

# Ganymede Exploration Orbiter - Jovian System Observer

J. F. Cooper, E. C. Sittler, Jr., /GSFC; S. J. Sturmer /USRA, J. Pitman /LM-ATC

## Jovian System Exploration from Ganymede

- Ganymede, other moons, Jupiter, magnetosphere
- Stable ~ 10<sup>2</sup> yr station-type orbit operations
- Natural magnetic shielding in dipole field
- Surface deformations 1-30m for subsurface oceans
- Surface geology and topographic mapping
- Active remote sensing for surface composition
- Remote surface seismo-acoustic sensing
- Remote astrobology, lander surveys
- Telecom relay for other Jovian system missions

## GSFC Planetary Laser Altimeter Heritage

- MOLA / Mars Global Surveyor
- MLA / Mercury Messenger
- ICESat / Earth cryosphere, polar ice sheet survey
- LOLA / Lunar Reconnaissance Orbiter
- Multiple Instrument Distributed Aperture Sensor (MIDAS) infusion from LM-ATC

## Overall Technology Implementation Goal

*High capability science instrument suites for conventional planetary spacecraft missions in fulfillment of outer planet science objectives*

## Funding Categories

- 2004 NASA/HQ High Capability Instrument awards
- LM-ATC IRAD funding for MIDAS & other optics
- 2005 NAI proposal - Space Physics of Life (SPOL)
- Discovery and New Frontiers mission opportunities

## NASA Outer Planet Mission Resources

- JPL expertise - missions, navigation, surface radar
- GSFC expertise - optics, laser altimetry, space physics
- MSFC expertise - lunar/planetary x-ray telescopes

## Related Recent and Upcoming Developments

- Ganymede Observer / Io Observer missions cited in 2003 NRC Solar System Exploration Survey
- GEO / JSO mission concept in SPOL proposal
- Cassini – Jupiter Dec. 2000 flyby, Saturn orbital tour
- Startup of MRO orbital remote sensing operations
- New Horizons Jupiter flyby February - March 2007

## Future Plans

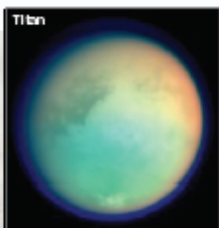
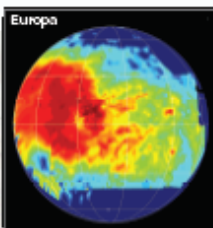
- Science instrument application studies for MIDAS
- Ganymede/Europa, Titan/Enceladus mission studies
- Jupiter and Saturn flagship mission architectures

# Space Physics Of Life (SPOL)

(SPOL)



NAPC 2005



The Search for Habitable Worlds, Resources and Signs of Life in the Context of the Space Environment

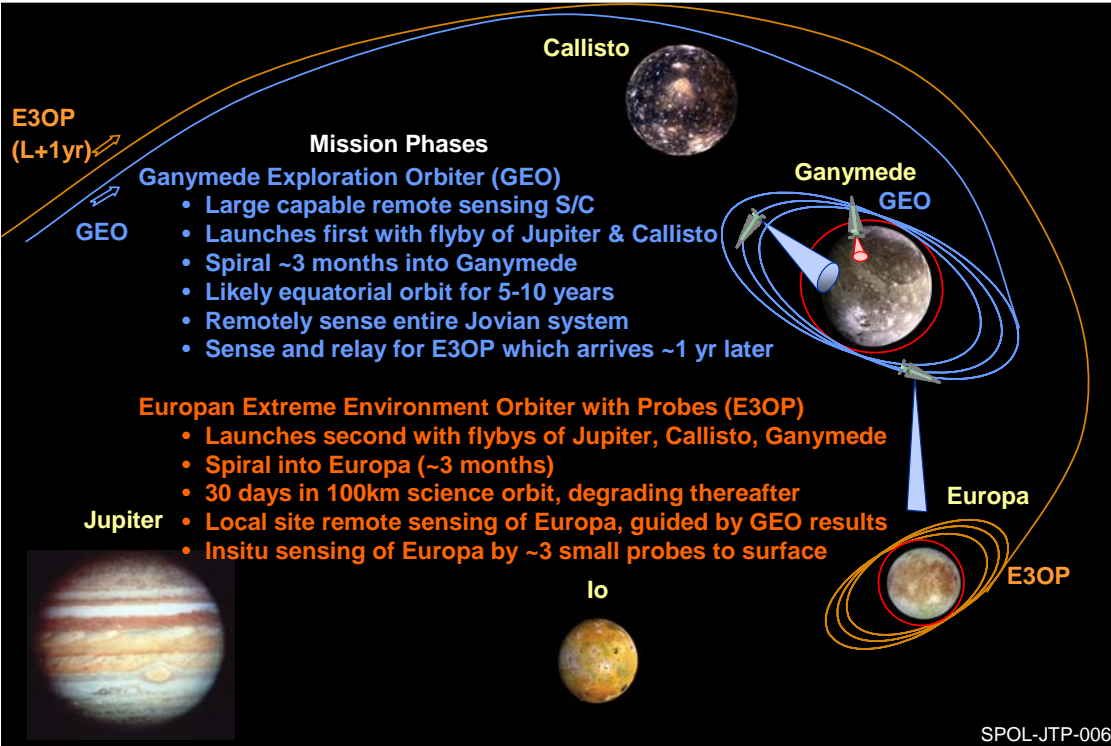
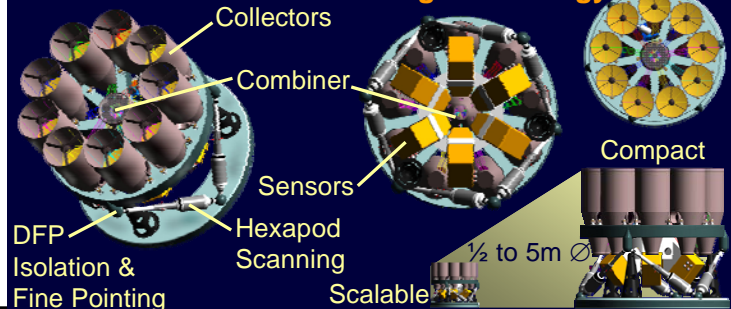
Goddard Space Flight Center  
 Marshall Space Flight Center  
 Jet Propulsion Laboratory  
 Lockheed Martin - ATC  
 Washington State University

Arizona State University  
 Georgia Inst. of Technology  
 Hampton University  
 Louisiana State University

University of California - Berkeley  
 University of California - Los Angeles  
 University of Massachusetts - Lowell  
 University of Virginia

Principal Investigator: Dr. John F. Cooper  
 Laboratory for Solar and Space Physics, Code 612.4  
 NASA/GSFC, Greenbelt, MD 20771  
 Submitted in Response to: NASA Astrobiology Institute  
 CAN Cycle 4 NNAH05ZDA001C October 28, 2005

## MIDAS Remote Sensing Technology



SPOL-JTP-006

## LM-ATC MIDAS 1m to 3m Payload on GEO

- Compact, cost-effective large-aperture payload
  - Imaging to diffraction limit of array's overall diameter
  - Ganymede to ~1cm/px from 100km science orbit
  - Europa to <100m/px for >5 yrs from Ganymede orbit
- Stable, 60 dB isolated, precision-pointed payload
- Complementary passive & active sensing modes
  - Concurrent multispectral imaging & FTIS to <1nm
  - Active ranging: Doppler LIDAR, vibrometry, etc
  - Active imaging: polarimetric, 3D LADAR, stereo, etc
  - Active spectroscopy: fluorescence, Raman, etc
- Optical comm transceiver for enhanced data return