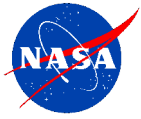


LRO CRaTER Preliminary Temperature Predictions

Design A Concept Old Concept

April 12, 2005

Cynthia Simmons/ESS

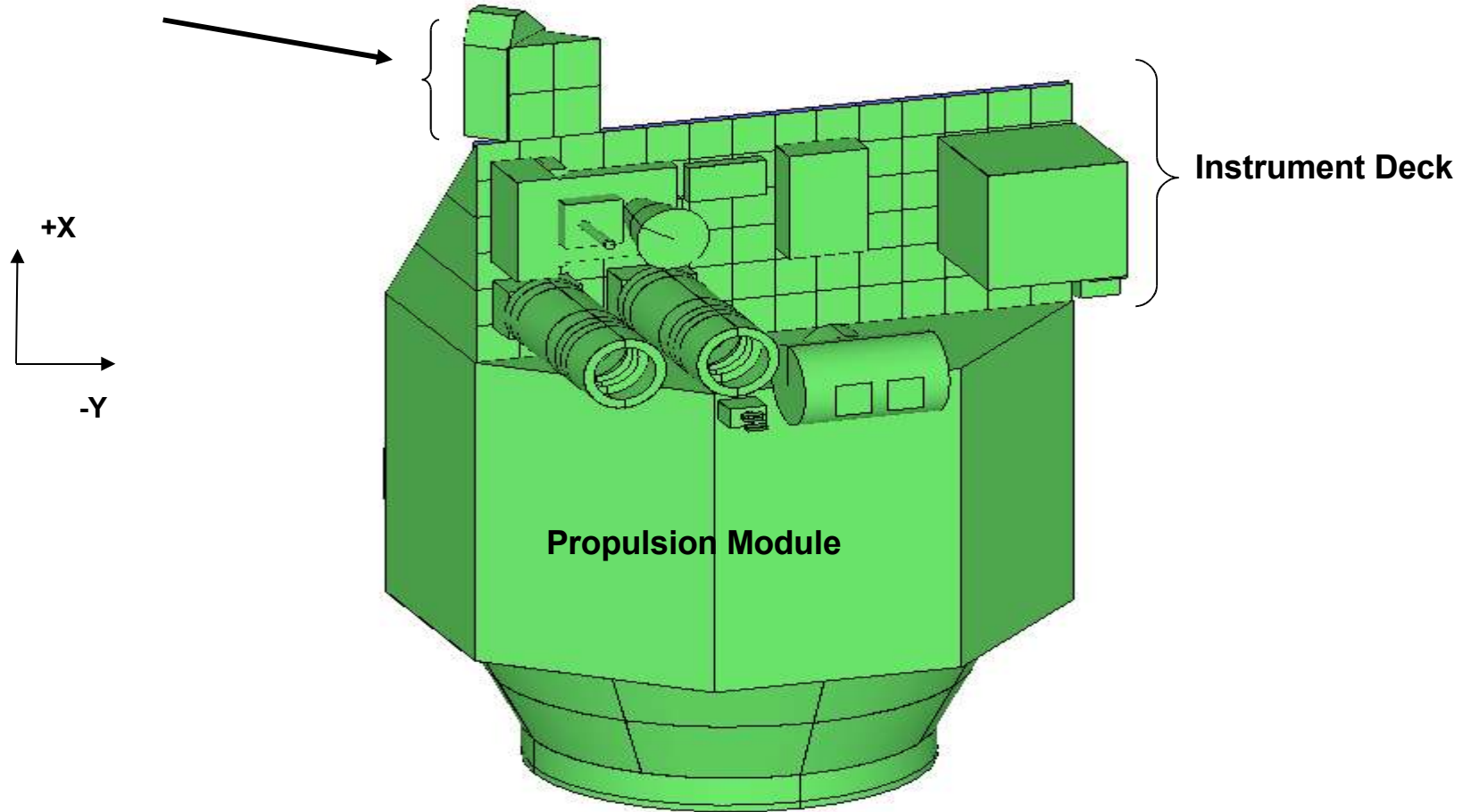


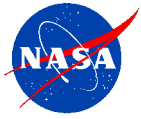
Latest LRO Geometry Model

Design A Concept



CRaTER located on its own bench in old spacecraft concept



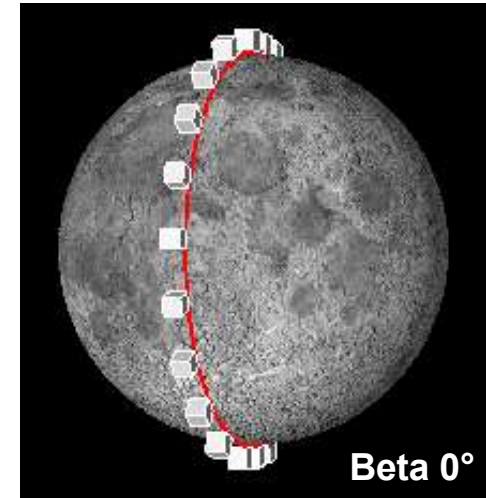


LRO Thermal Environment



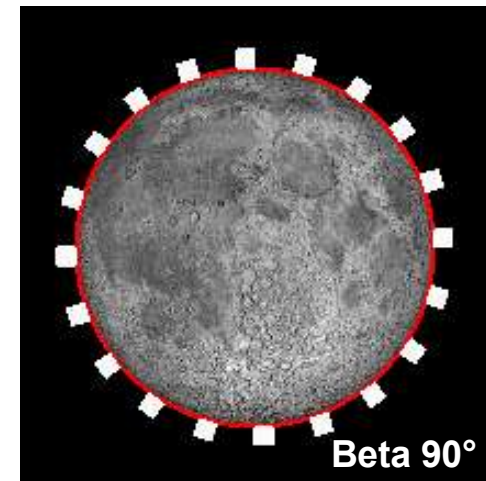
Orbit Parameters

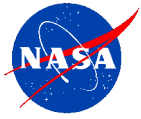
type	lunar circular
altitude	50 +/-20 Km
inclination	90°
orbit period	113. minutes
full sun orbits	beta 90.0° to 76.4° (55 days/yr)
eclipsed orbits	beta 76.4° to 0.0° (310 days/yr)
max. eclipse	48. minutes (beta 0°)
lunar orbit plane angle to earth	5.15°



Lunar Thermal Environment

solar constant	1420 - 1280 W/m ² (Hot to Cold)
albedo factor	0.13 – 0.06 (0.073 average)
Lunar emittance	1 – albedo factor
infrared emission	
sunlit side	varies (cosine from sub solar point)
sub solar point	400 K (1335 W/m ²)
dark side	100 K (5.22 W/m ²)



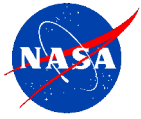


Thermal Model Assumptions For CRaTER Instrument



Instrument	I/F Conductance Value (W/m ² -C)	Model Linear Coupling (J/C)	Instrument Thermal Dissipation (W)		Operational Temperature Limit (°C)	
			Hot Case	Cold Case	Minimum	Maximum
CRATER	20	1.0798	6.6	5.4	-30	35



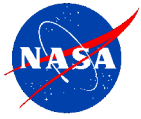


Preliminary Results (Steady-state)



CRaTER Node Number	Predicted Temperature (°C)		Heater Power (W) (Cold Case)	Operational Temperature Limit (°C)	
	Hot Case	Cold Case		Minimum	Maximum
CRATER.1	20.9	-26.0	0	-30	35
CRATER.2	23.2	-23.9	0	-30	35
CRATER.3	24.0	-23.1	0	-30	35
CRATER.4	23.7	-23.4	0	-30	35
CRATER.5	23.8	-23.5	0	-30	35
CRATER.6	23.8	-23.5	0	-30	35
CRATER.7	27.6	-19.9	0	-30	35
CRATER.8	24.4	-22.9	0	-30	35
CRATER.9	24.1	-23.2	0	-30	35
CRATER.10	24.1	-23.1	0	-30	35
CRATER.3001 (MLI)	0.4	-16.1	0	-30	35
CRATER.3002 (MLI)	5.5	-62.5	0	-30	35
CRATER.3003 (MLI)	-30.9	-57.8	0	-30	35
CRATER.3004 (MLI)	-22.1	-90.3	0	-30	35
CRATER.3005 (MLI)	-7.4	-157.4	0	-30	35
CRATER.3006 (MLI)	5.5	-152.7	0	-30	35
CRATER.3007 (MLI)	-42.9	-154.8	0	-30	35
CRATER.3008 (MLI)	-41.9	-156.8	0	-30	35
CRATER.3009 (MLI)	3.4	-146.2	0	-30	35
CRATER.3010 (MLI)	-7.1	-70.8	0	-30	35
Spacecraft Instrument Deck	+21	-30	4.1	N/A	N/A



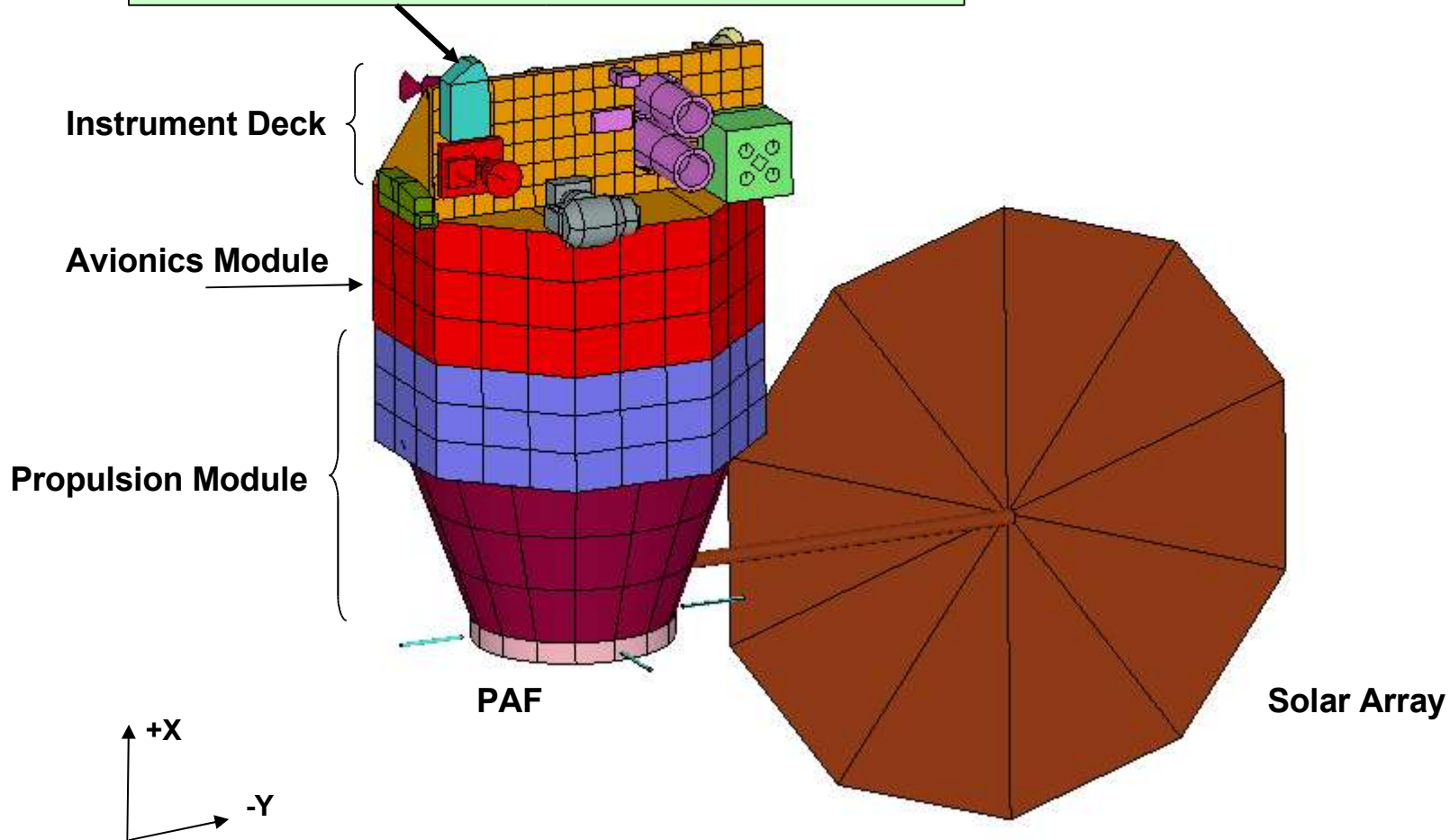


Latest LRO Geometry Model

Design E Concept



CRaTER location in latest spacecraft concept



NOTE: Star Trackers and solar array will be moved to new location.

