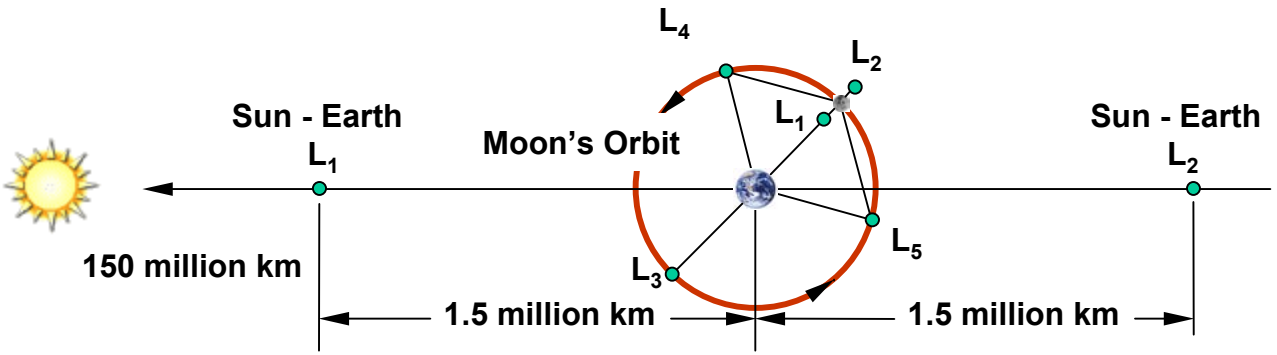
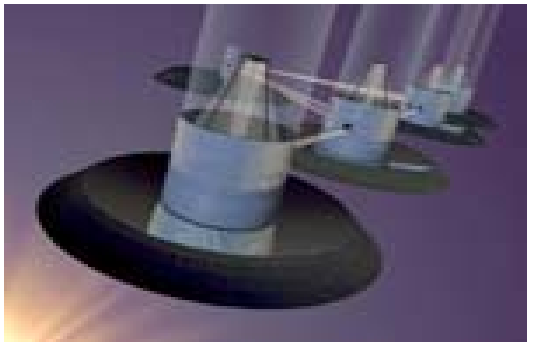
FY01 Focus Areas

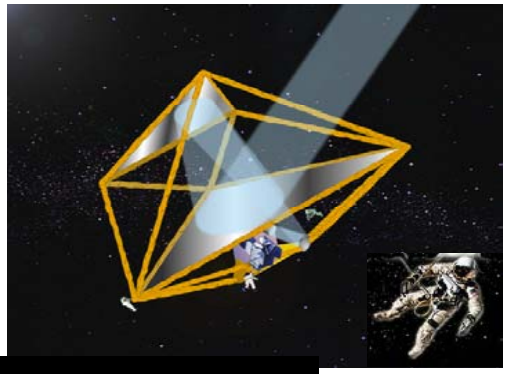
- **Prioritize investments to achieve Agency goals**
- **Improve understanding of the Earth's Neighborhood**
  - Refine concepts and science needs
- **Improve definition of the robotic/human partnership in space**
  - Capture the state-of-the-art for future robotics
  - Quantify and compare robotic/human performance in projected operations
  - Increase understanding of critical Bioastronautics issues
- **Advance Technology for Human/Robotic Exploration and Development of Space (THREADS)**
  - Discover innovative concepts and technology
  - Show progress in key technology areas
- **Expand leveraging activities**
  - Active investments from; NIAC, RASC, SBIR, SSP
  - DoD - opportunities through Technology Area Review and Assessment (TARA), Advanced Concept Technology Demonstrations (ACTD), etc.
  - Education; Steckler Trust

Viewing Cosmic Origins and Destiny



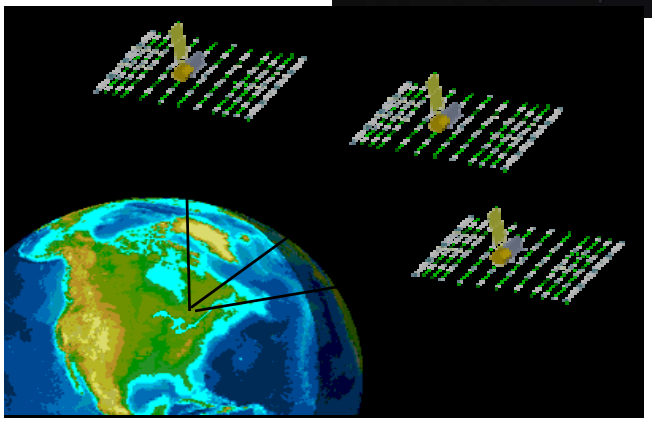
Searching for biomarkers in planetary atmospheres



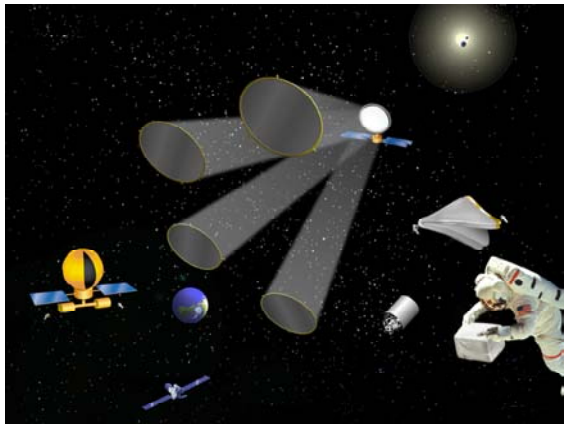


The birth of stars and planets

Detailed environmental monitoring

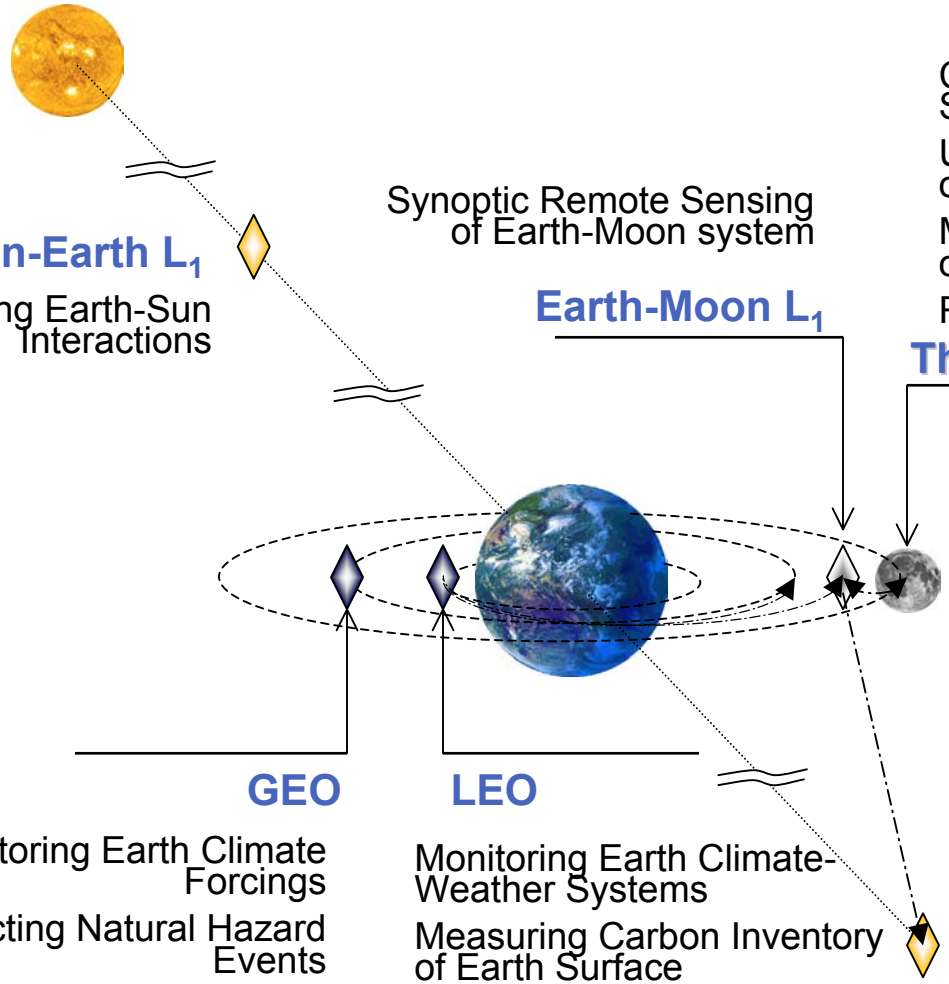


Studying habitability around neighboring stars



Impact history and evolution of the Moon

Example : Science



Sun-Earth L_1

Monitoring Earth-Sun Interactions

Synoptic Remote Sensing of Earth-Moon system

Earth-Moon L_1

Calibrating the "clocks" for Solar System Events

Understanding Isotopic Character of Solar System Volatiles

Measuring Lunar Collision Record of Inner Solar System

Radio Science

The Moon

Earth-Moon L_2

Monitoring Lunar Collision Record on Short Time Scales

GEO

Monitoring Earth Climate Forcings

Detecting Natural Hazard Events

Improving Weather Predictions

LEO

Monitoring Earth Climate-Weather Systems

Measuring Carbon Inventory of Earth Surface

Measuring State Variables of Earth System

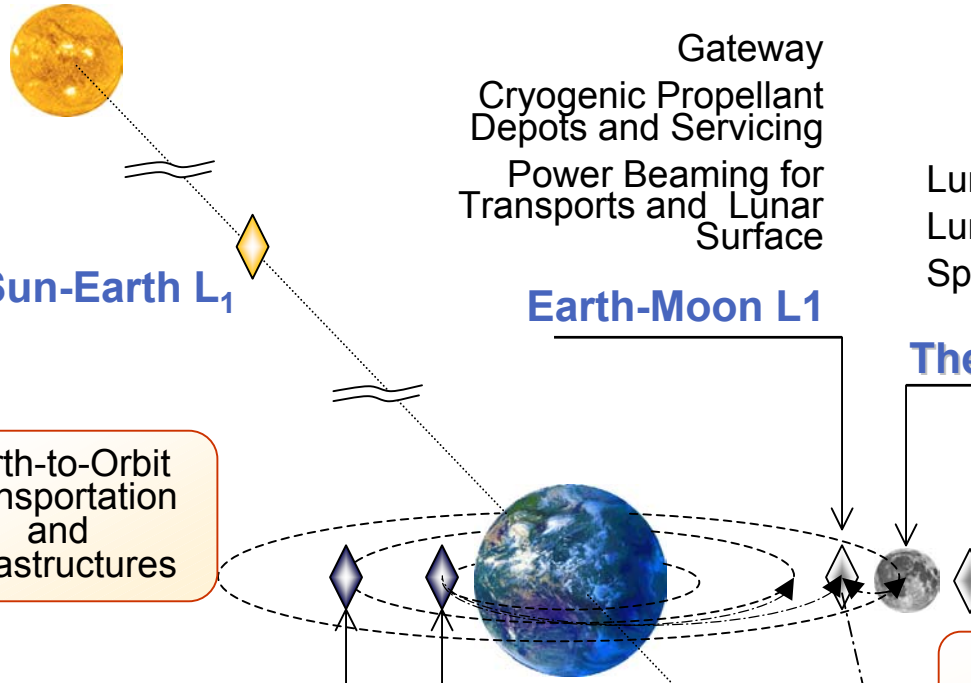
Sun-Earth L_2

Interferometry Planet Finder

Earth Atmosphere Chemistry

A Vision of the Future in the Coming Decades

Example : Utilization



Gateway
Cryogenic Propellant Depots and Servicing
Power Beaming for Transports and Lunar Surface

Lunar Excursion Transportation
Lunar Surface Outpost Systems
Space Resources Development

Sun-Earth L_1

Earth-Moon L1

The Moon

Earth-to-Orbit Transportation and Infrastructures

Earth-Moon L_2

LEO-to-Earth Neighborhood Transportation

GEO

Mega-CommSats
Advanced GEO Operations Systems
Solar Power Satellites

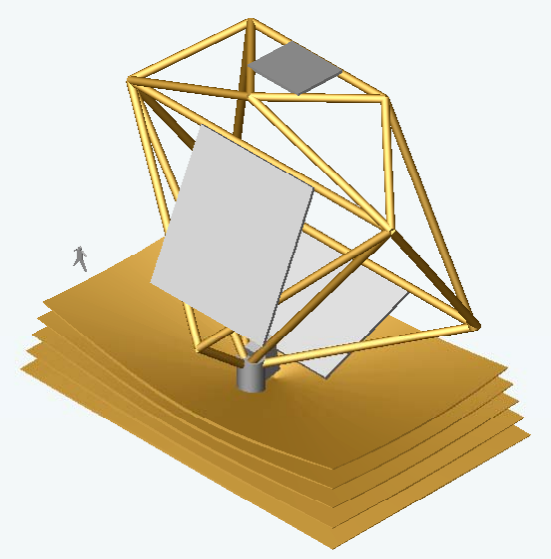
LEO

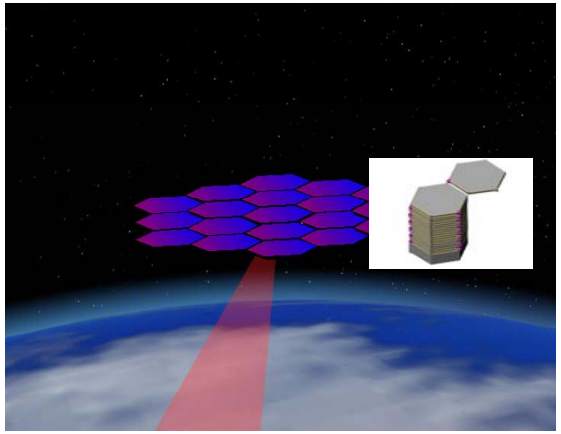
Evolutionary/Advanced Technology for ISS
Space Business Parks
Systems for Public Space Travel and Tourism

Sun-Earth L_2

Observatory Maintenance Systems
Telescope Transfer and Station-keeping

Science Concept Studies





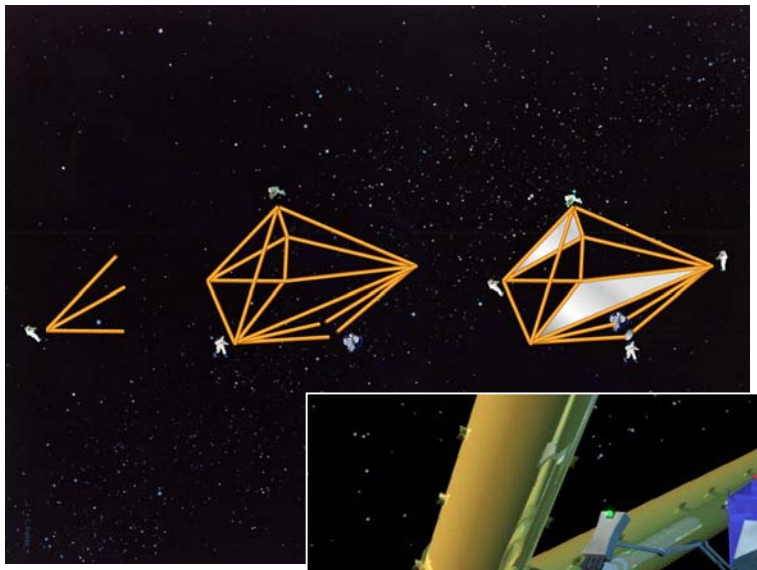
- **Space Science**
  - Defined and analyzed the assembly of large gossamer structures in libration points
    - Studied the optimization of the relative roles of robots and humans in such activities
    - Refined Dual Anamorphic Reflecting Telescope proposal - study system design of a reflecting telescope including astronaut deployment
- **Earth Science**
  - Defined and analyzed geosynchronous Synthetic Aperture Radar (SAR) for tectonic mapping, disaster management, and measurement of vegetation and soil moisture
    - Large (30m) antenna aperture using a reconfigurable, autonomous SAR-based on an array of hexagonal elements which can be assembled in space to form arrays of differing geometries
  - Defined and analyzed geosynchronous Lidar system for atmospheric winds and moisture measurements
    - Requires optics on the scale of 100m

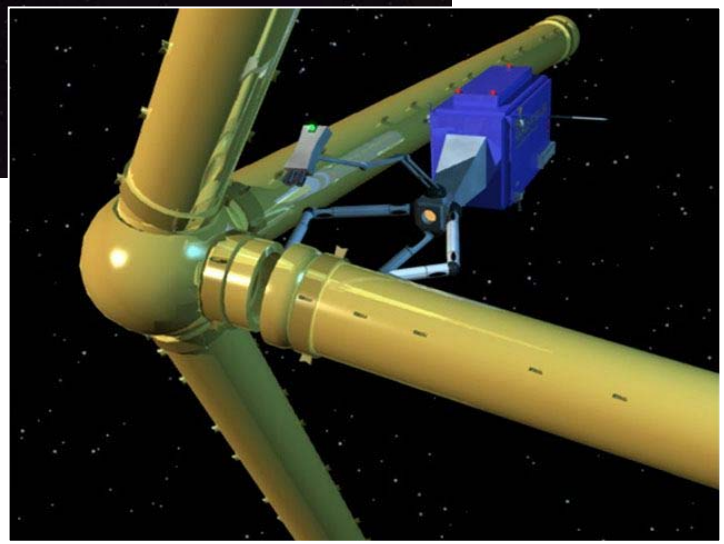
Reports Available - Team X DART Option 1 Study and Geosynchronous lidar and synthetic aperture observatories

Optimizing Deployment of Complex Science Facilities

Evaluation of options for the deployment of large, complex science facilities, beginning with a post-NGST infrared telescope in Low Earth Orbit.

Key results will include:

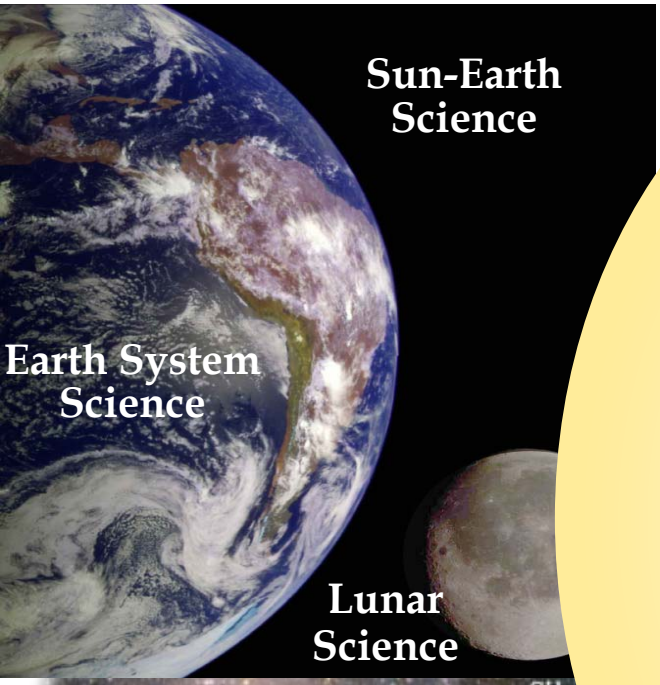


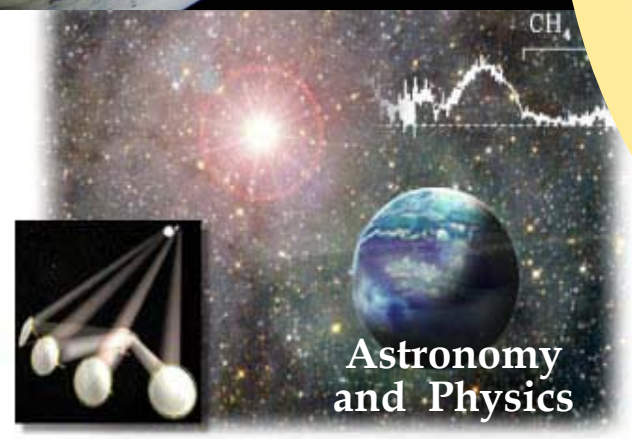


- **Relative effectiveness and cost of robotic-, astronaut-, and autonomous-deployment as a function of major telescope parameters**
- **Priority capabilities to enable deployment (lightweight instrument systems, precision joints and connections, non-contaminating thrusters, . . .)**
- **Priority technologies to enable deployment (high strength-to-weight materials, precision inflatables, moderate-thrust propulsion systems . .)**
- **Mitigation strategies to reduce contamination of cold optics**
- **Launch vehicle requirements as a function of telescope aperture**
- **Basic mission characteristics: subsystem sizes, masses, materials, power . . .**

Transforming Capabilities

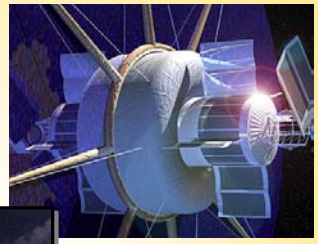
Science Drivers → **Transforming Capabilities** → **New Opportunities in Earth's Neighborhood and Beyond**





High-Isp Transport

Gateway in Earth-Moon L_1

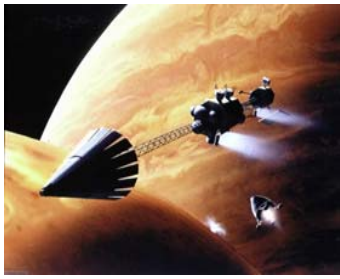


Earth to Orbit Transport

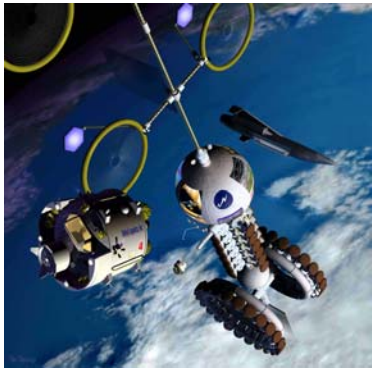
Space Assembly & Servicing

Human-Machine Systems

Ambitious Robotic Missions



Robotic and Human Exploration of Mars



Commercial Development of Space