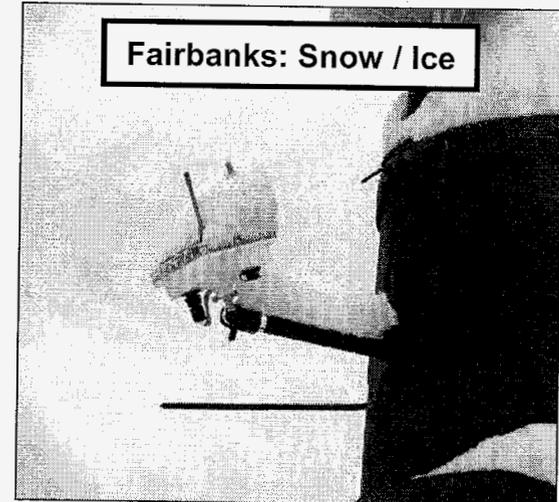
**Simulated Rainforest:
Extreme Humidity**



Antarctica: Extreme Cold



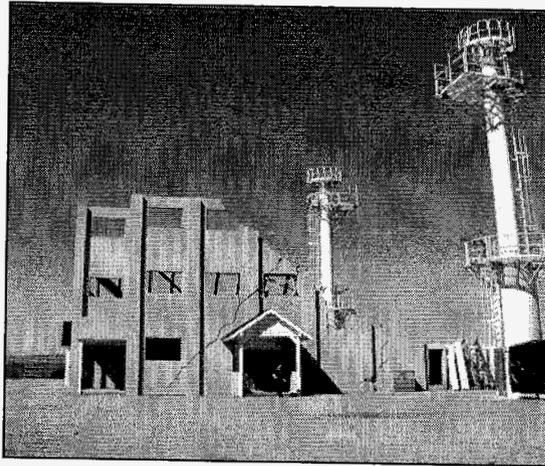
Fairbanks: Snow / Ice





National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

NASA Sensor Web: First-Responder Training



Responder Tracking, Sign In/Out, Communication Infrastructure, Gas Monitoring, etc.



National Aeronautics and Space
Administration
Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Point of Contact



Erich Corduan, Program Manager
Information Technologies and Homeland Security
Jet Propulsion Laboratory
California Institute of Technology
National Aeronautics and Space Administration
Phone 818.393.5128
Fax 818.393.2588

Jet Propulsion Laboratory
Attn: Erich Corduan
Mail Stop 291-105
4800 Oak Grove Drive
Pasadena, CA 91109