

TECHNOLOGICAL NEEDS OF ADVANCED
EARTH-OBSERVATION SPACECRAFT

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Because this paper was not available at time
of publication, only slides are presented.

EOS Study Objective

Provide Design and Analysis Data on
Microwave Radiometer Satellites, Augmented
with Additional Earth Surface and
Atmospheric Observation Sensors.

EOS Study Outline

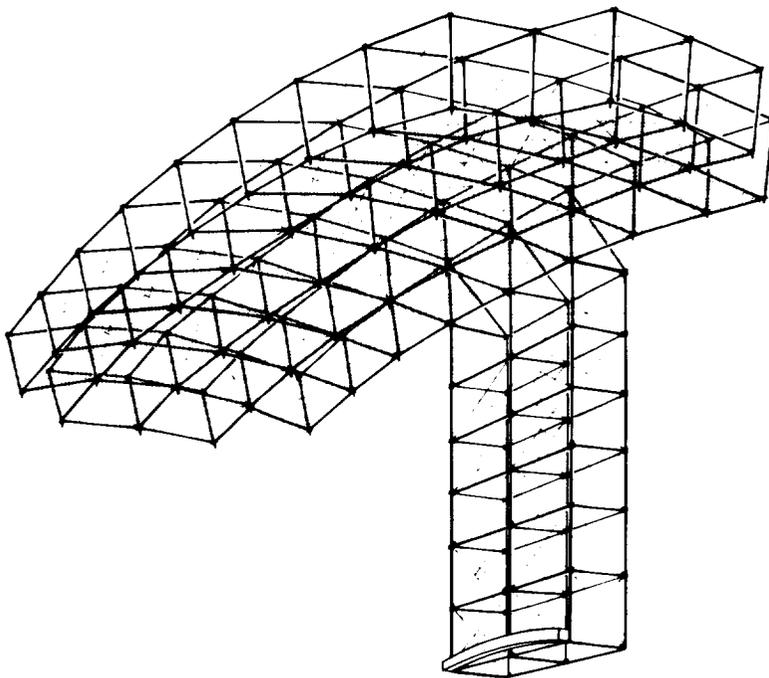
- Analyze Mission Scenarios
Develop Sensor Sets
- Develop Conceptual Spacecraft Designs
Perform Spacecraft Analyses
- Evaluate and Rank EOS Concepts
Identify Compromises/Advantages for Multidiscipline EOS
- Perform Parametric Subsystem Analyses
Identify New Technology Requirements
- Expand LaRC Integrated Analysis Program

EOS — Systems to be Considered

- Microwave Radiometer Satellite (MRS)
 - 50 - 200 m Diameter
 - 700 km Altitude

- MRS Plus Supplementary Instruments for
 - Earth Observations, or
 - Ocean Observations, or
 - Atmospheric Observations, or
 - Combinations of the Above

120 Meter x 60 Meter Radiometer



120 Meter by 60 Meter Radiometer Design Parametric

Size

- 8 Bay by 4 Bay Reflector
- 8 Bay by 2 Bay Feed Mast
- 15 Meter Boxes

Member Sizes

- Surface 8.9 cm (3.5 in.) Diameter by 0.089 cm (0.035 in.)
- Verticals 6.35 cm (2.5 in.) Square by 0.089 cm (0.035 in.)

Weight

- (6900 lb) 3130 Kg Reflector, Feed, and Mesh
- (1000 lb) 454 Kg Feed Mass Allocation

Dynamics - First Five Fundamental Frequencies

- 1) 1.23 Hz
- 2) 1.46 Hz
- 3) 1.78 Hz
- 4) 4.21 Hz
- 5) 4.41 Hz

Typical Measurement Requirements for MRS

Measurand	Range	Resolution, km	Repeat, days	Observable at, GHz
Soil Moisture	5-40%, 10-25-cm Depth	1-10	1-3	1-10
Water Surface Temperature	270-310°K	1-10	1-3	1-8
Water Roughness (Wind)	0-60 m/s	1	3-7	1-37
Salinity	0-40 PPT	1-10	1-3	1-2
Water Pollution (Oil Slicks)	0-1-cm Thickness	1	1	1-10
Probable Operating Frequency: 1-5 GHz				

Typical Supplementary Observations

Earth Surface

Resource Identification
and Mapping
Land Mass Imaging
Geological Feature
Identification

Atmosphere

Composition
Dynamics
Energy Transfer

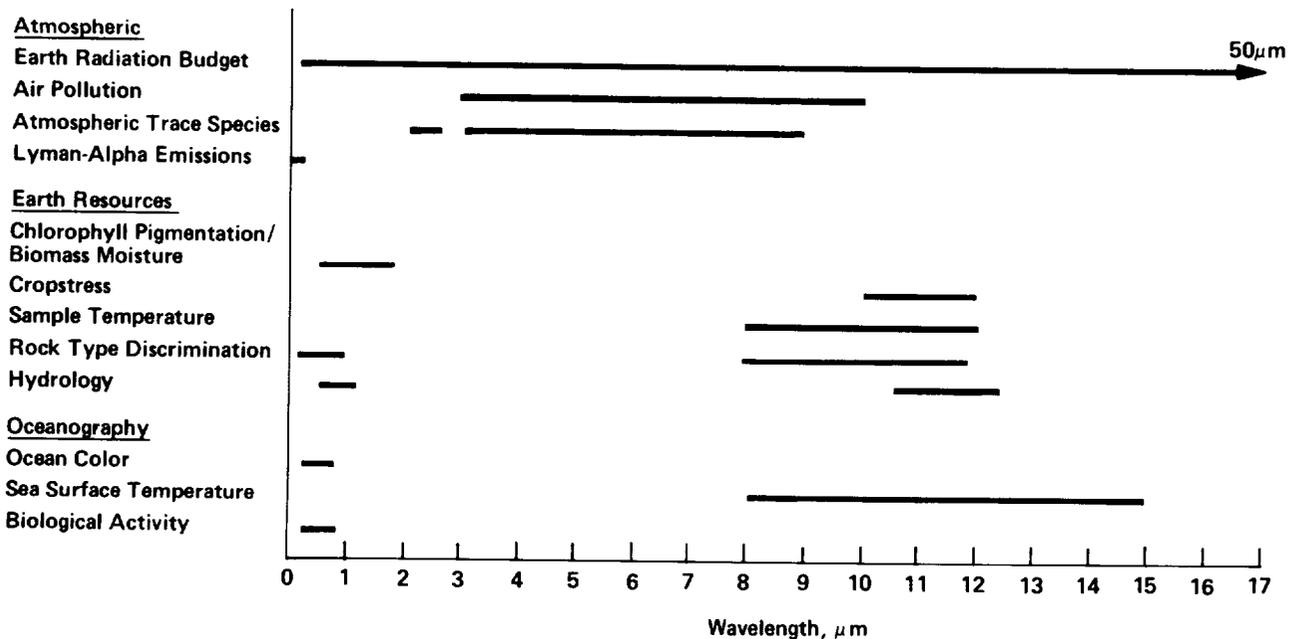
Ocean

Color
Currents
Wave State
Ice

Spectra

Ultraviolet
Visible
Infrared
L/X-Band SAR

Remote-Sensing Spectral Distribution



Typical Instrument Characteristics

Mass:	10-500 kg (2/3 in 50-250 kg Range)
Altitude:	700 km Okay for Most, (SARs are Large at 700 km)
Orbit Inclination:	60 deg Okay for Most, Some Require 98 deg
Pointing Accuracy:	± 0.1 deg for All
Pointing Stability:	± 30 arc-s for All
Unobstructed LOS Access:	NADIR ± 90 deg along and across Track
Average Power:	500 w/Instrument Except for SAR (Several kW) LIDAR (2.6 kW), All 28 Vdc
Data Rates:	1 kbps - 120 Mbps per Instrument Real Time, Near Real Time