



AlmS: Acousto-Optic Imaging Spectrometer



David Glenar, NASA/GSFC, AIMS PI

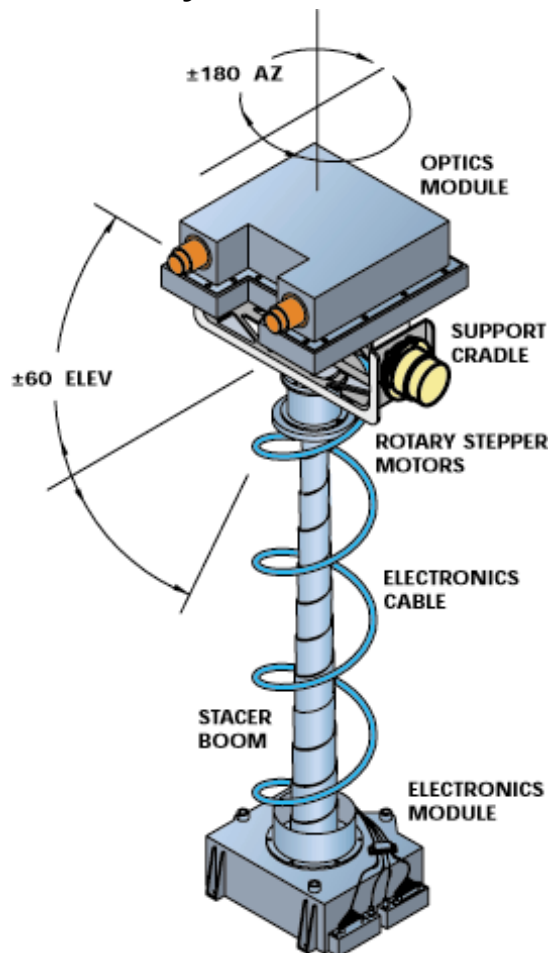
Diana Blaney, JPL, Co-I

Dan Britt, U. Tenn, Co-I

GSFC Engineering: Jay Parker, Tom Flatley

University of Maryland: Dept. of Aerospace Engineering

Industry: Lockheed Martin, Rockwell, NEOS, Orbital Fairchild



SCIENCE OBJECTIVES

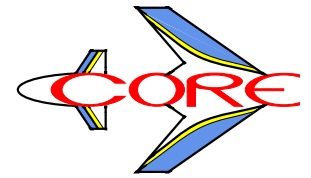
- Spectral mapping of: Iron oxides, clay minerals, CO₂ and H₂O ice/ frost, chemically bound & absorbed H₂O, carbonates, sulfates and silicates, at centimeter to meter scales.
- Rapid, 360-degree spectral-spatial site characterization.
- True-color restoration
- Distance reckoning

AIMS SPECIFICATIONS

- A two channel (VIS/IR), electronically tunable, stereoscopic, "hyperspectral" camera
- Tuning Technology: Acousto-optic tunable filters
- Tuning range: 0.5-1.02 μm (Ch 1) 0.9-2.4 μm (Ch 2)
- Spectral resolution ($\lambda/\Delta\lambda$): 190-530
- SNR: to 350
- FOV: 12x17 deg (Ch1) 12x12 deg (Ch2)
- Optics temperature range: 160-260 K
- Phys: 2.1 kg optics module (24 x 24 x 9 cm)
~ 1.5 kg flt electronics; Pwr ~ 12 watts



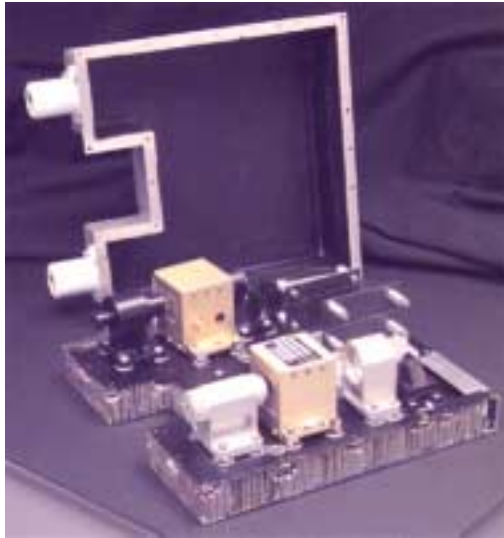
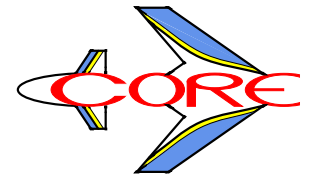
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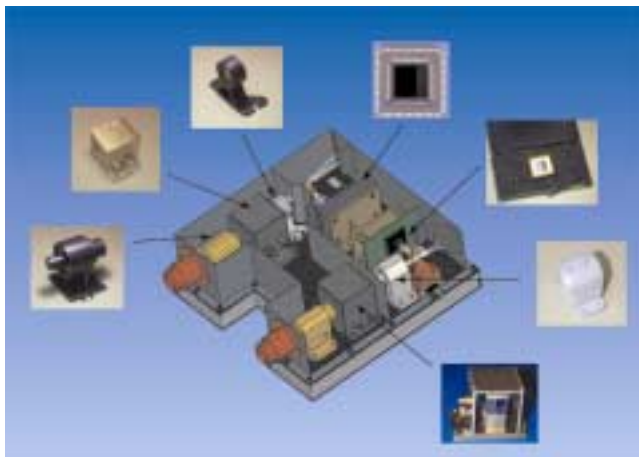
- University of Maryland's role
 - Thermal analysis of deck and cover
 - Placement design and design of optical hard points
 - Fabrication of deck and cover



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Optics module during component fit check
3D-Drawing and Optical Piece Parts



FY '00 Accomplishments:

- All optical components (AOTFs, optics) and "B"-grade CCD/FPA delivered.
- Opto-mechanical assembly of optics module nearly complete (see photo).
- AIMS environmental shroud ready for thermal tests (photo below).
- VNIR Channel breadboard completed. Acquired image cubes of mineralogical field samples and meteorite powders.
- GSE station and preliminary version of WEB software ready. Awaiting test.
- CCD front-end electronics breadboard under test. Some changes expected.

FY '01 Plans:

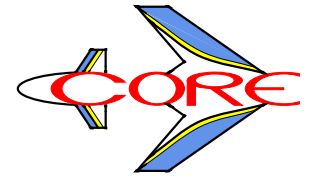
- Complete CCD/ IR-FPA front-end electronics
- Integration, alignment and lab science performance testing
- Field testing (location TBD)

Environmental
shroud (Janis, Inc.)

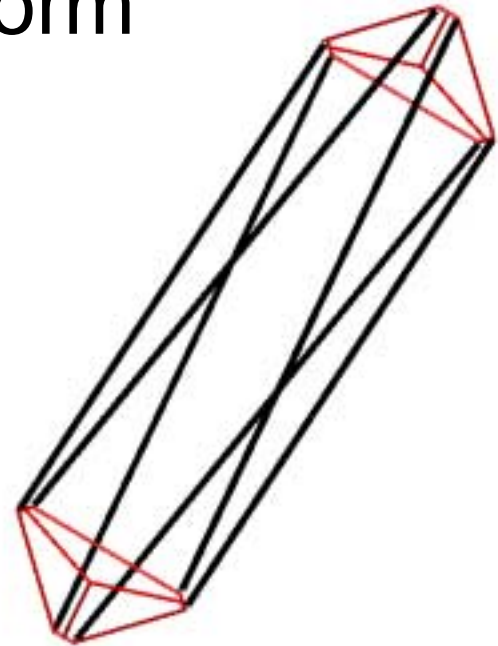
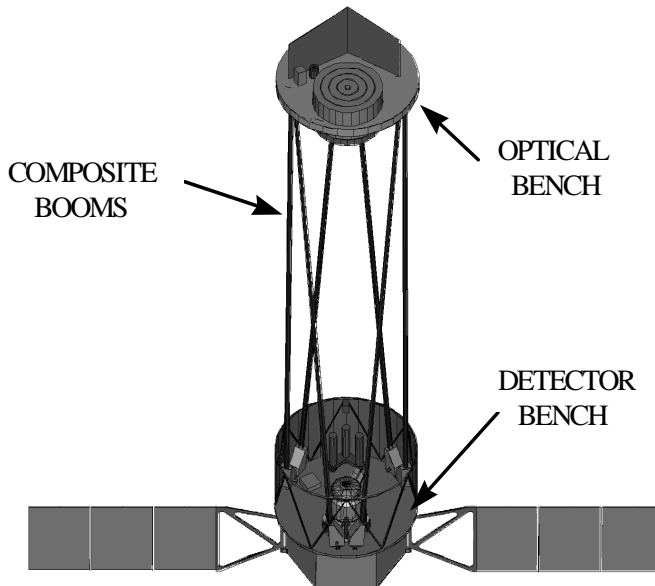




Composite Extendible Boom

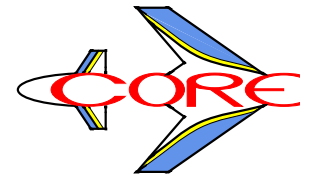


- NASA Goddard DDF
- Maryland to build, assemble, and test 30' Stewart Platform





Boom Manufacture

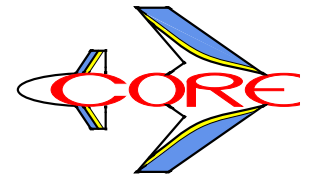


**Manufacture of booms on
Aluminum mandril with
internal heater**





Composite Extendible Booms

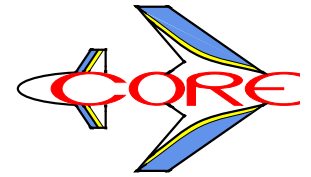


**First time
lateral
assembly**

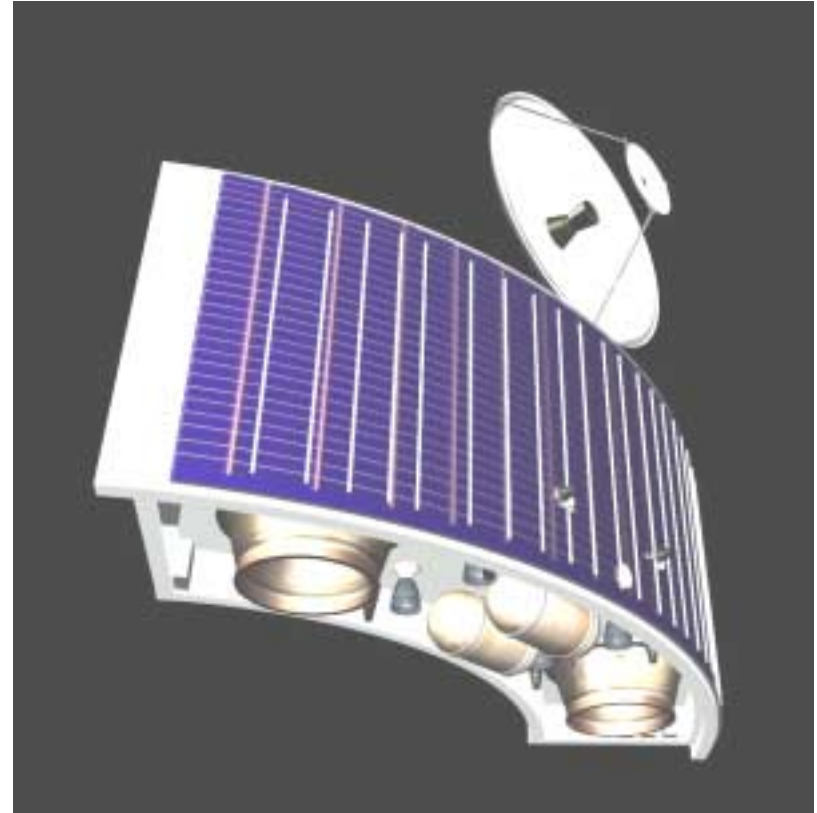




Mars Micromission

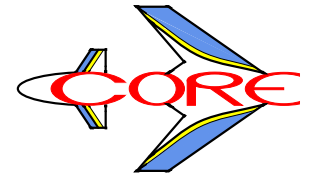


- Carleton Technologies, Inc, Pressure Technology Division – design and build qualification units for Propellant and Pressurant tanks (JPL).
- University of Maryland sub to PTD to design and build composite skirt, 300 g to carry 80 kg propellant at 25 g.

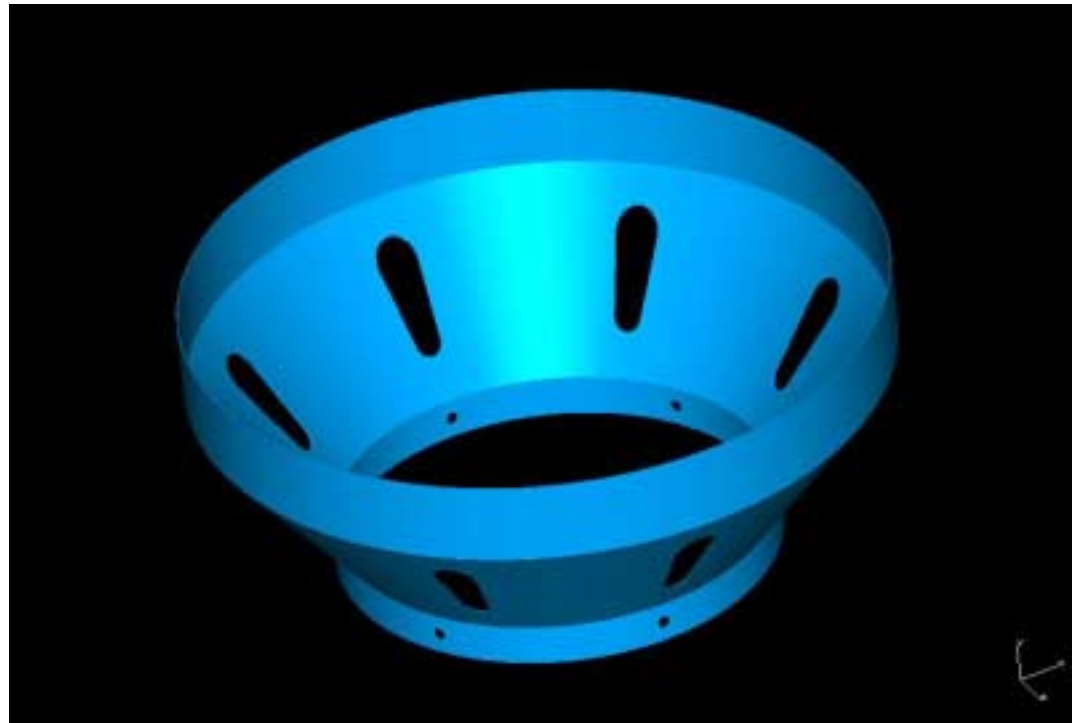




Skirt Design



- High stiffness Graphite/Cyanate Ester
- Cutouts for lightening
- Titanium bushings

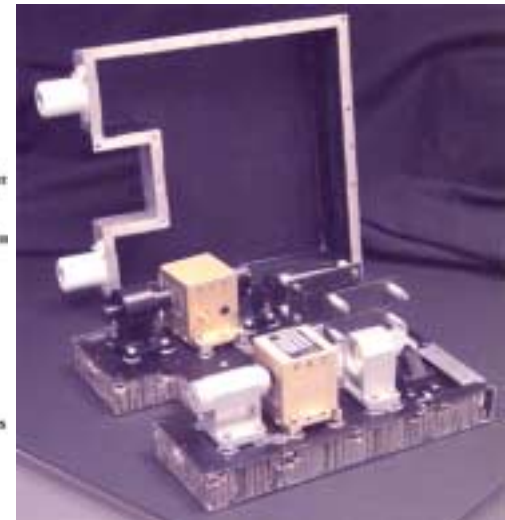
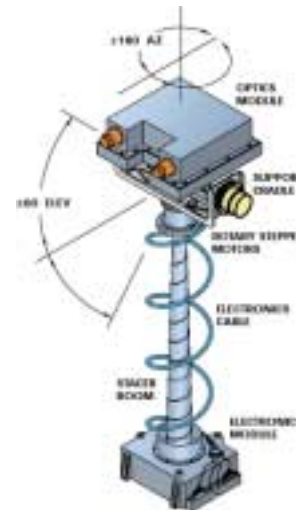




University of Maryland Composites Research Laboratory

- Specializing in:
 - Lightweight and Multifunctional Structures
 - Deployable and Inflatable Structures
- Location/Special Facilities
 - College Park, Maryland
 - Complete fabrication including, autoclave, hot press, specialized machining
 - Extensive testing capabilities including 500-200k lb load cells, static/fatigue, hot, cold (LN2), various ASTM stds
- Current Activities
 - Sponsored Research with:
 - NASA Goddard
 - NRL
 - Pressure Technology Div/JPL
 - NRTC
 - FAA
 - Design and build space structures, sandwich structures, structural integrity.

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Alms Optics module during component fit check