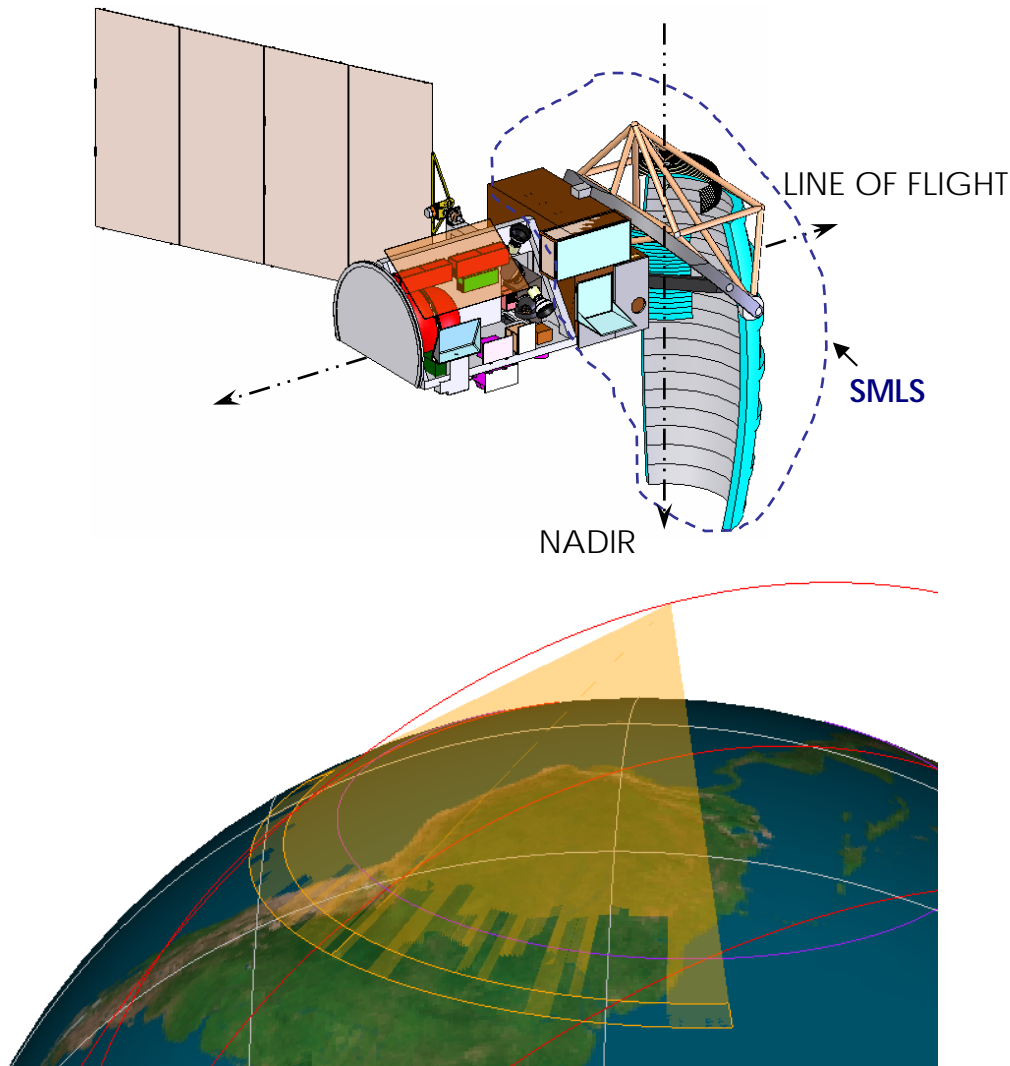


Composition of the Atmosphere from Mid-Earth Orbit (CAMEO) Scanning Microwave Limb Sounder (SMLS)



Sub-mm (200-600 GHz) passive limb sounding radiometer.

- ~1° vertical limb scan in ~10s
- ±65° conical azimuth scan of 0.05x1° HPBW footprint in 0.5s: small mirror sweeps beam over toroidal reflectors
- Atmospheric limb an extended source (no 'guide star' for adaptive correction)
- At these frequencies, significant thermal deformations dictate low CTE materials
- Precessing orbit: 4m Primary reflector temperature [-30,+150] °C
- JPL 2006 study concluded that composite sandwich architecture, like EOS MLS, is feasible for thermal, launch loads
- Primary, Secondary share differing principal curvatures (barrel shape):
 - Drives thermal deformations
 - Enables low areal densities

NASA SBIR/STTR Technologies



Thermally Stable Multi-Meter Aperture Sub-millimeter Reflector

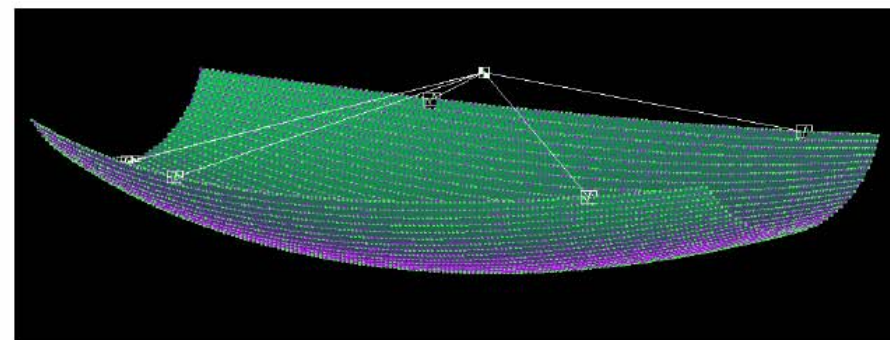
Contract: NNC07QA69P

PI: Theodore G. Stern, DR Technologies, Inc. – San Diego, CA

Identification and Significance of Innovation

The next generation of sub-millimeter and microwave instruments, such as the planned CAMEO mission at JPL, will need larger aperture reflectors to meet science requirements for increased temporal and spatial resolution. Despite the inherently good properties of GFRC materials for sub-millimeter reflector applications (lightweight, stiff, low thermal expansion), several obstacles exist to successful scale-up of the technology from the ~2m to ~4m range.

Expected TRL Range at the end of Contract (1-9): 5



Technical Objectives and Work Plan

The overall objective of this proposed effort is to support the scale up of lightweight thermally stable composite reflector technology to meet the requirements of next generation sub-millimeter and microwave instruments. The goal is to achieve surface accuracies of 5 to 10 microns RMS for aperture sizes in the 4+ meter range and with areal densities of 5 to 10 kg / m².

NASA and Non-NASA Applications

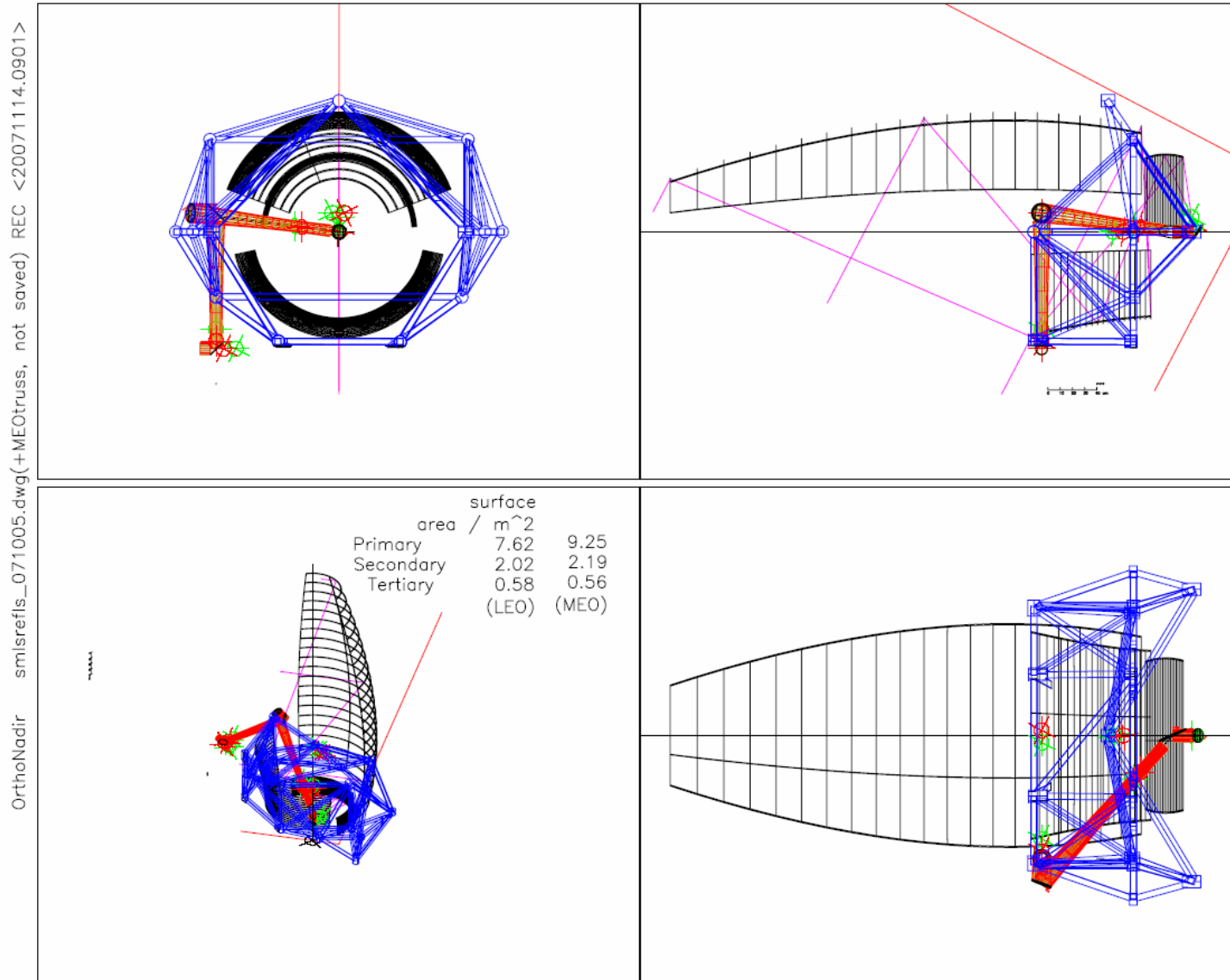
Composition of the Atmosphere from Mid-Earth Orbit (CAMEO)
Scanning Microwave Limb Sounder (SMLS) Instrument
High frequency, high bandwidth data communications.
Space to Ground Antenna Group (SGANT) for the International Space Station and Orion Launch Vehicle

Firm Contacts

Theodore G. Stern 858-587-4210
Daron Giles 858-587-4210
Steve Sherman 858-587-4210

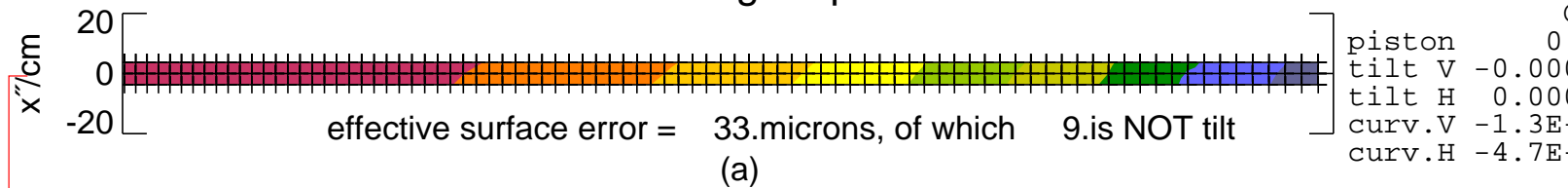
NON-PROPRIETARY DATA

Low-Earth Orbit SMLS



•MEO→LEO (1500→830 km) changes all prescriptions; most evident in Primary

55.2 deg.Az.pixel



SMLS_BASELINE_B60: T= 6.89509E+04:subcase_12

PM

