

Going Out in a Blaze of Glory: Cassini Science Highlights and Grand Finale



Trina L. Ray
with thanks to
Earl Maize and Linda Spilker, and Erick Sturm



Jet Propulsion Laboratory
California Institute of Technology

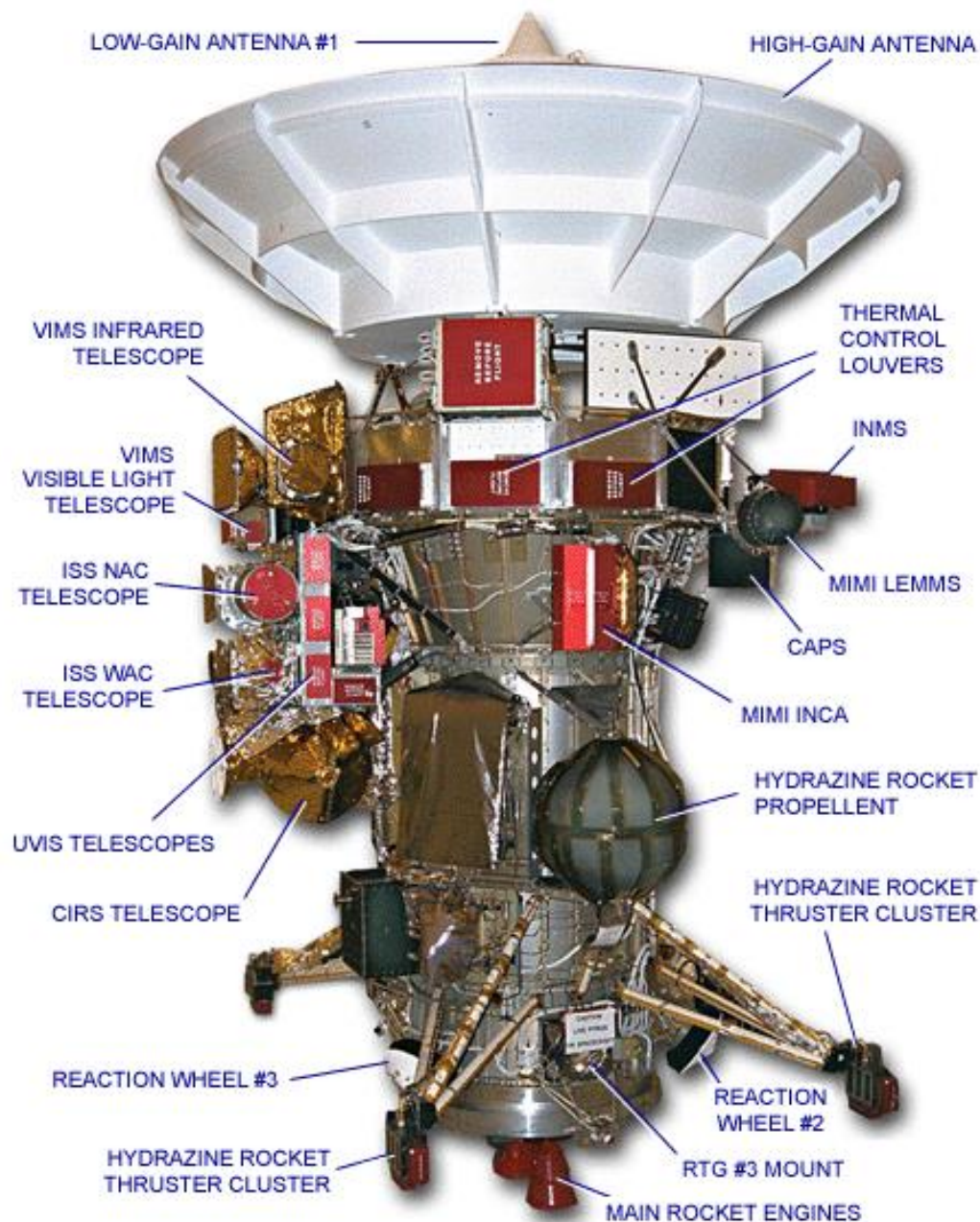
Cassini Orbiter & Huygens Probe



Cassini Spacecraft Specs

- Height: 6.8 m (22 ft)
- Diameter: 4 m (13 ft)
- Mass: 2125 kg (2.8 tons)
(fueled+probe): 5574 kg (6 tons)
- Power: 875 Watts at Launch
670 Watts currently
- .5 GB recorder
- Huygens Probe:
320 kg (~700 lbs)

The 12 Orbiter Instruments



Cassini Instruments:

Optical Remote Sensing (ORS)

CIRS: Composite Infrared Spectrometer

ISS: Imaging Science Subsystem

UVIS: Ultraviolet Imaging Spectrograph

VIMS: Visual and Infrared mapping Spectrometer

Microwave Remote Sensing

RADAR: Cassini Radar

RSS: Radio Science Subsystem

Magnetospheric and Plasma Science (MAPS)

CAPS: Cassini Plasma Spectrometer

CDA: Cosmic Dust Analyzer

INMS: Ion and Neutral Mass Spectrometer

MAG: Magnetometer

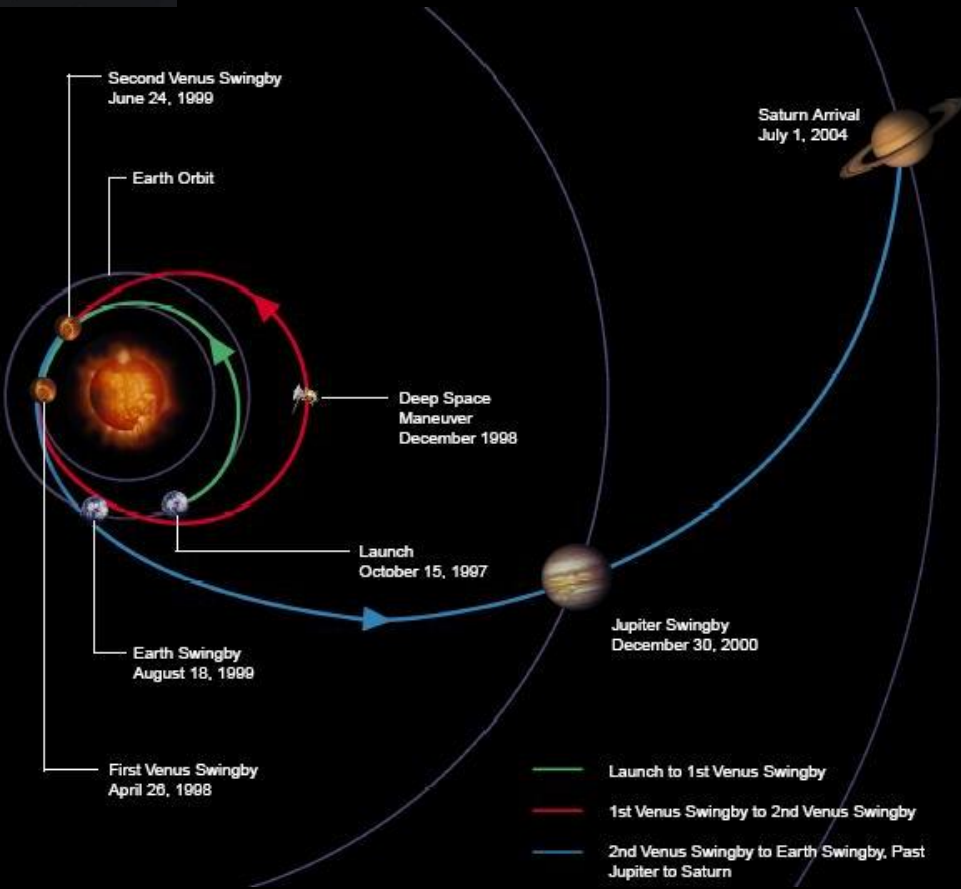
MIMI: Magnetospheric Imaging Instrument

RPWS: Radio and Plasma Wave Science

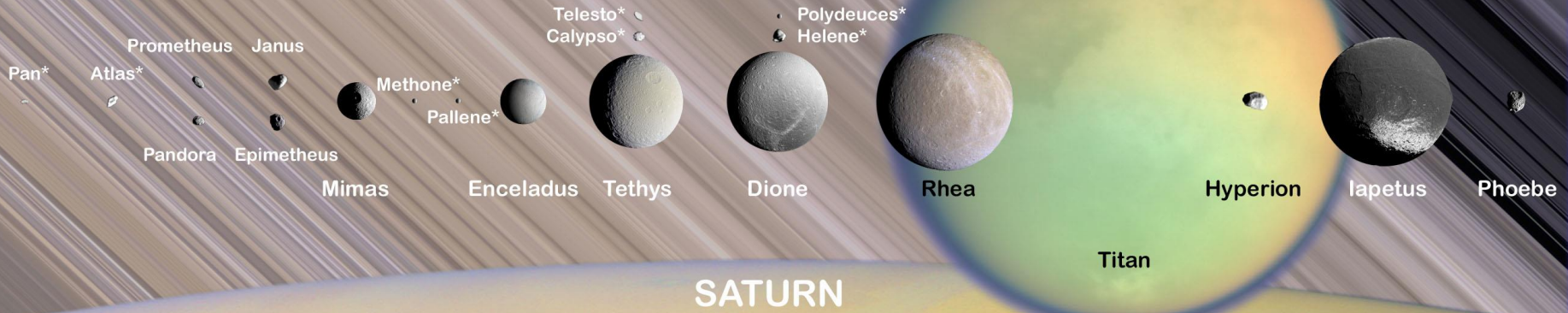


Launched on October 15, 1997 from KSC

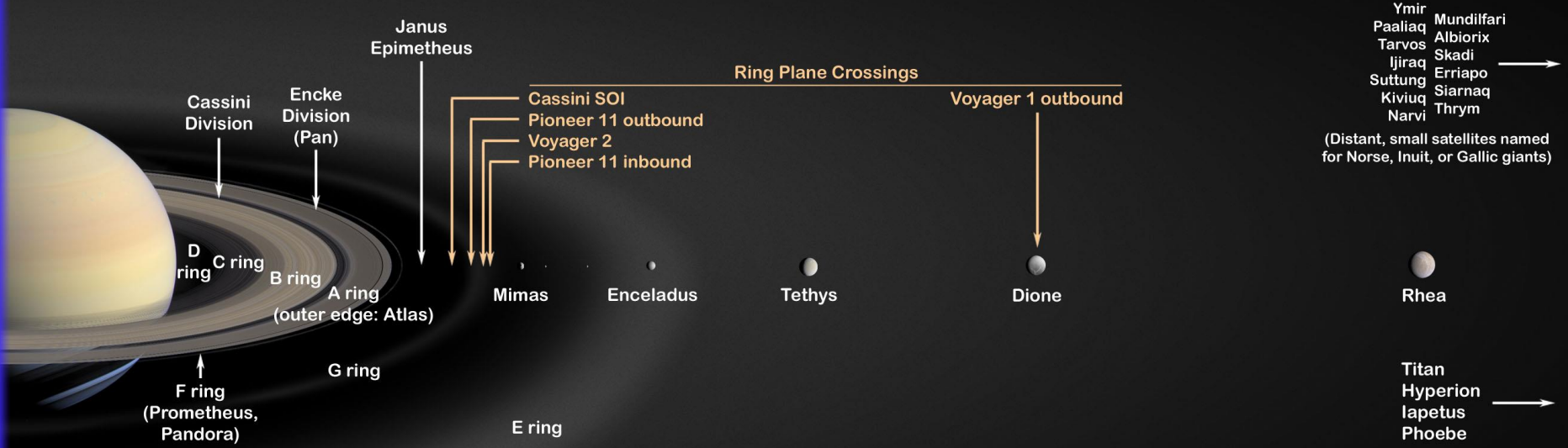
7 year cruise on VVEJGA trajectory



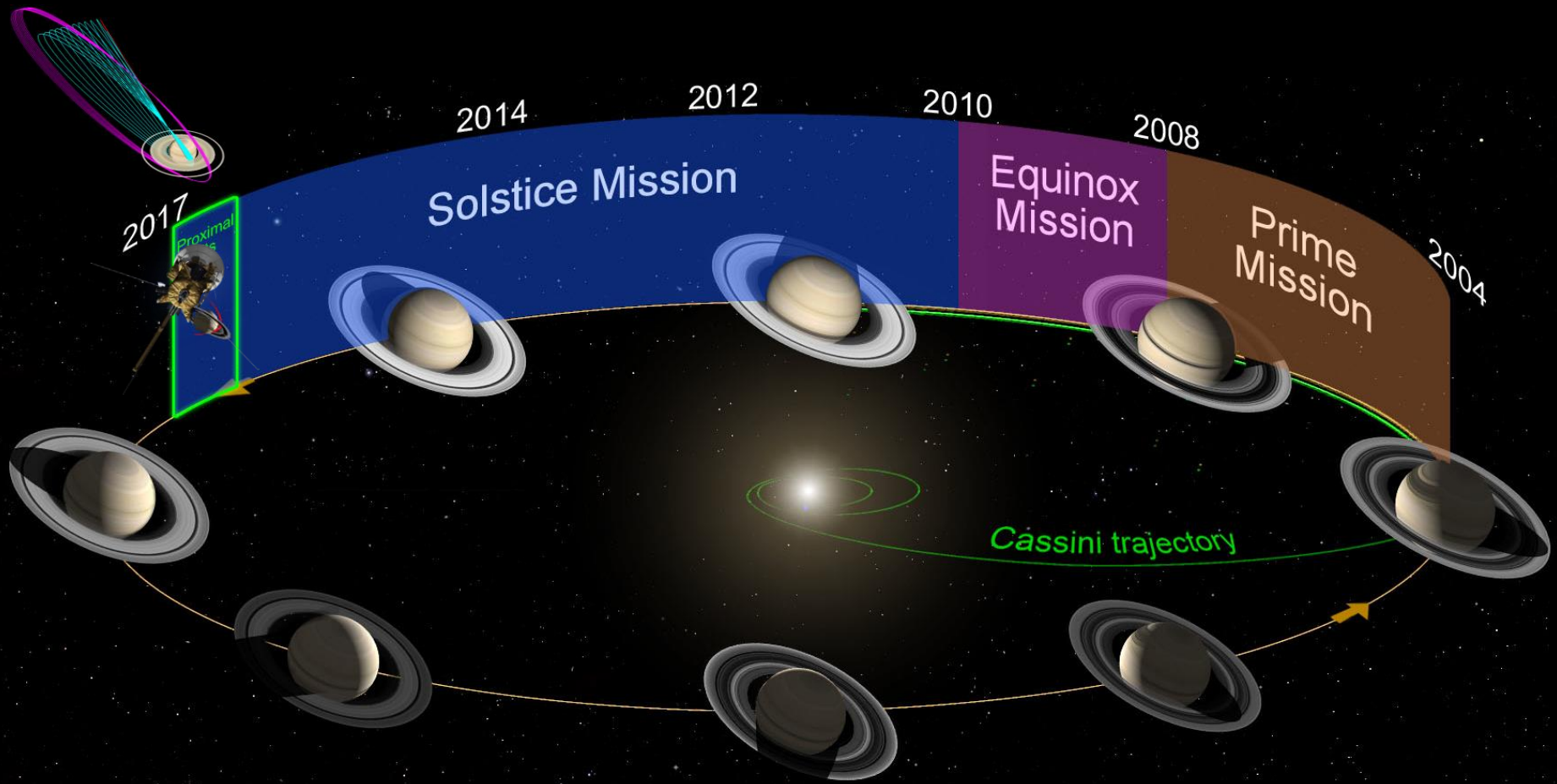
THE SATURNIAN SYSTEM



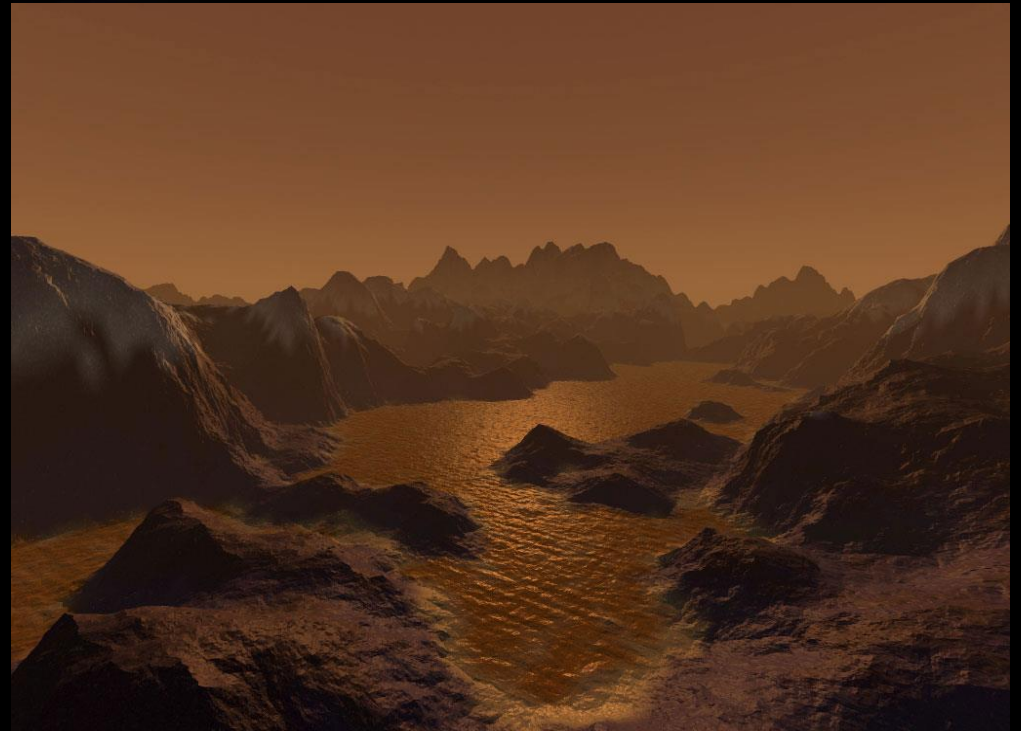
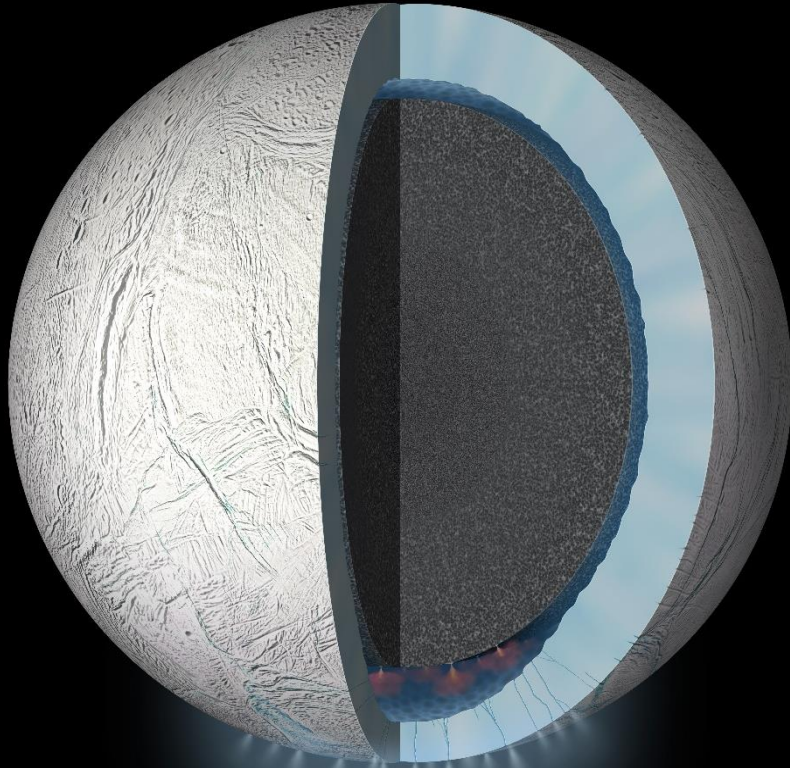
All bodies are to scale except for the eight small, starred (*) bodies whose sizes have been exaggerated by a factor of 5.



Cassini-Huygens Mission Overview

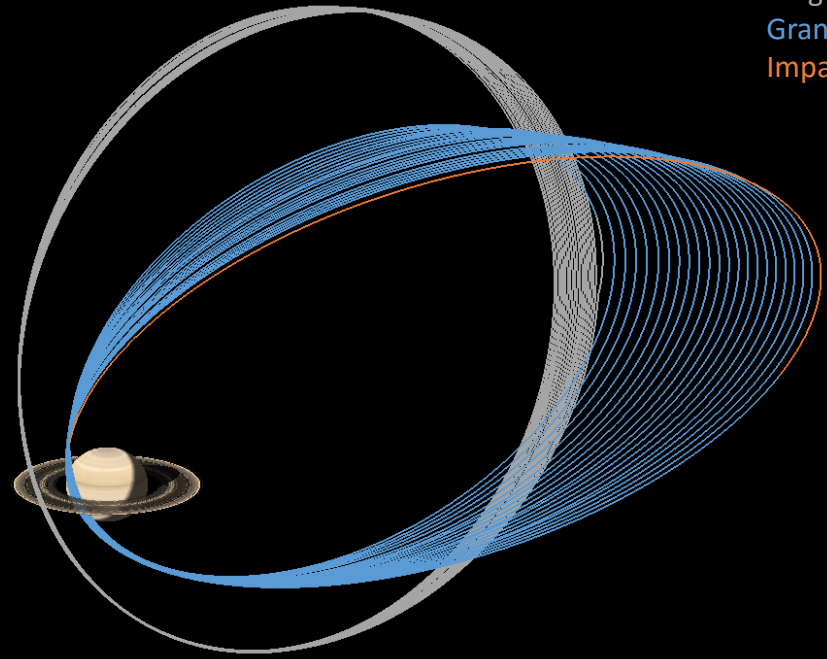


Protecting Saturn's Ocean Worlds



Solstice Mission Trajectory

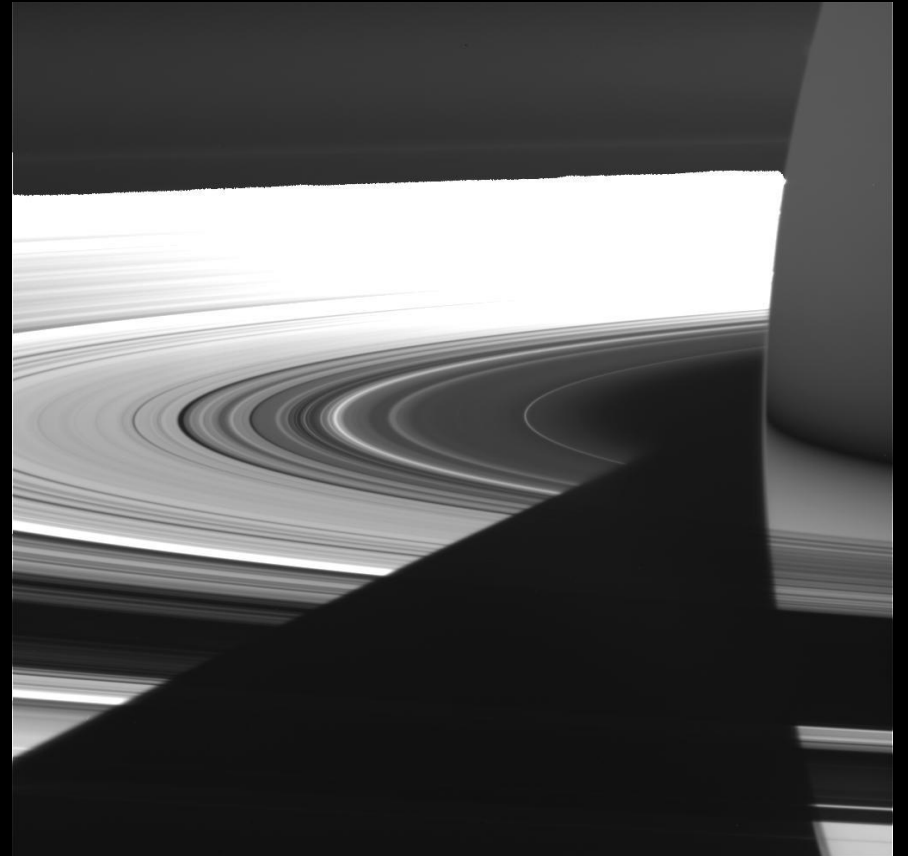
Ring-Grazing orbits
Grand Finale orbits
Impact orbit



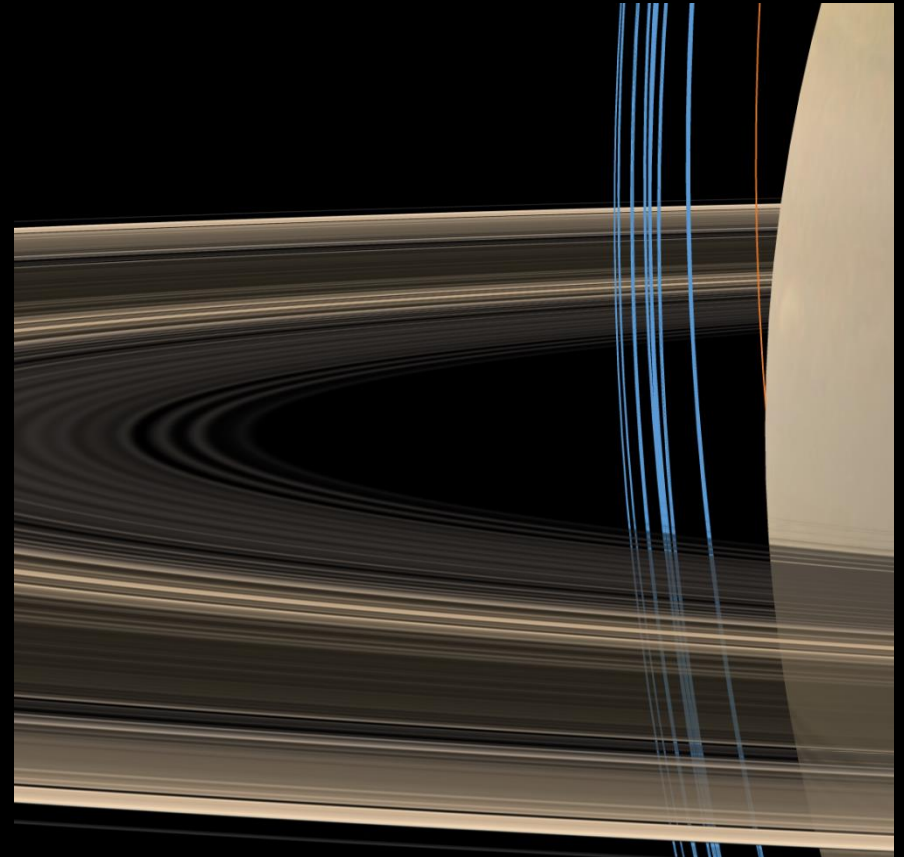
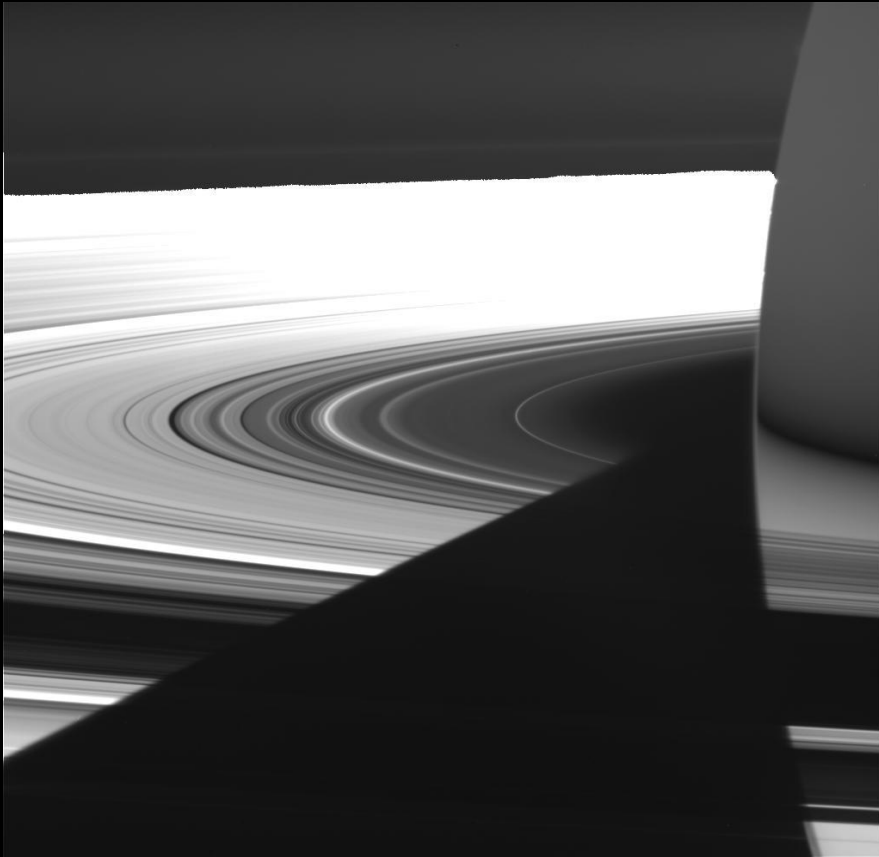
Challenges



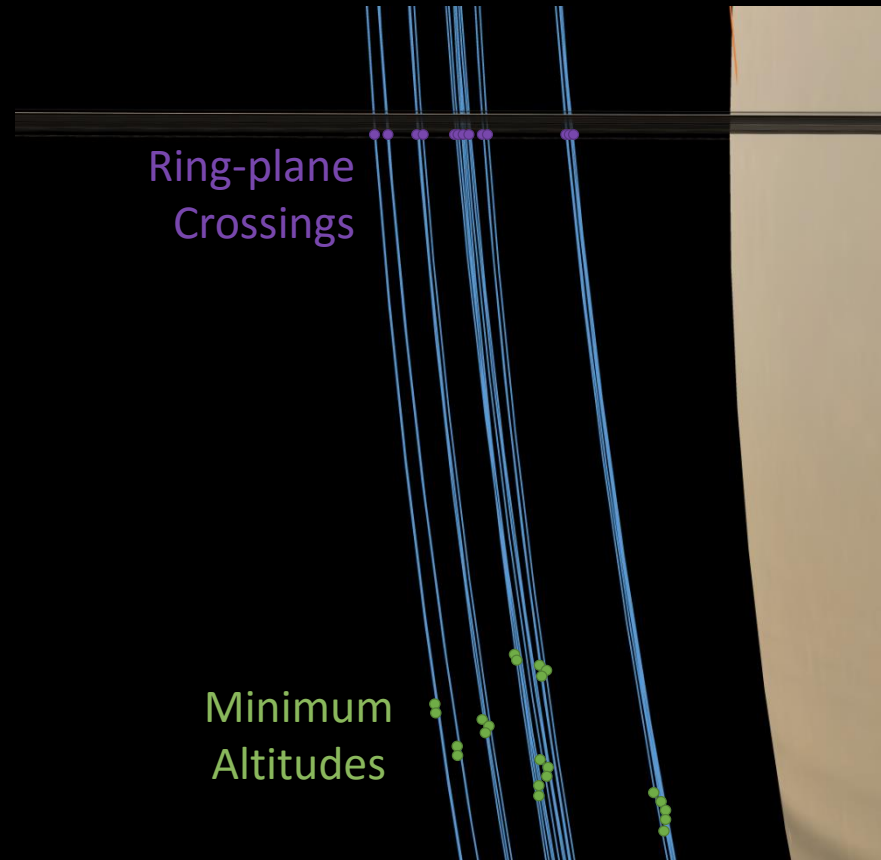
Mind the Gap



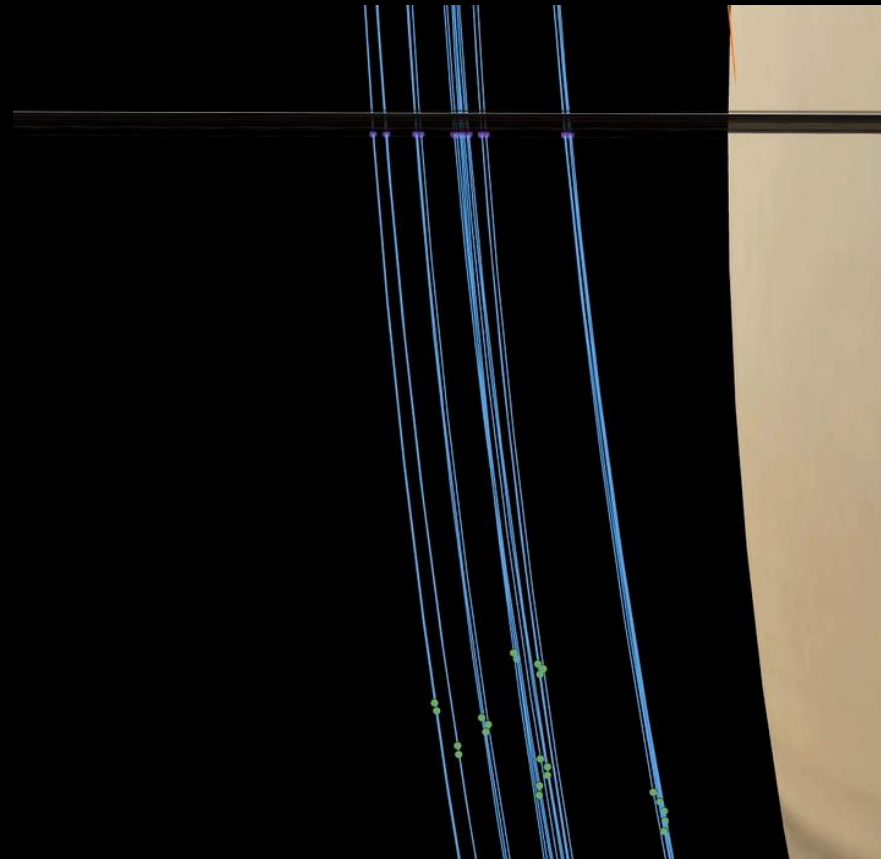
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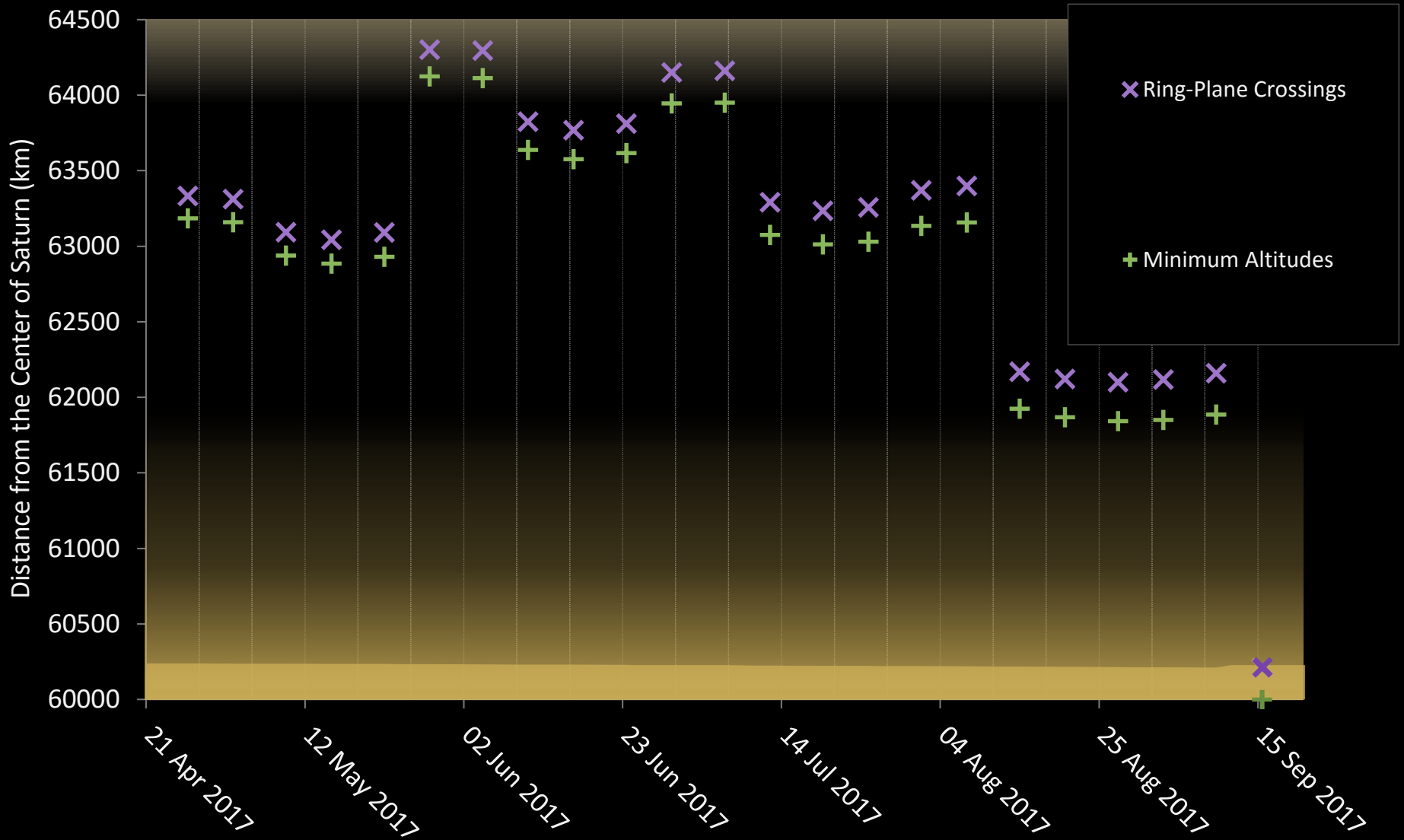
Mind the Gap



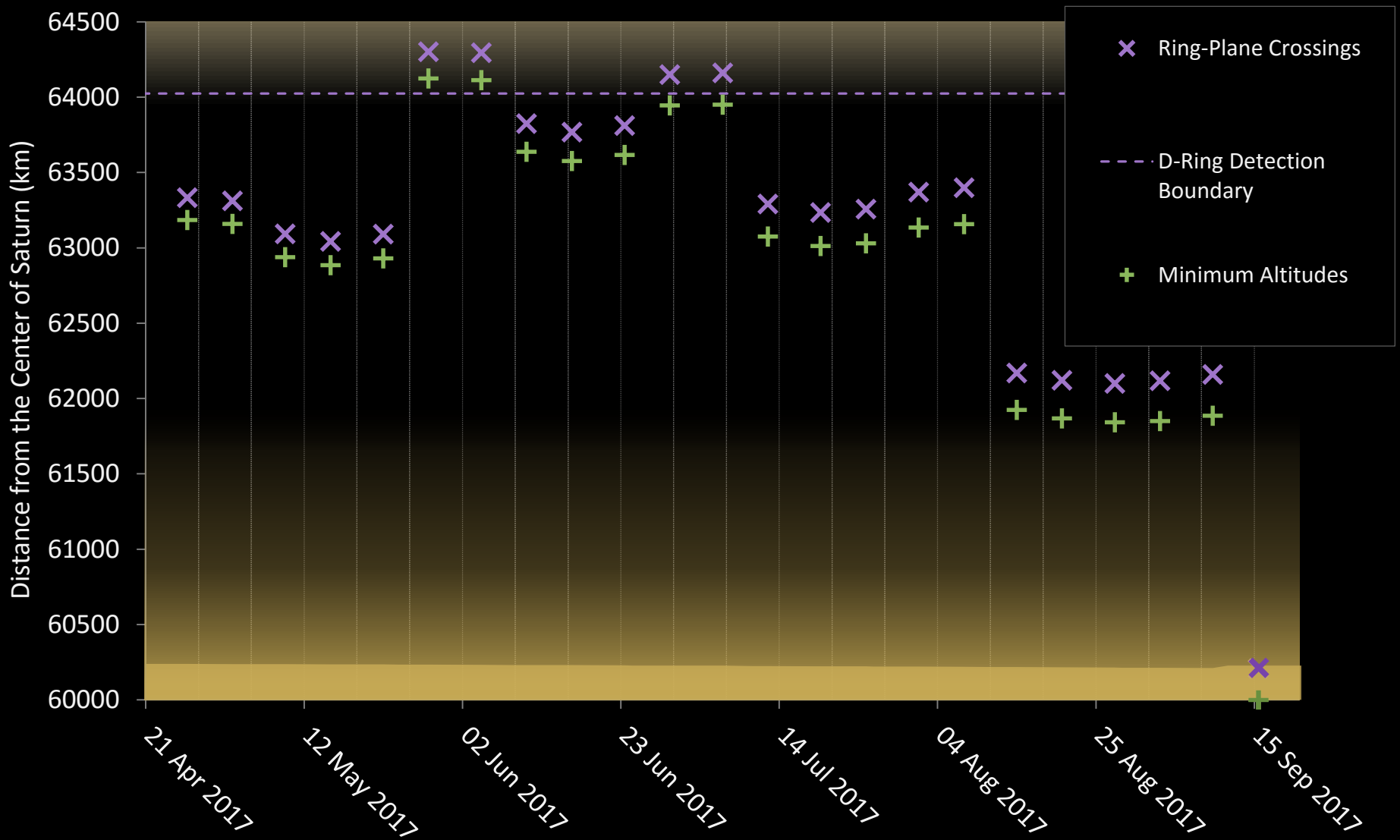
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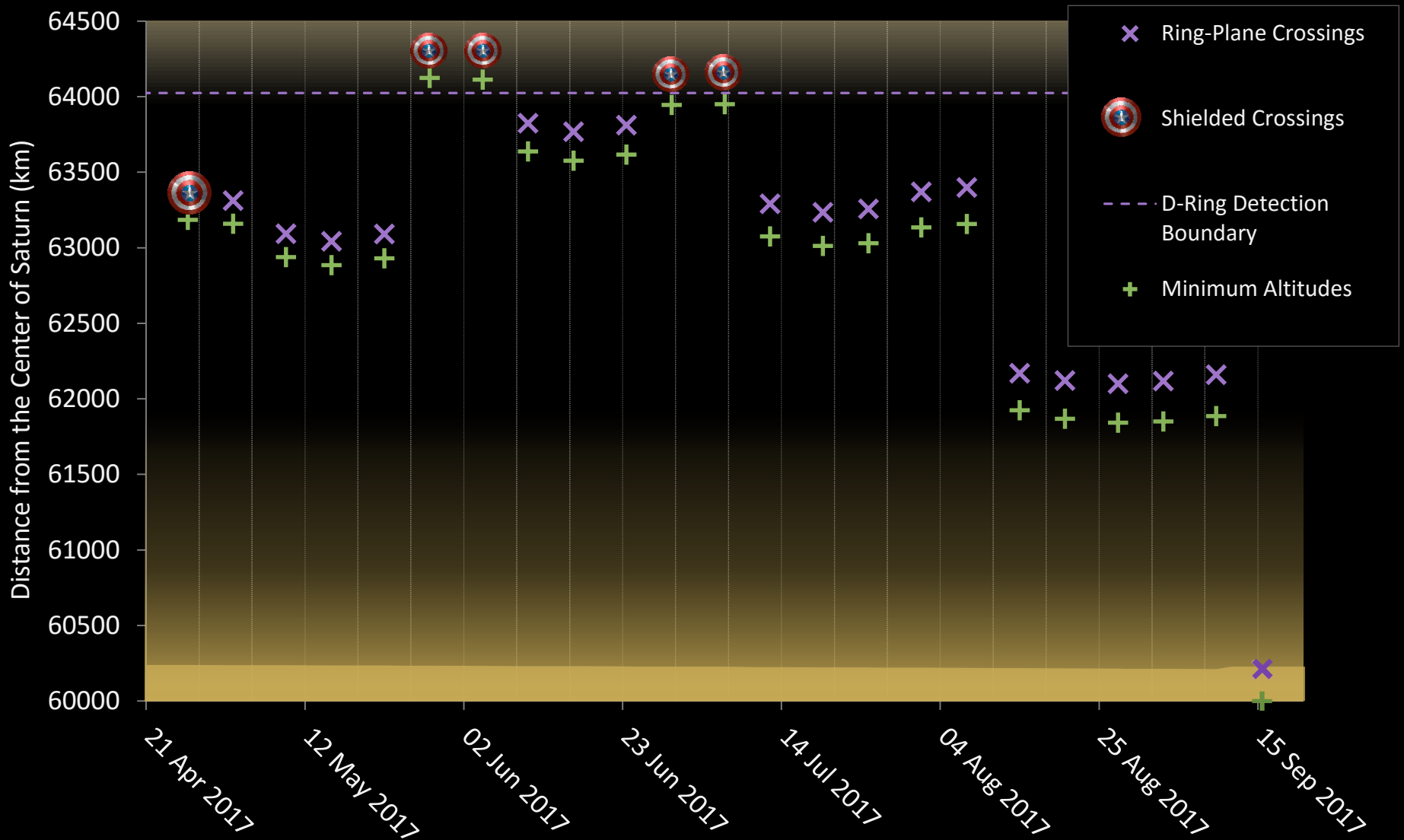
Proximal Corridor



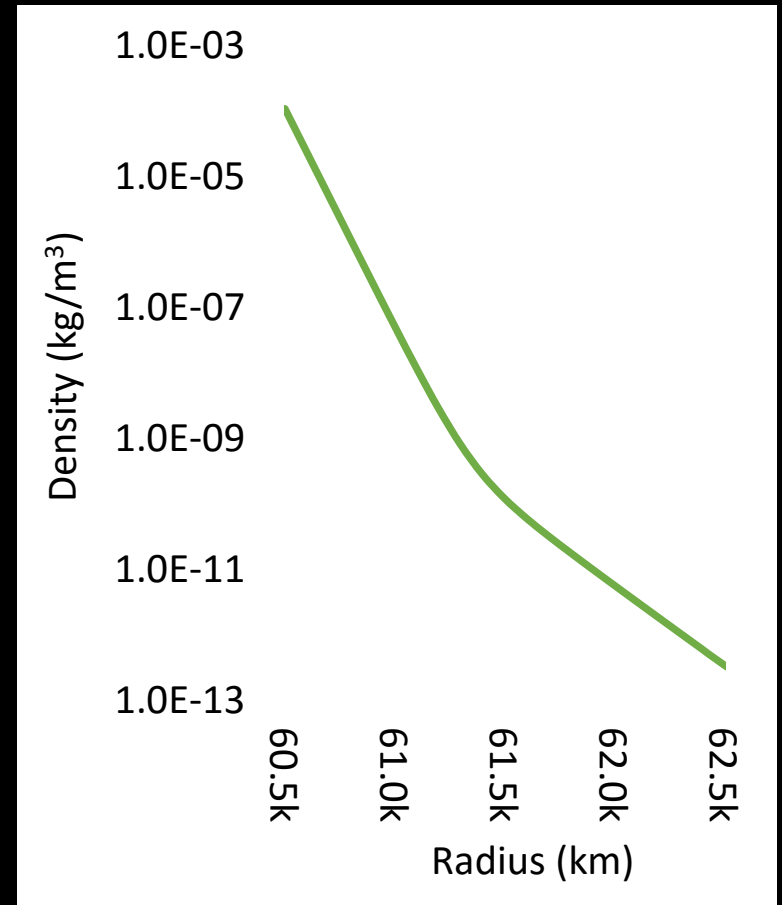
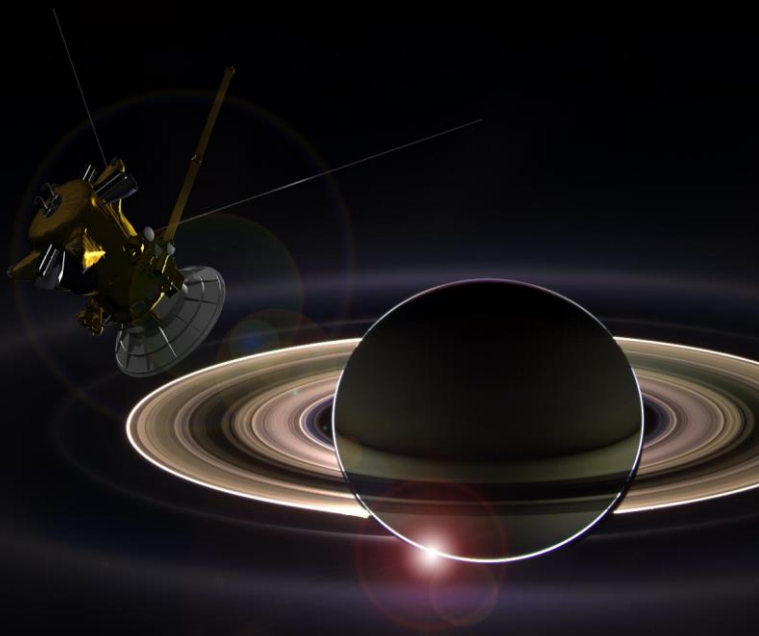
Proximal Corridor



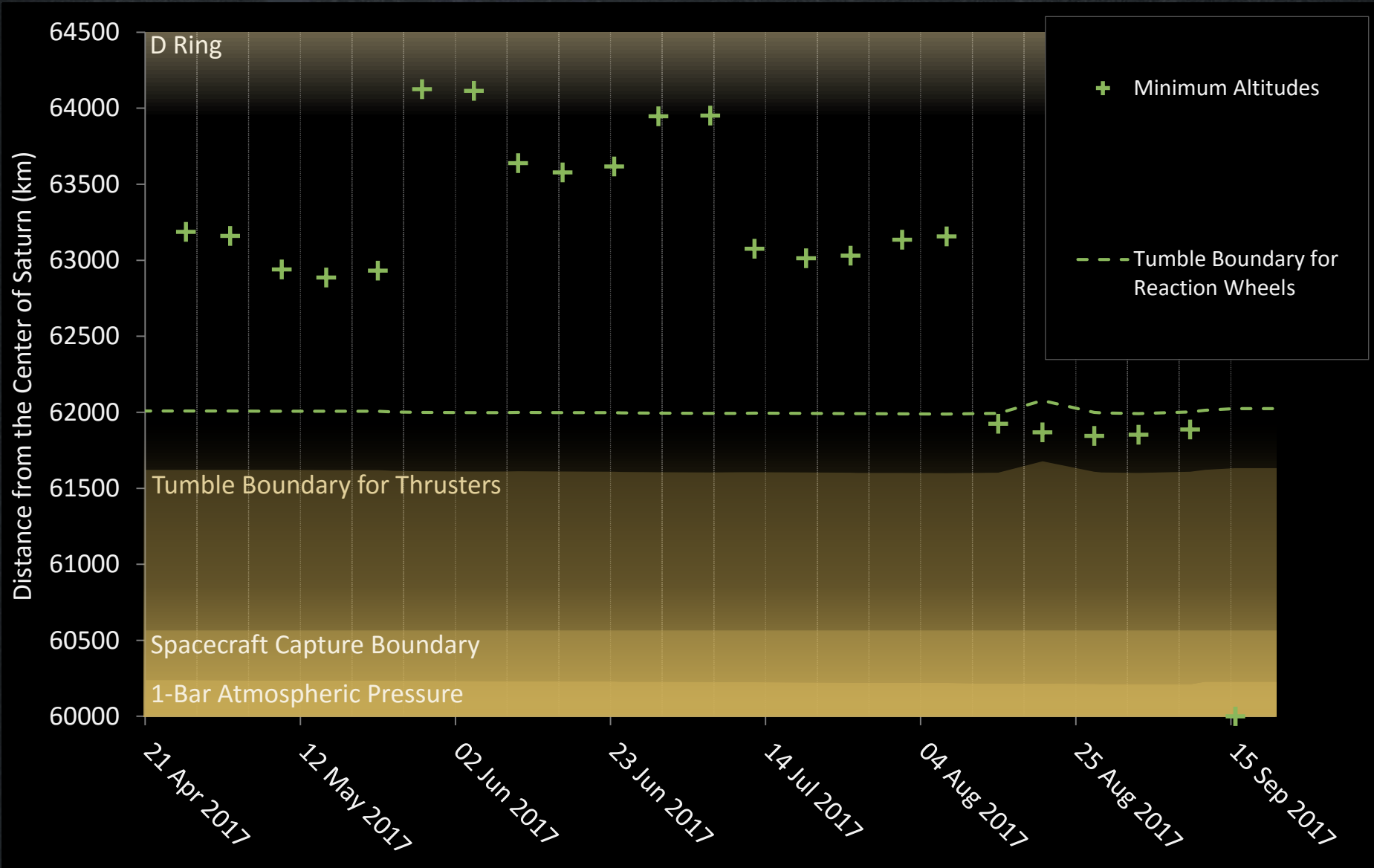
Dust Hazard Plan



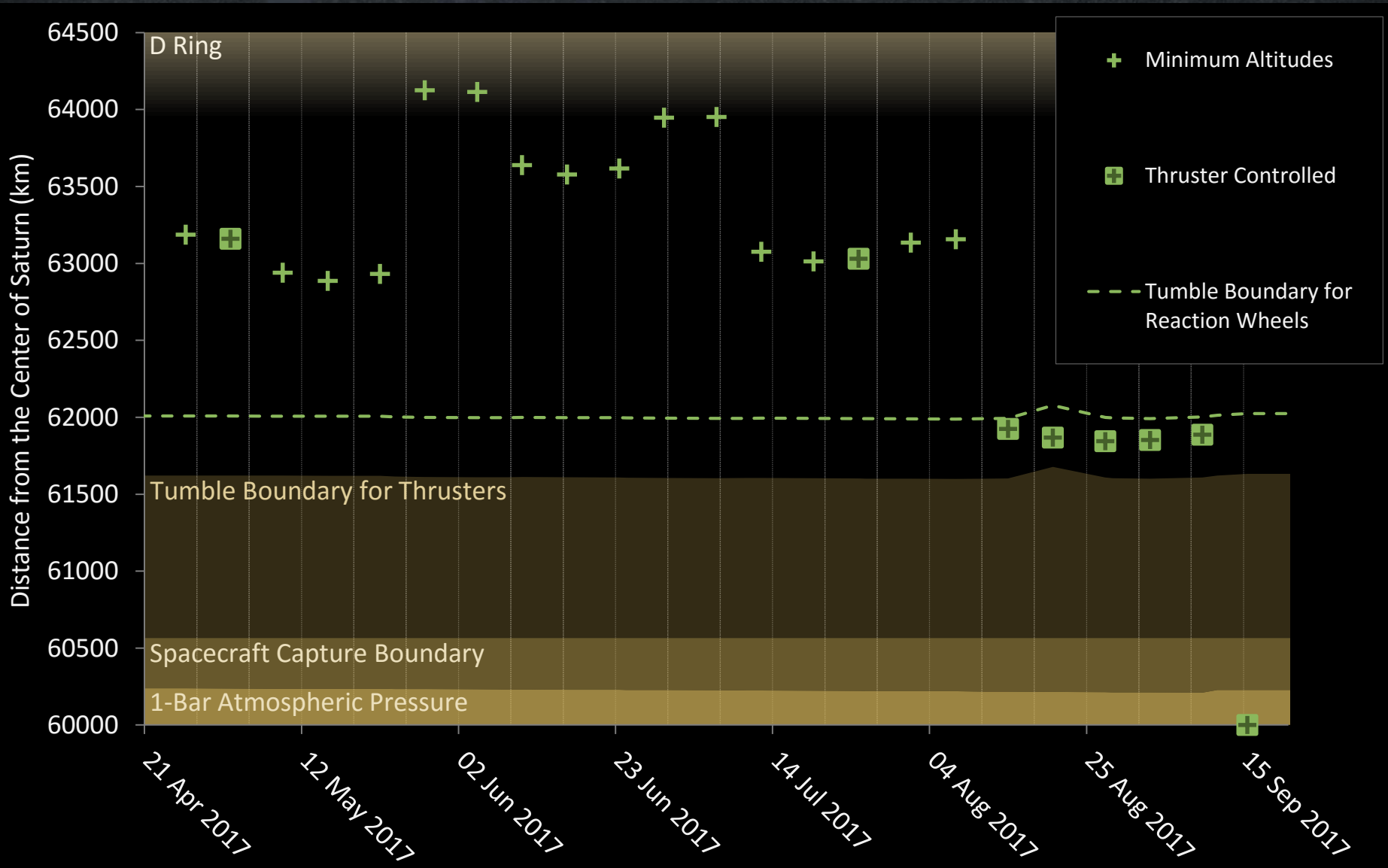
Saturn Atmosphere



Proximal Corridor



Atmosphere Protection



Grand Finale Objectives

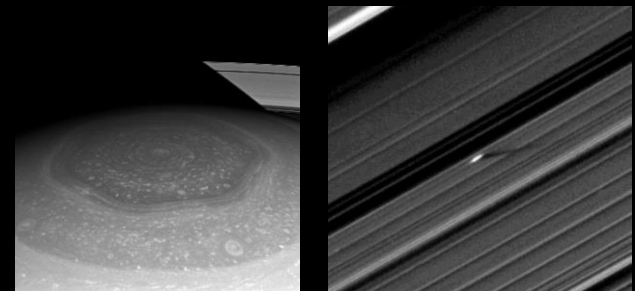
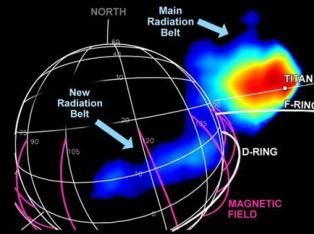
*Bringing Cassini closer to Saturn
than ever before*

Planetary Protection

- Spacecraft disposal

Unique Science

- Saturn internal structure
 - Magnetic & gravity high-order moment measurements
- Ring mass
 - Address age of main rings
- In-situ measurements
 - Ionosphere, inner radiation belts, auroral region, and D ring particles
- High resolution observations
 - Rings, poles/aurora, atmosphere



Grand Finale Objectives

36 passes needed, we have 22

RSS – 6 flybys
Antenna to Earth

MIMI & RPWS – all (but no pointing constraint)

MAG – 4 flybys
Rolling about 2 axes

CIRS – 3 to 4
(at +1hour)

VIMS – 5
(cold at +1 hour)

INMS - 8

CDA - 8

ISS – 4
3 Cameras to Saturn
1 Cameras to Ring

RADAR 3
1 Z to Saturn
3 Z to Ring

UVIS – 2

1 Cameras to Saturn (slewing)
1 Cameras to Rings (slewing)

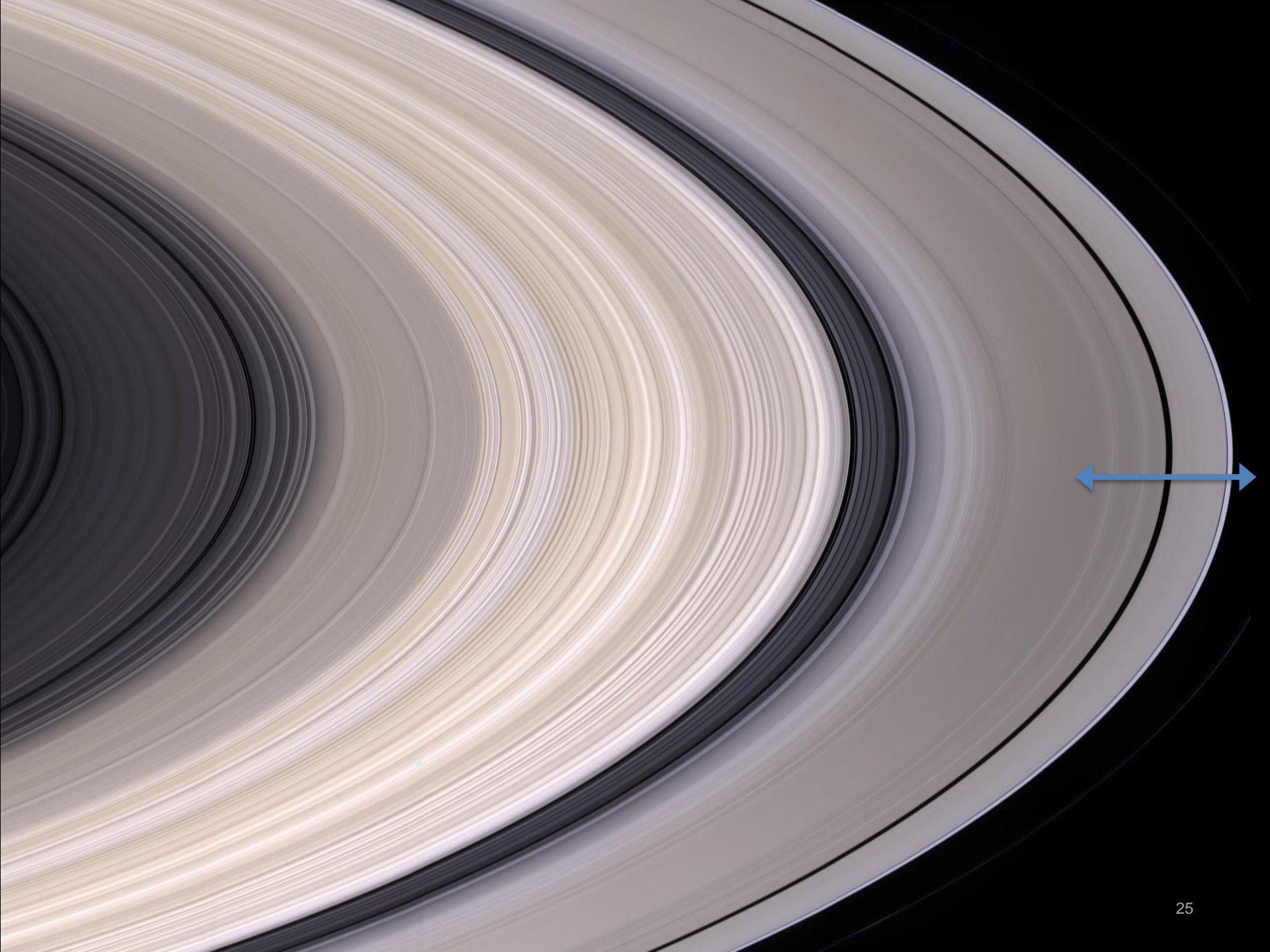
Unique Science

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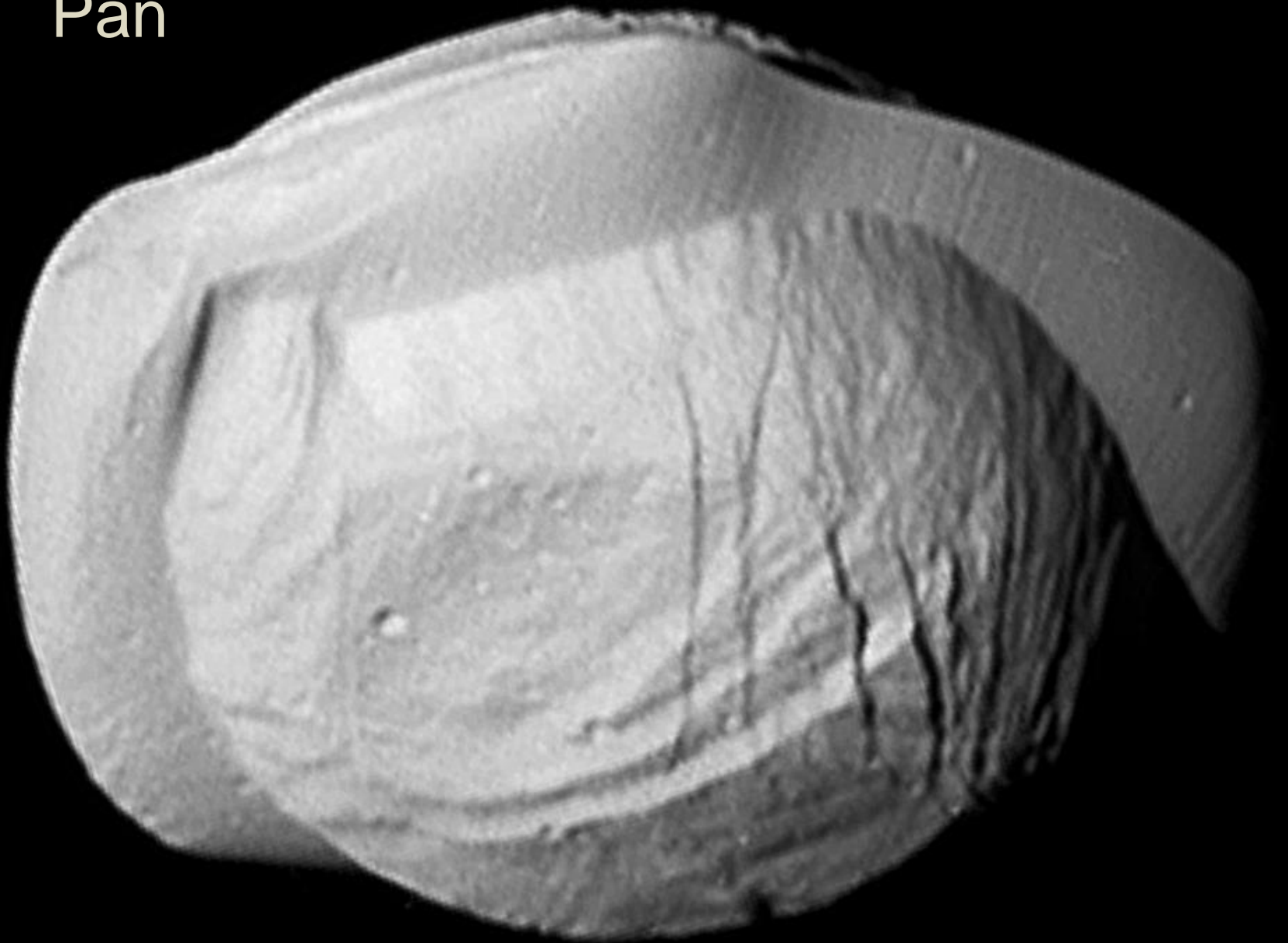
Grand Finale Sharing

Rev	271	272	273	274	275	276	277	278	279	280	281
	Intermediate Altitude Periapses (~63,000 km)					High Altitude Periapses (~64,000 km)					
RCS control at periapse		RCS 3:08									
Sequence	S99	S99	S99	S99	S99	S100	S100	S100	S100	S100	S100
Segment owner	Saturn	XD	Maps	Rings	Saturn	Rings	Rings	Saturn	Maps	XD	Saturn
peri-12 to -6 hrs			RSS	RSS	RSS			RSS		RSS	
peri -6 to -5 hrs			RSS	RSS	RSS			RSS		RSS	
peri -5 to -4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -4 to -3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri-60 to-45 min	CIRS N Pol	MAG	RSS/MAG	RSS	RSS	RADAR Rings	ISS Rings	RSS		RSS	ISS Saturn
ISS Saturn	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
ISS Saturn	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
Slew*	Slew*	MAG	RSS/MAG	RSS/CDA	RSS/CDA	Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri-10 to -0 min	HGA to RAM*	MAG	RSS/MAG	RSS/CDA	RSS/CDA	HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri 0 to +10 min	HGA to RAM*	MAG	RSS/MAG	RSS/CDA	RSS/CDA	HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri+10 to+30 min	Slew*	MAG	RSS/MAG	RSS/CDA	RSS/CDA	Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri+30 to +45min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri +45 to +60 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri+1 to +2 hrs	CIRS S Pol	MAG	RSS/MAG	RSS	RSS	ISS Rings	RADAR Rings	RSS		RSS	CIRS S Pol
peri+2 to +3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+3 to +4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+4 to +5 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+5 to +7 hrs			RSS	RSS	RSS			RSS		RSS	
peri+7 to +12 hrs			RSS	RSS	RSS			RSS		RSS	
Rev	282	283	284	285	286	287	288	289	290	291	292
	Intermediate Altitude Periapses (~63,000 km)					Low Altitude Periapses (62,000 km)					
RCS control at periapse				RCS 3:55			RCS 2:17	RCS 2:10	RCS 3:19	RCS 2:15	RCS 2:15
Sequence	S100	S101	S101	S101	S101	S101	S101	S101	S101	S101	S101
Segment owner	Rings	Rings	Saturn	Maps	SOST	Maps	Saturn	Maps	Saturn	Saturn	Saturn
peri-12 to -6 hrs			RSS								
peri -6 to -5 hrs			RSS								
peri -5 to -4 hrs			RSS/MAG	MAG							
peri -4 to -3 hrs			RSS/MAG	MAG							
peri -3 to -2 hrs			RSS/MAG	MAG							
peri -2 to -1 hrs	UVIS Rings		RSS/MAG	MAG							
peri-60 to-45 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	AUR INB	RCS xtion	RADAR Saturn	INMS**
ISS Saturn	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR Saturn	RADAR Saturn	INMS**
ISS Saturn	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	RADAR/INMS	INMS**
Slew	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	RADAR/INMS	INMS**
peri-10 to -0 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	RADAR/INMS	INMS**
peri 0 to +10 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	RADAR/INMS	INMS**
peri+10 to+30 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR/INMS	RADAR/INMS	INMS**
peri+30 to +45min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	RADAR Saturn	INMS**
peri +45 to +60 min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	RADAR Saturn	INMS**
peri+1 to +2 hrs	RADAR Rings		RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*		RADAR Saturn	RADAR Saturn	INMS**
peri+2 to +3 hrs			RSS/MAG	MAG	COLD AUR		RCS xtion		RCS xtion	RCS xtion	RCS xtion
peri+3 to +4 hrs			RSS/MAG	MAG	COLD AUR/ENC						
peri+4 to +5 hrs			RSS/MAG	MAG	COLD ENC						
peri+5 to +7 hrs			RSS		COLD ENC						
peri+7 to +12 hrs			RSS								

Highlights



Pan



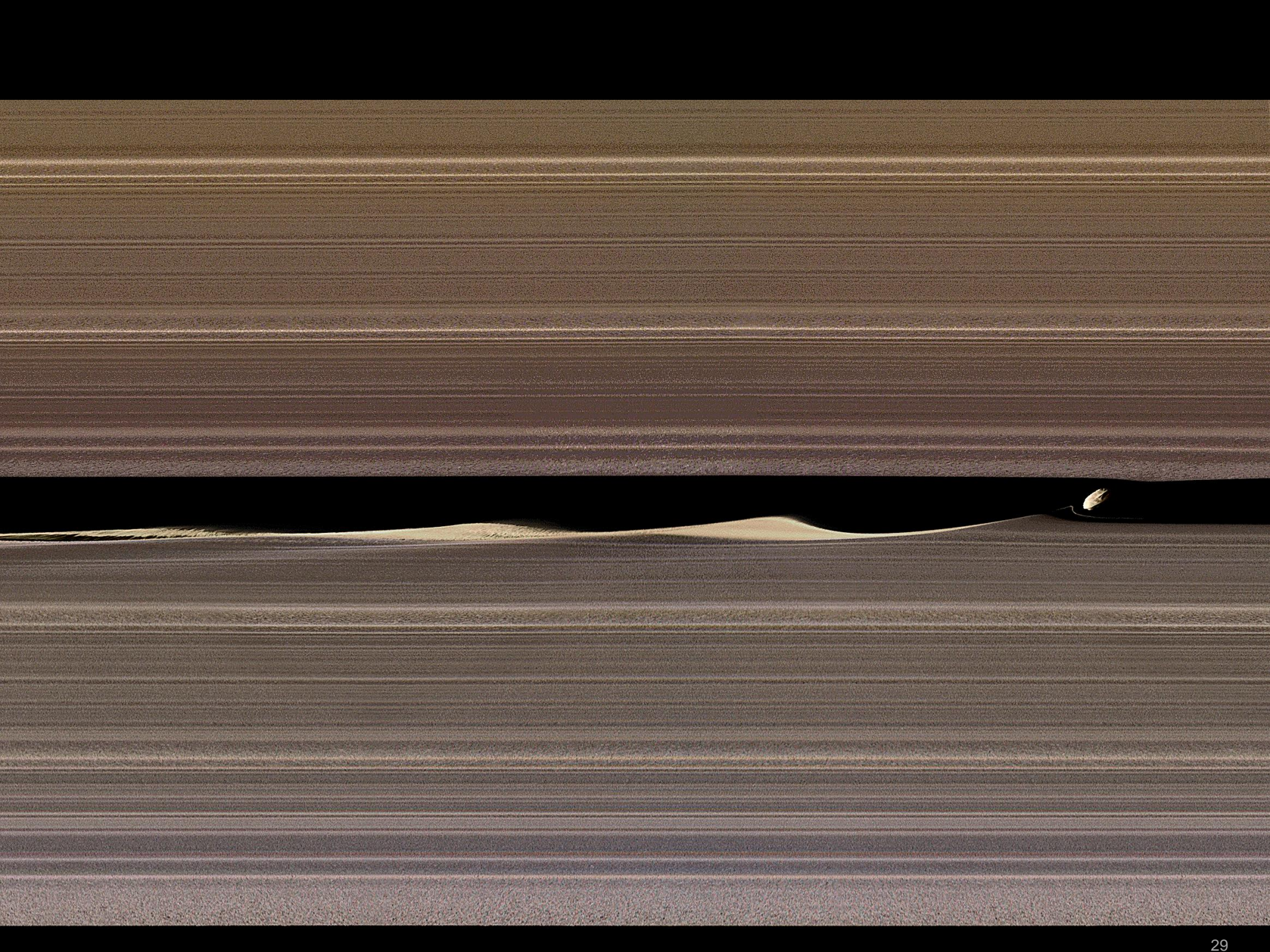
150 m/pixel (500 feet/pixel)

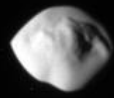




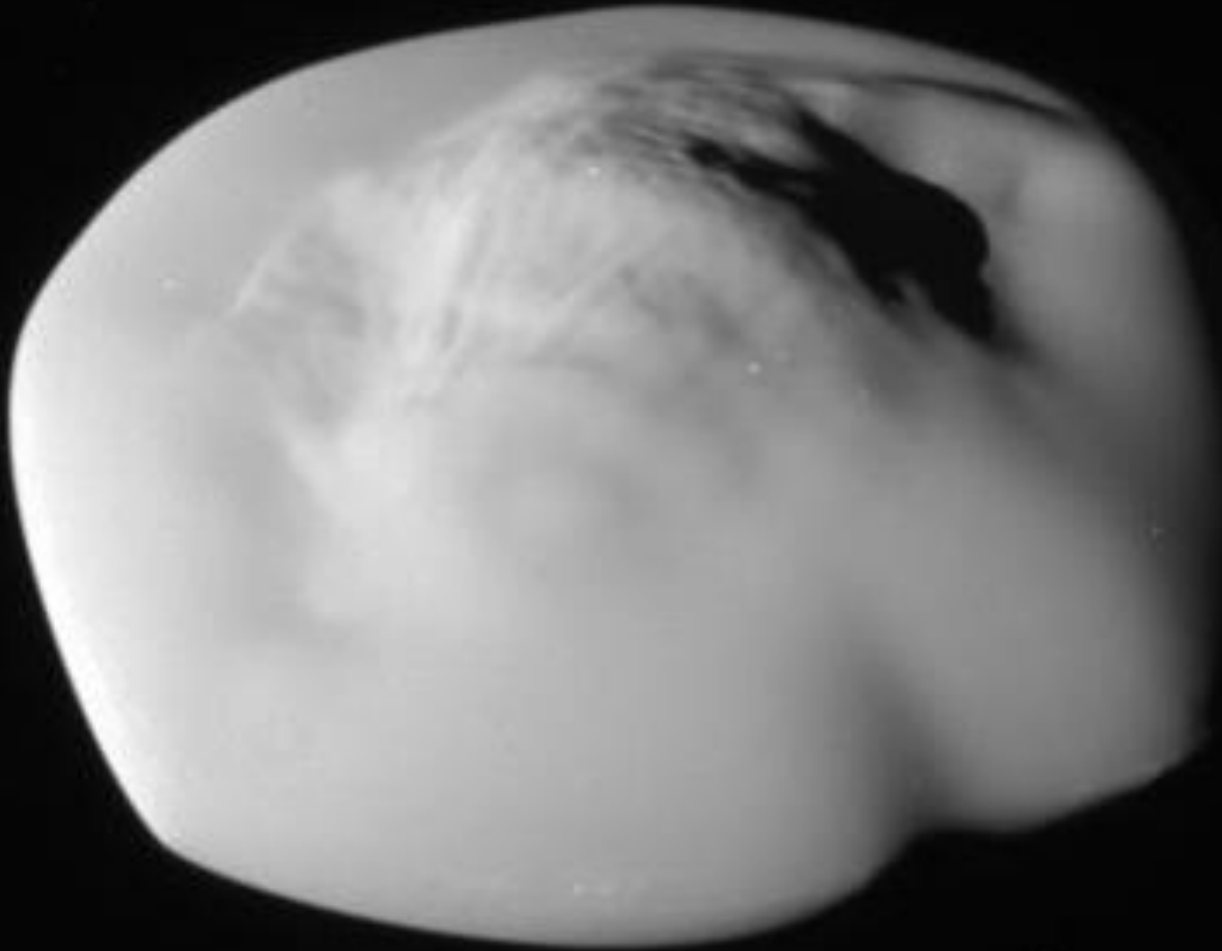
Daphnis

168 m/pixel (551 feet/pixel)

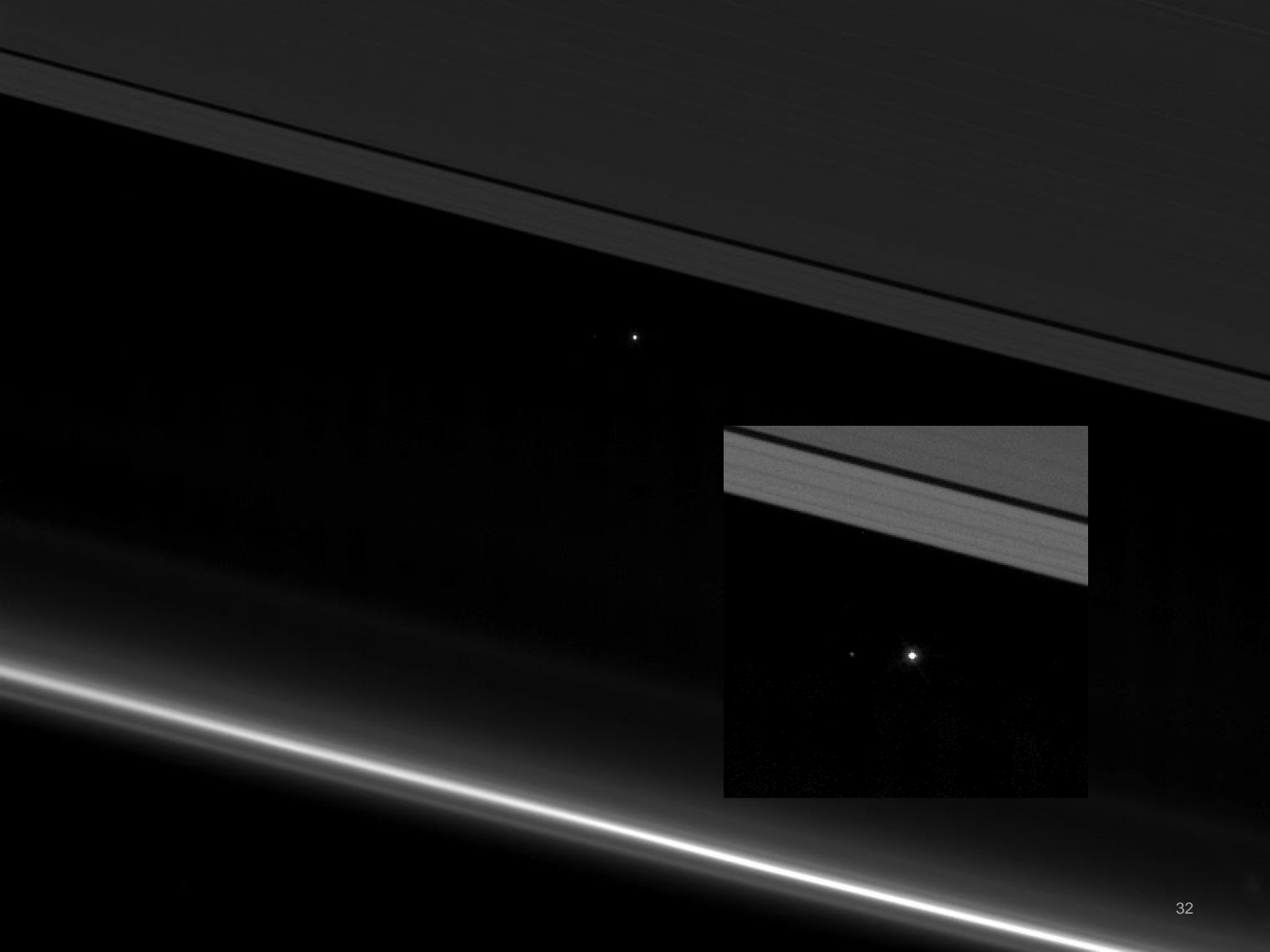




Atlas Shoulders Weight of Rings



65 m/pixel (250 feet/pixel)



Cassini Makes Historic Passage

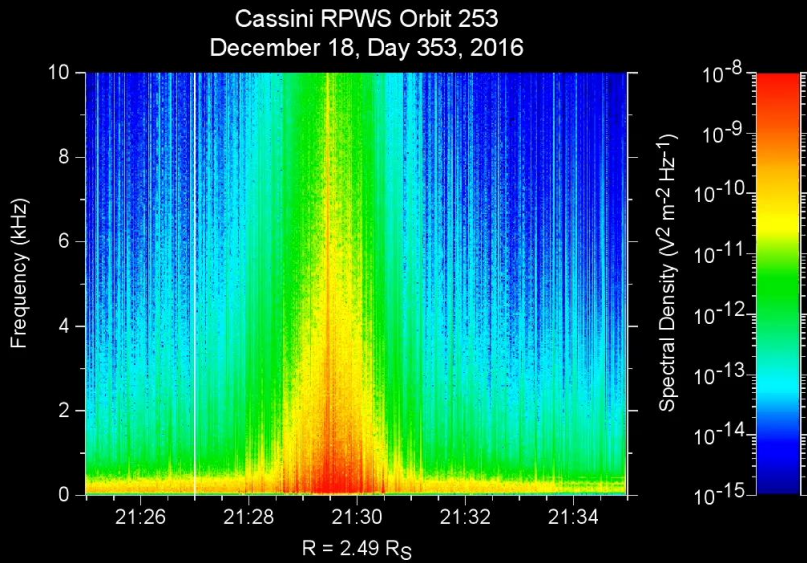


Grand Finale Sharing

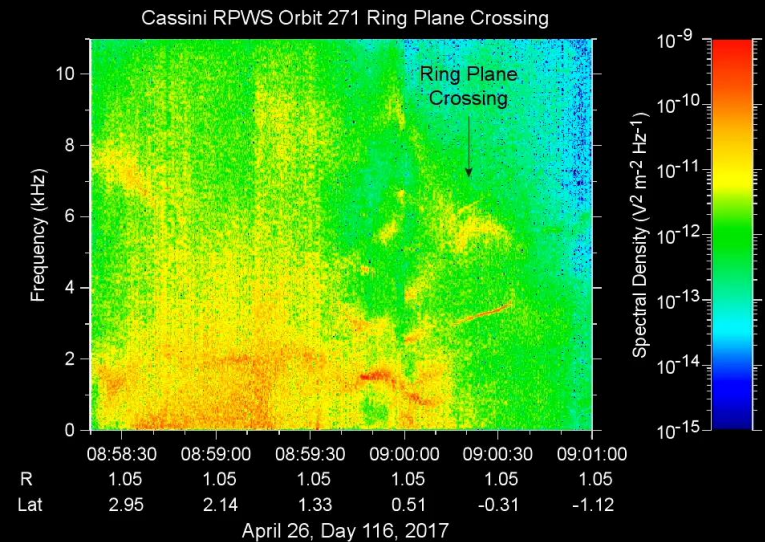
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peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri-60 to -45 min	CIRS N Pol	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri -45 to -30 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
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peri-10 to -0 min	HGA to RAM*	MAG	RSS/MAG	RSS/CDA	RSS/CDA	HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri 0 to +10 min	HGA to RAM*	MAG	RSS/MAG	RSS/CDA	RSS/CDA	HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri+10 to +30 min	Slew*	MAG	RSS/MAG	RSS/CDA	RSS/CDA	Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri+30 to +45min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri +45 to +60 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS		RSS	CIRS S Pol
peri+1 to +2 hrs	CIRS S Pol	MAG	RSS/MAG	RSS	RSS			RSS		RSS	
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peri -3 to -2 hrs			RSS/MAG	MAG							
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peri -45 to -30 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR Saturn	INMS**	INMS***
peri-30 to -10 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri-10 to -0 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri 0 to +10 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri+10 to +30 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR/INMS	INMS**	INMS***
peri+30 to +45min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
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peri+1 to +2 hrs	RADAR Rings		RSS/MAG	MAG	COLD AUR		RCS xtion		RCS xtion	RCS xtion	RCS xtion
peri+2 to +3 hrs			RSS/MAG	MAG	COLD AUR/ENC						
peri+3 to +4 hrs			RSS/MAG	MAG	COLD ENC						
peri+4 to +5 hrs			RSS/MAG	MAG	COLD ENC						
peri+5 to +7 hrs			RSS		COLD ENC						
peri+7 to +12 hrs			RSS								

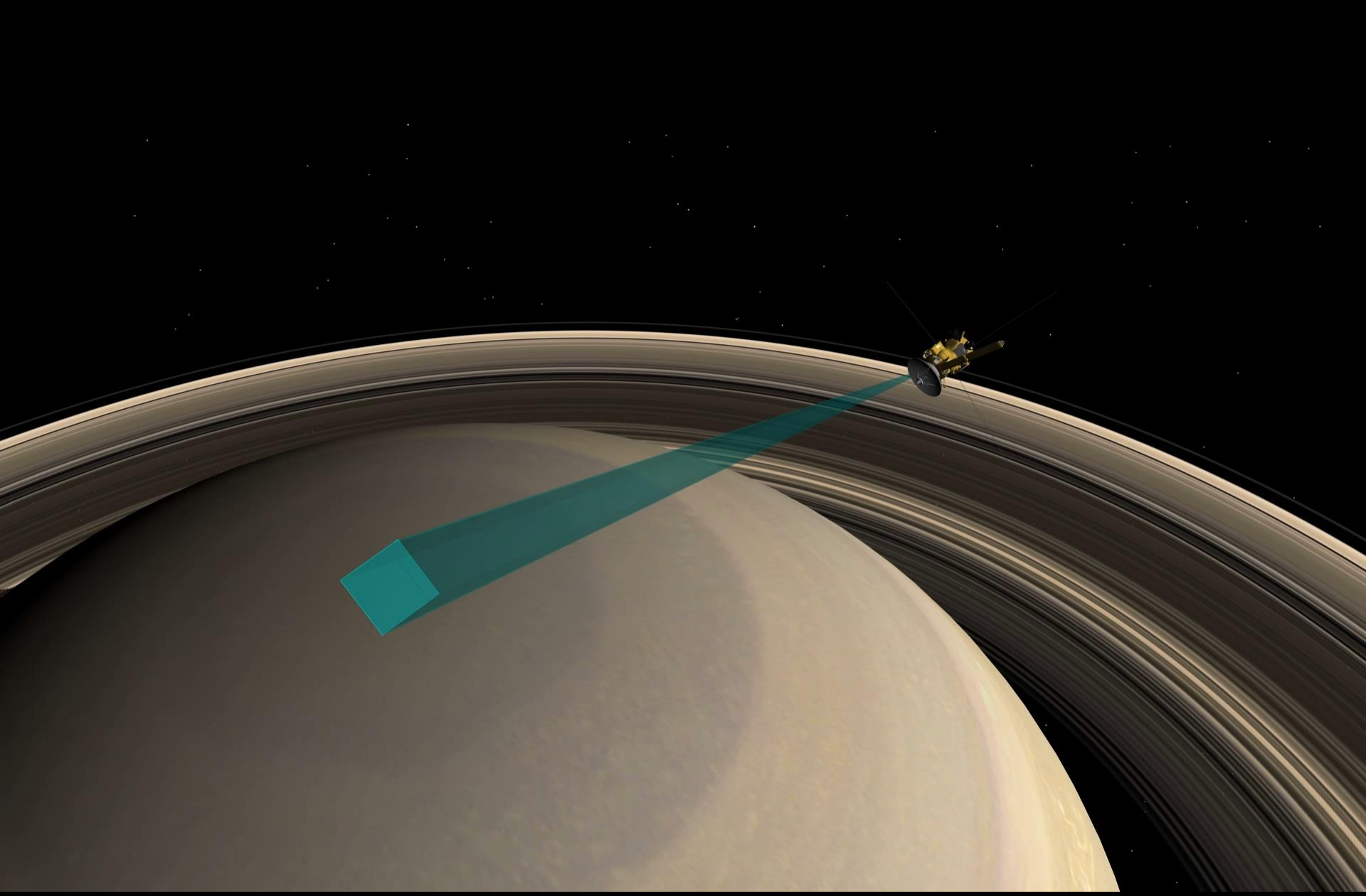
Saturn Radio Plasma Waves

What We Expected



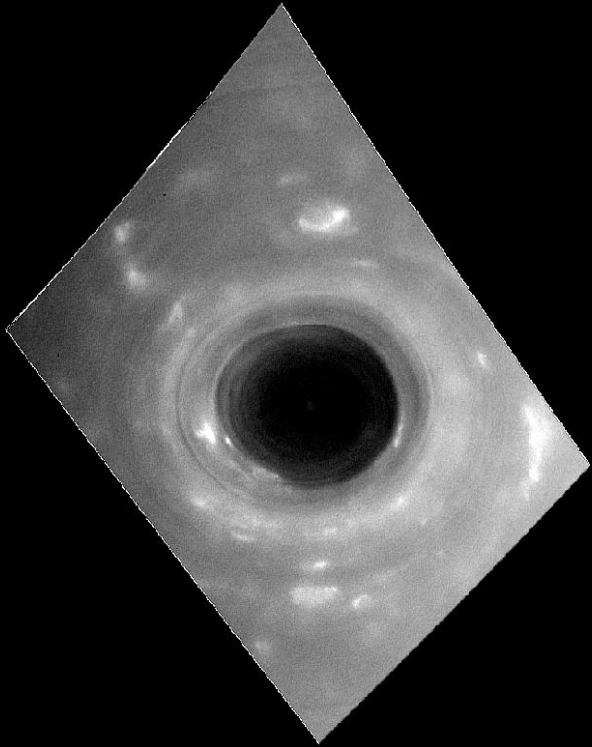
What We Saw



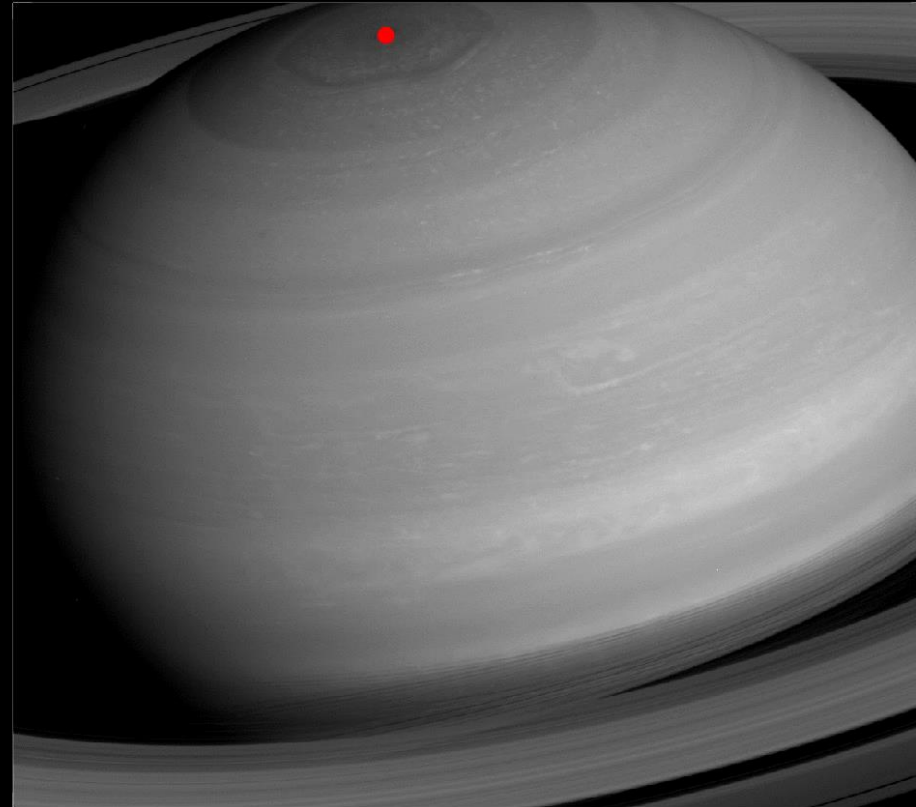


Saturn Noodle

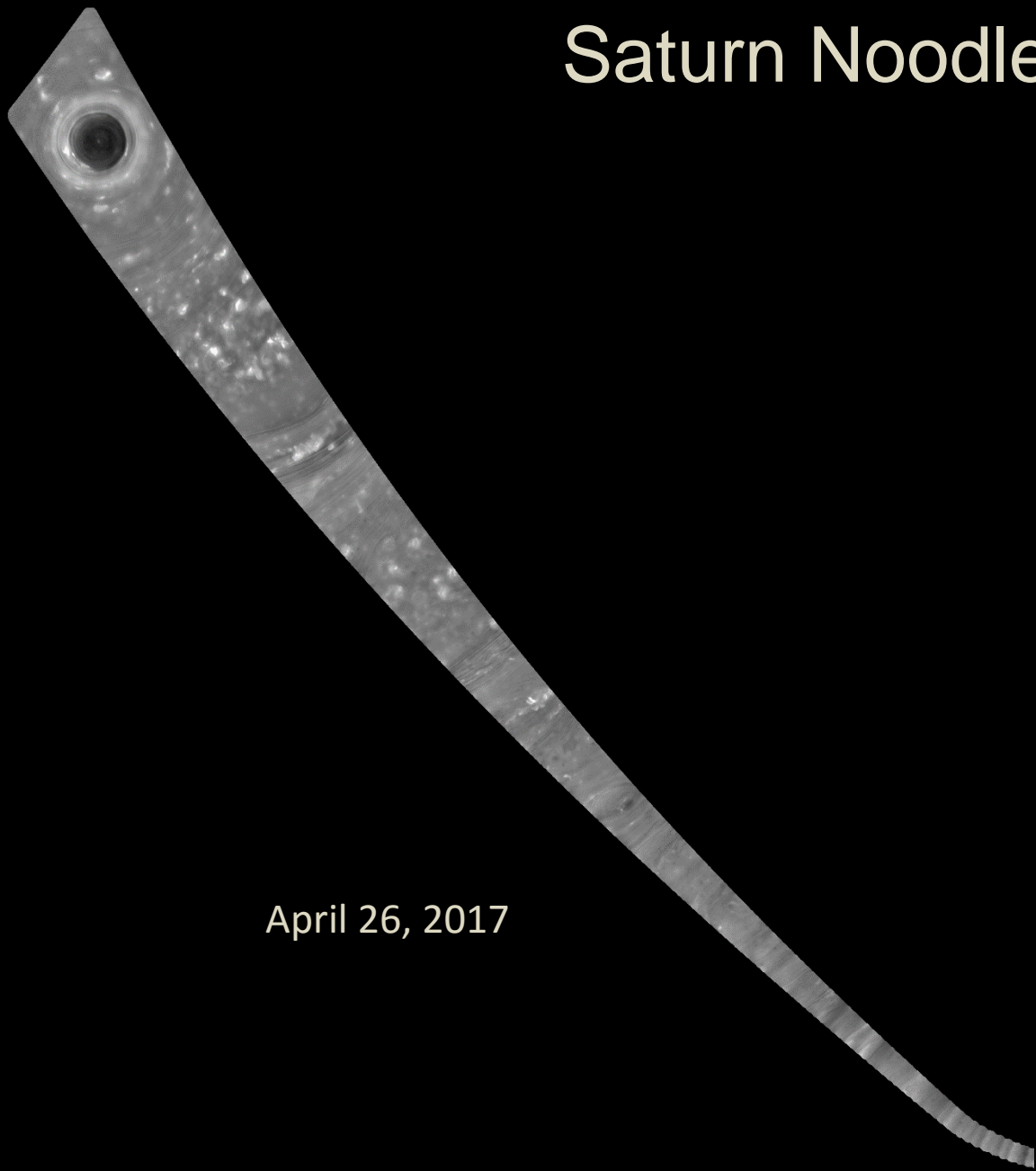
Camera View



Reference View



Saturn Noodle




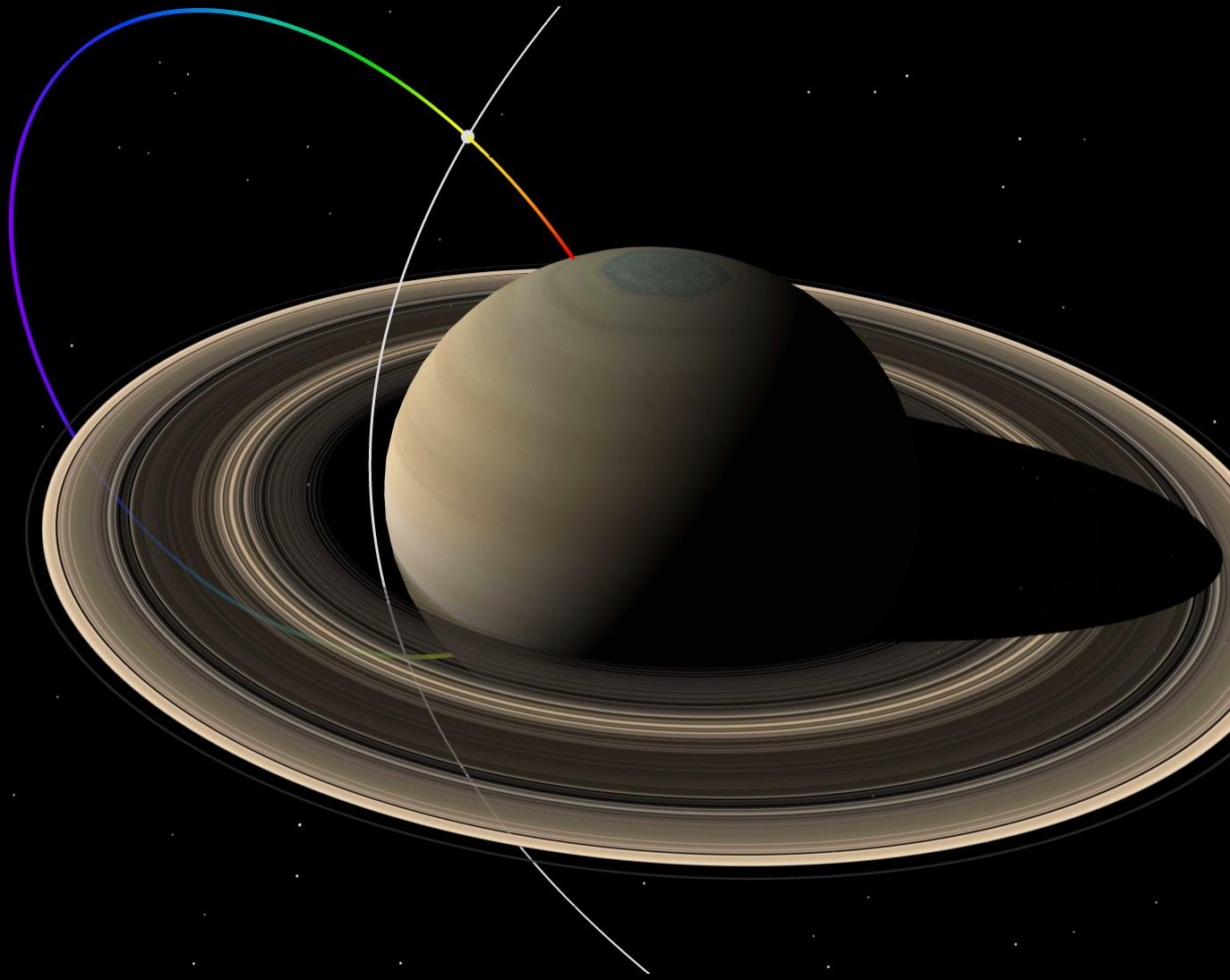
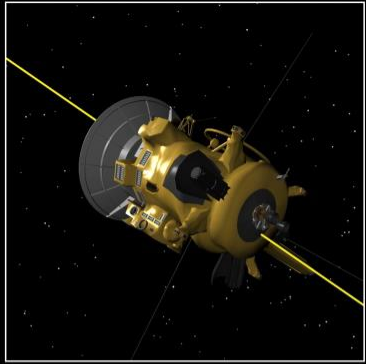
April 26, 2017



June 29, 2017

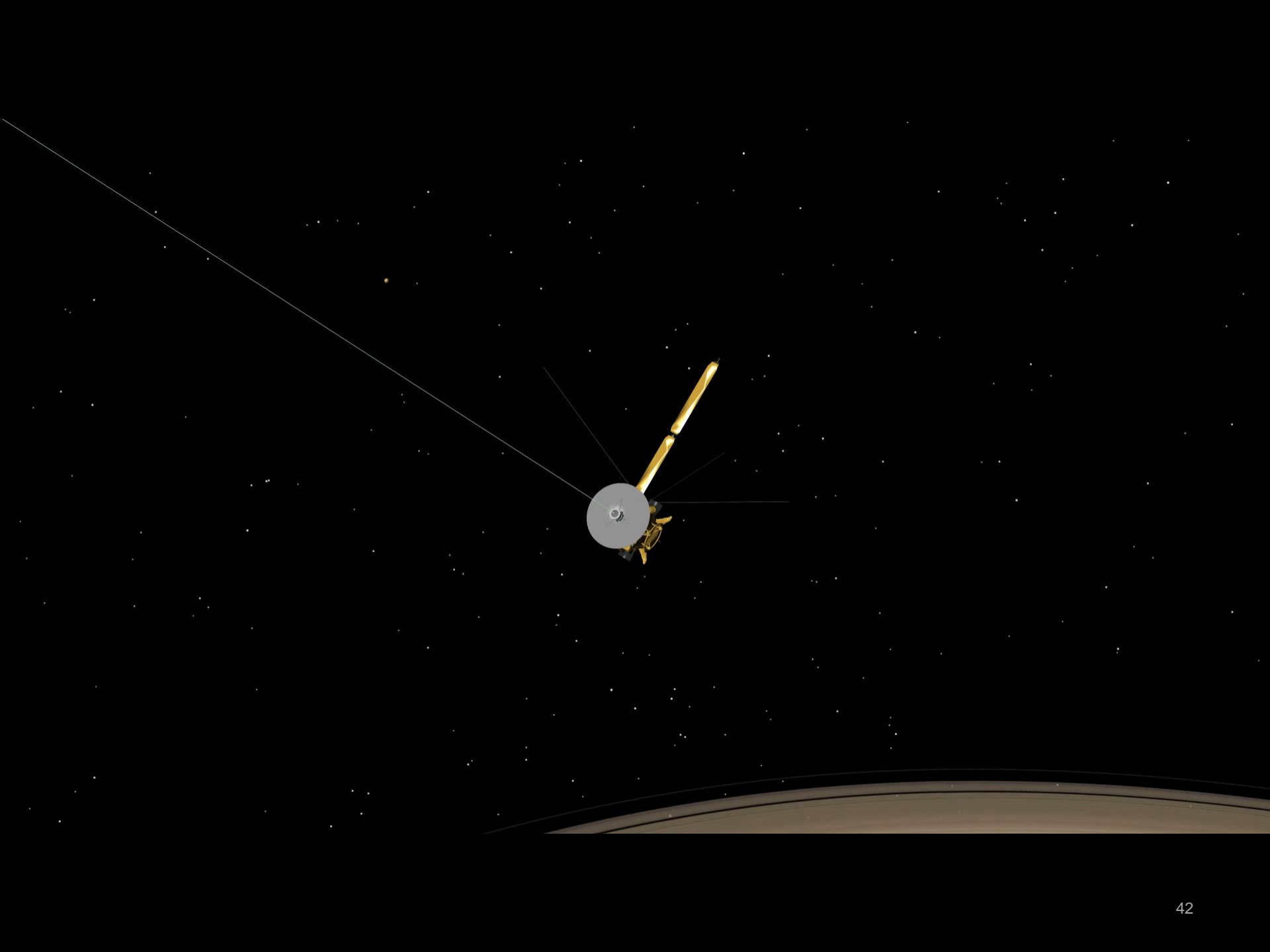
Cassini Grand Finale

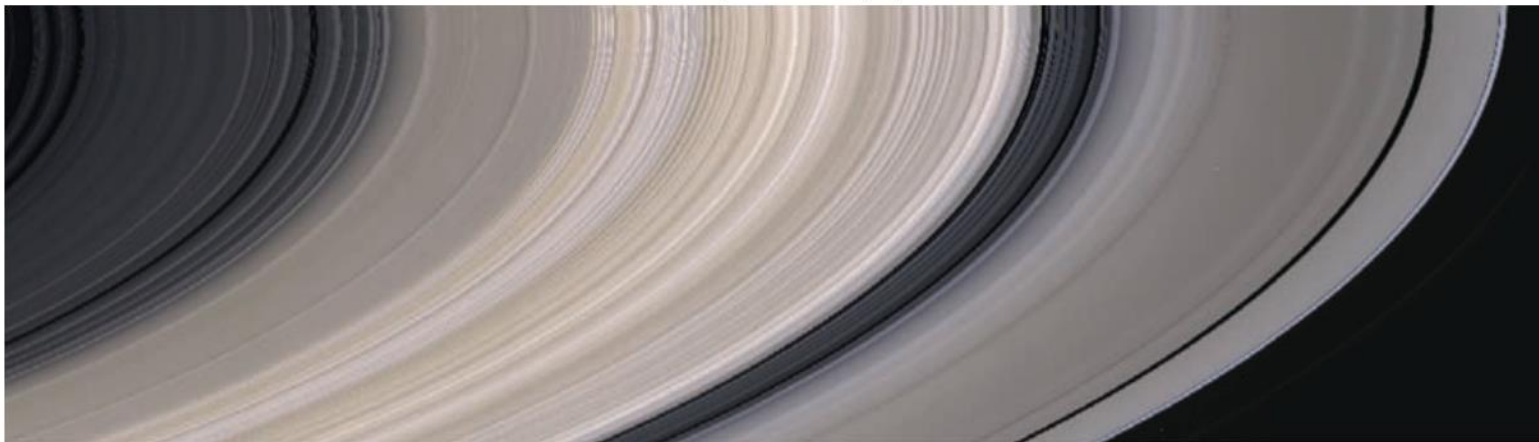
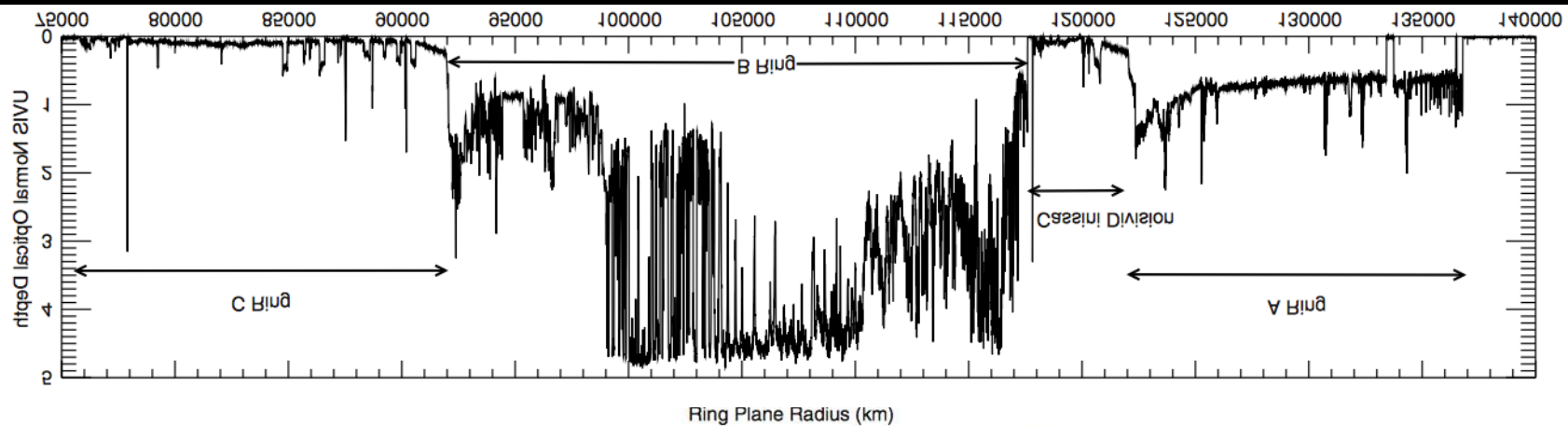
Rev	271	272	273	274	275	276	277	278	279	280	281	
	Intermediate Altitude Periapses (~63,000 km)					High Altitude Periapses (~64,000 km)						
RCS control at periapse Sequence	S99	S99	S99	S99	S99	S100	S100	S100	S100	S100	S100	
Segment owner	Saturn	XD	Maps	Rings	Saturn	Rings	Rings	Saturn	Maps	XD	Saturn	
peri-12 to -6 hrs			RSS	RSS	RSS			RSS		RSS		
peri -6 to -5 hrs			RSS	RSS	RSS			RSS		RSS		
peri -5 to -4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS		
peri -4 to -3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS		
peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS		
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS		
peri-60 to -45 min	 CIRS N Pol ISS Saturn ISS Saturn HGA to RAM HGA to RAM Slew ISS Rings ISS Rings CIRS S Pol	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn	
peri -45 to -30 min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn	
peri-30 to -10 min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*	
peri-10 to -0 min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*	
peri 0 to +10 min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*	
peri+10 to +30 min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*	
peri+30 to +45min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn	
peri +45 to +60 min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn	
peri+1 to +2 hrs			MAG	RSS/MAG	RSS	RSS			RSS		RSS	CIRS S Pol
peri+2 to +3 hrs			MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+3 to +4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS		
peri+4 to +5 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS		
peri+5 to +7 hrs			RSS	RSS	RSS			RSS		RSS		
peri+7 to +12 hrs			RSS	RSS	RSS			RSS		RSS		
Rev	282	283	284	285	286	287	288	289	290	291	292	
	Intermediate Altitude Periapses (~63,000 km)					Low Altitude Periapses (62,000 km)						
RCS control at periapse Sequence	S100	S101	S101	RCS 3:55	S101	S101	RCS 2:17	RCS 2:10	RCS 3:19	RCS 2:15	RCS 2:15	
Segment owner	Rings	Rings	Saturn	Maps	SOST	Maps	Saturn	Maps	Saturn	Saturn	Saturn	
peri-12 to -6 hrs			RSS									
peri -6 to -5 hrs			RSS									
peri -5 to -4 hrs			RSS/MAG	MAG								
peri -4 to -3 hrs			RSS/MAG	MAG								
peri -3 to -2 hrs			RSS/MAG	MAG								
peri -2 to -1 hrs	UVIS Rings		RSS/MAG	MAG								
peri-60 to -45 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	AUR INB	RADAR Saturn	INMS**	INMS***	
peri -45 to -30 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR Saturn	INMS**	INMS***	
peri-30 to -10 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***	
peri-10 to -0 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***	
peri 0 to +10 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***	
peri+10 to +30 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR/INMS	INMS**	INMS***	
peri+30 to +45min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***	
peri +45 to +60 min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***	
peri+1 to +2 hrs	RADAR Rings		RSS/MAG	MAG	COLD AUR		RCS xtion		RCS xtion	RCS xtion	RCS xtion	
peri+2 to +3 hrs			RSS/MAG	MAG	COLD AUR/ENC							
peri+3 to +4 hrs			RSS/MAG	MAG	COLD ENC							
peri+4 to +5 hrs			RSS/MAG	MAG	COLD ENC							
peri+5 to +7 hrs			RSS		COLD ENC							
peri+7 to +12 hrs			RSS									



Cassini Grand Finale

Rev	271	272	273	274	275	276	277	278	279	280	281
	Intermediate Altitude Periapses (~63,000 km)					High Altitude Periapses (~64,000 km)					
RCS control at periapse	RCS 3:08										
Sequence	S99	S99	S99	S99	S99	S100	S100	S100	S100	S100	S100
Segment owner	Saturn	XD	Maps	Rings	Saturn	Rings	Rings	Saturn	Maps	XD	Saturn
peri-12 to -6 hrs			RSS	RSS	RSS			RSS		RSS	
peri -6 to -5 hrs			RSS	RSS	RSS			RSS		RSS	
peri -5 to -4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -4 to -3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri-60 to -45 min	CIRS N Pol	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri -45 to -30 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-30 to -10 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri-10 to -0 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri 0 to +10 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri+10 to +30 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri+30 to +45min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri +45 to +60 min	CIRS S Pol	MAG	RSS/MAG	RSS	RSS	ISS Rings	RADAR Rings	RSS		RSS	CIRS S Pol
peri+1 to +2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+2 to +3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+3 to +4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+4 to +5 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+5 to +7 hrs			RSS	RSS	RSS			RSS		RSS	
peri+7 to +12 hrs			RSS	RSS	RSS			RSS		RSS	
Rev	282	283	284	285	286	287	288	289	290	291	292
	Intermediate Altitude Periapses (~63,000 km)				Low Altitude Periapses (62,000 km)						
RCS control at periapse	RCS 3:55										
Sequence	S100	S101	S101	S101	S101	S101	S101	S101	S101	S101	S101
Segment owner	Rings	Rings	Saturn	Maps	SOST	Maps	Saturn	Maps	Saturn	Saturn	Saturn
peri-12 to -6 hrs			RSS								
peri -6 to -5 hrs			RSS								
peri -5 to -4 hrs			RSS/MAG	MAG							
peri -4 to -3 hrs			RSS/MAG	MAG							
peri -3 to -2 hrs			RSS/MAG	MAG							
peri -2 to -1 hrs			RSS/MAG	MAG							
peri-60 to -45 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	AUR INB	RADAR Saturn	INMS**	INMS***
peri -45 to -30 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR Saturn	INMS**	INMS***
peri-30 to -10 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri-10 to -0 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri 0 to +10 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri+10 to +30 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR/INMS	INMS**	INMS***
peri+30 to +45min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri +45 to +60 min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri+1 to +2 hrs	RADAR Rings		RSS/MAG	MAG	COLD AUR		RCS xtion		RCS xtion	RCS xtion	RCS xtion
peri+2 to +3 hrs			RSS/MAG	MAG	COLD AUR/ENC						
peri+3 to +4 hrs			RSS/MAG	MAG	COLD ENC						
peri+4 to +5 hrs			RSS/MAG	MAG	COLD ENC						
peri+5 to +7 hrs			RSS		COLD ENC						
peri+7 to +12 hrs			RSS								



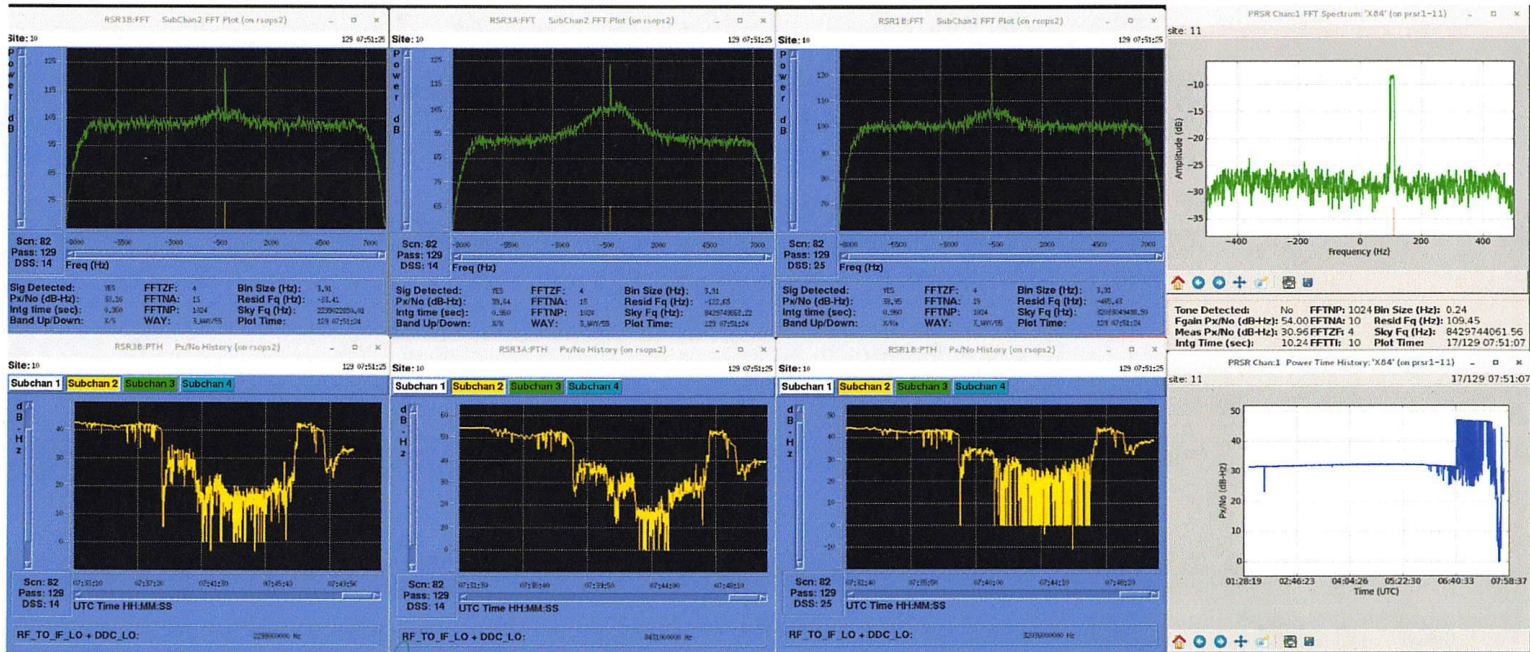


RSS Gravity + Occultation

Trammar Mauro
Shortest, Closest, Fastest
Cassini RSS Ring Occultation

REV 273
DOY 2017/128-129
MAY 8-9

Aseel Arabtaw
W



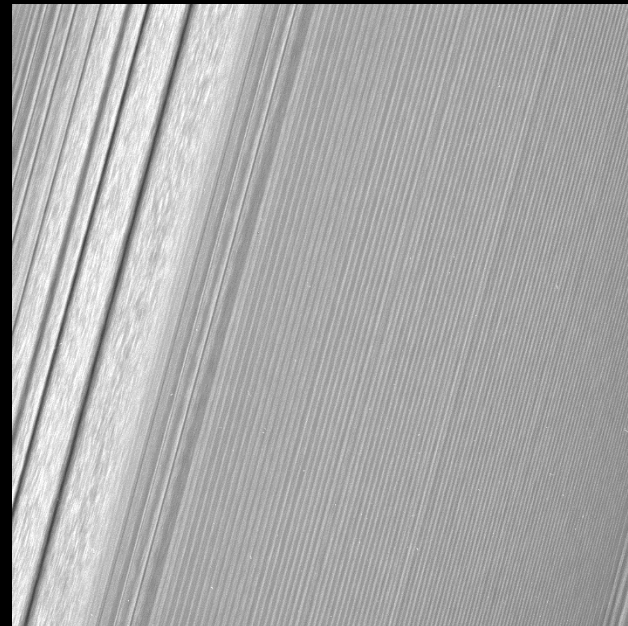
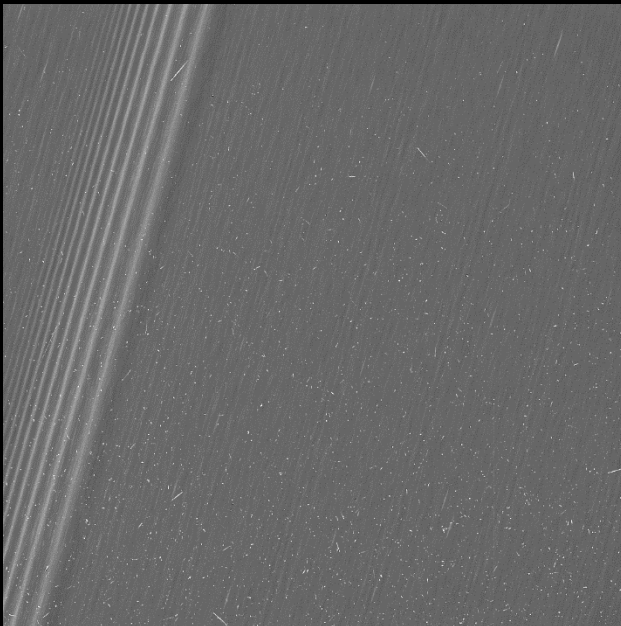
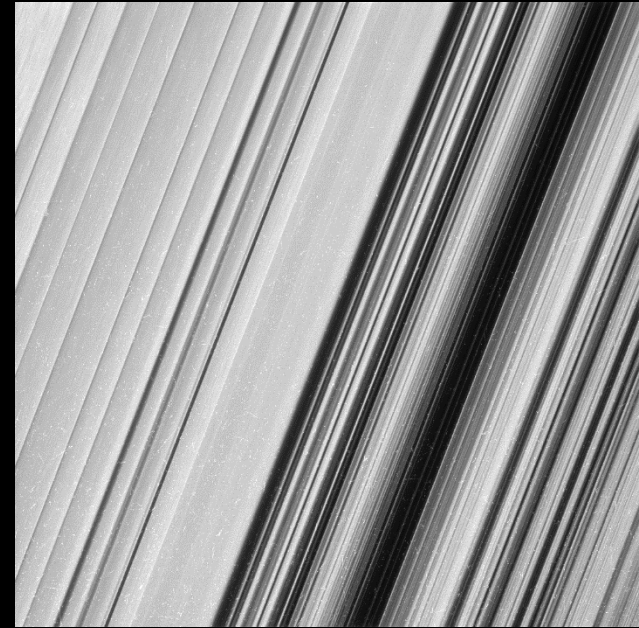
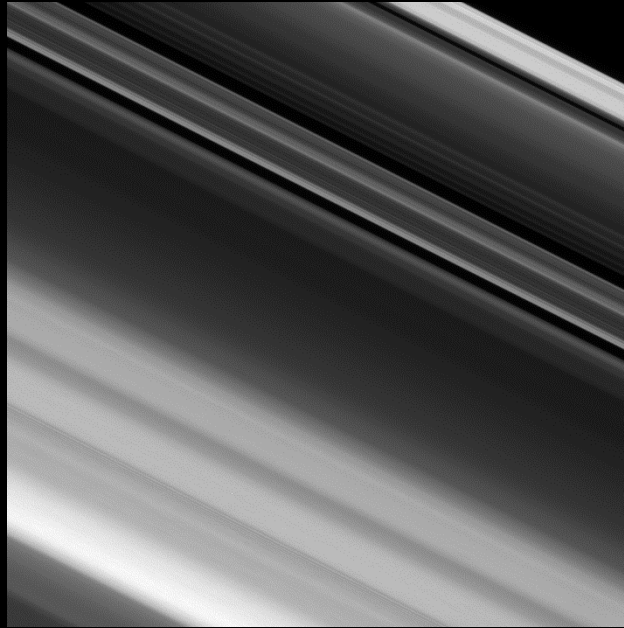
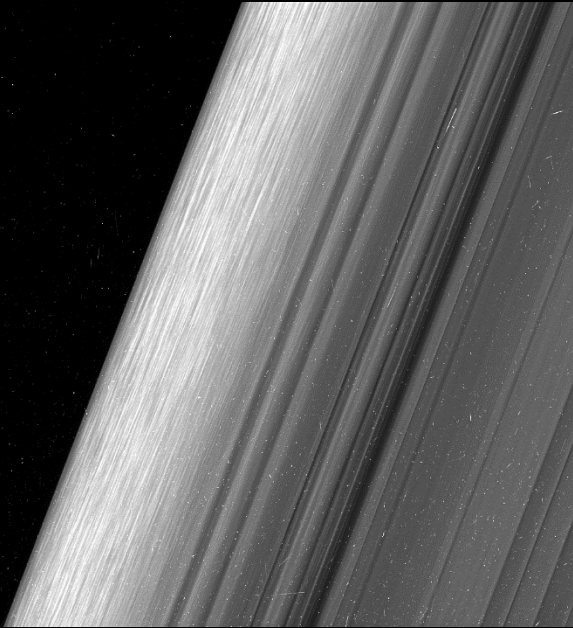
Trammar Mauro
RSS Emeritus
Elias Barbieri
Judy

Scott Edinger
deputy Project Scientist

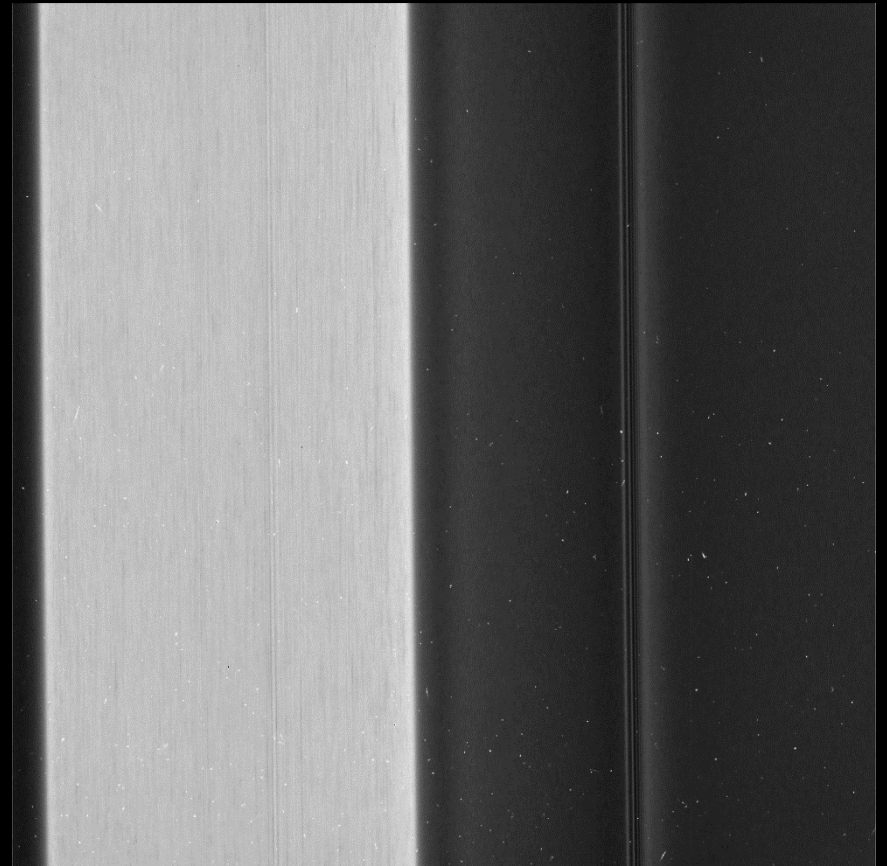
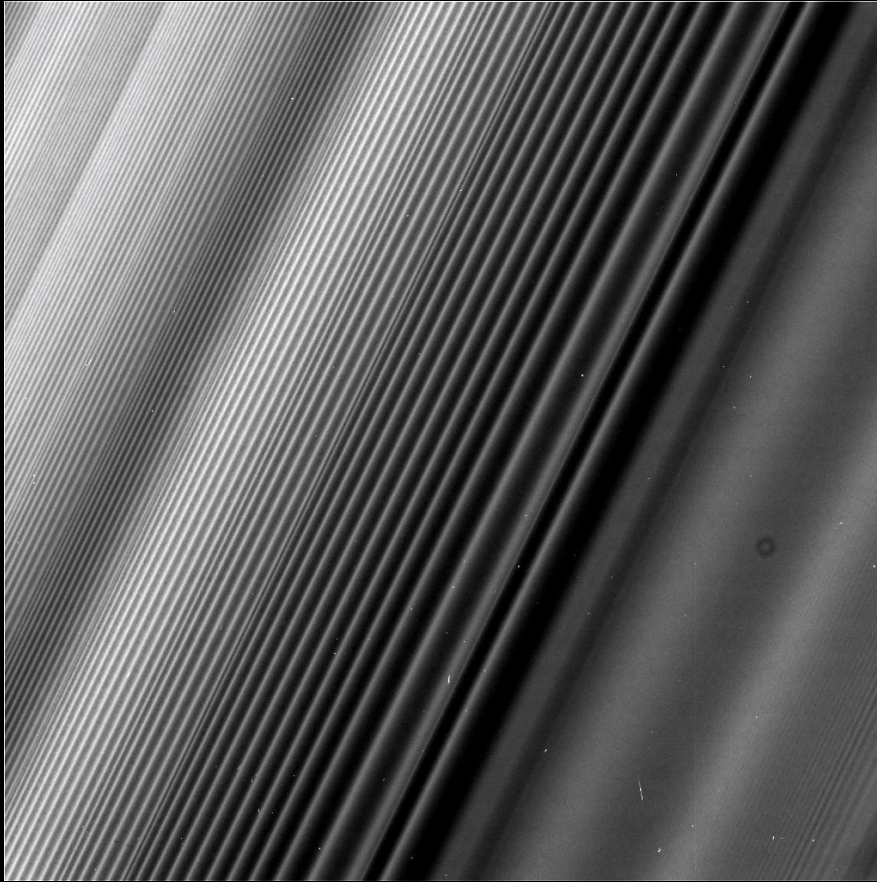
Cassini Grand Finale

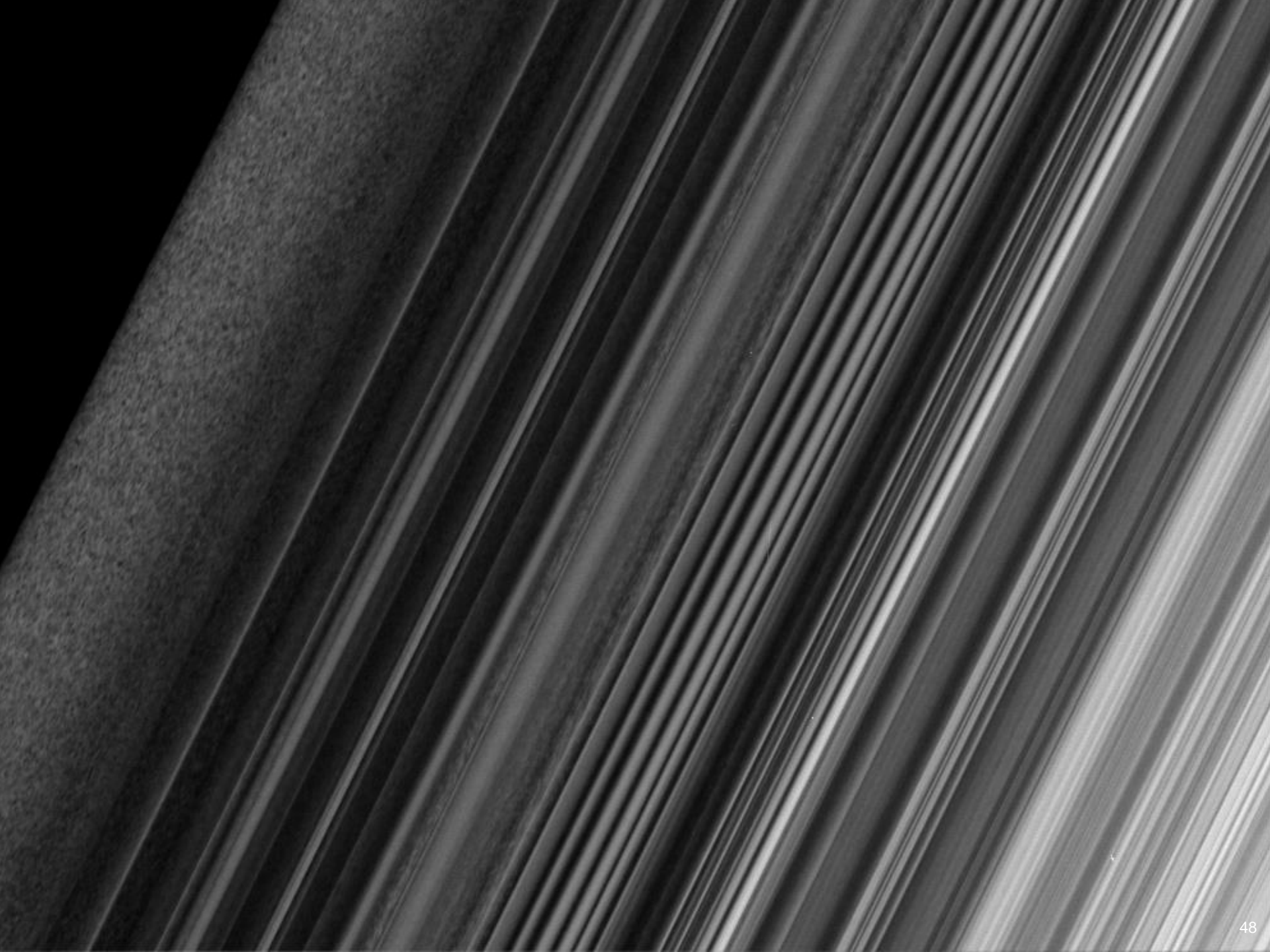
Rev	271	272	273	274	275	276	277	278	279	280	281
	Intermediate Altitude Periapses (~63,000 km)					High Altitude Periapses (~64,000 km)					
RCS control at periapse		RCS 3:08									
Sequence	S99	S99	S99	S99	S99	S100	S100	S100	S100	S100	S100
Segment owner	Saturn	XD	Maps	Rings	Saturn	Rings	Rings	Saturn	Maps	XD	Saturn
peri-12 to -6 hrs			RSS	RSS	RSS			RSS		RSS	
peri -6 to -5 hrs			RSS	RSS	RSS			RSS		RSS	
peri -5 to -4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -4 to -3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri-60 to -45 min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri -45 to -30 min		MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-30 to -10 min						Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri-10 to -0 min						HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri 0 to +10 min						HGA to RAM	HGA to RAM	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri+10 to +30 min						Slew	Slew	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri+30 to +45min						ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri +45 to +60 min						ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri+1 to +2 hrs								RSS		RSS	CIRS S Pol
peri+2 to +3 hrs								RSS		RSS	
peri+3 to +4 hrs								RSS		RSS	
peri+4 to +5 hrs								RSS		RSS	
peri+5 to +7 hrs								RSS		RSS	
peri+7 to +12 hrs								RSS		RSS	
Rev	282	283	284	285	286	287	288	289	290	291	292
	Intermediate Altitude Periapses (~63,000 km)					Low Altitude Periapses (62,000 km)					
RCS control at periapse				RCS 3:55			RCS 2:17	RCS 2:10	RCS 3:19	RCS 2:15	RCS 2:15
Sequence	S100	S101	S101	S101	S101	S101	S101	S101	S101	S101	S101
Segment owner	Rings	Rings	Saturn	Maps	SOST	Maps	Saturn	Maps	Saturn	Saturn	Saturn
peri-12 to -6 hrs			RSS								
peri -6 to -5 hrs			RSS								
peri -5 to -4 hrs			RSS/MAG	MAG							
peri -4 to -3 hrs			RSS/MAG	MAG							
peri -3 to -2 hrs			RSS/MAG	MAG							
peri -2 to -1 hrs			RSS/MAG	MAG							
peri-60 to -45 min			RSS/MAG	MAG							
peri -45 to -30 min			RSS/MAG	MAG							
peri-30 to -10 min			RSS/MAG	MAG							
peri-10 to -0 min			RSS/MAG	MAG							
peri 0 to +10 min			RSS/MAG	MAG							
peri+10 to +30 min			RSS/MAG	MAG							
peri+30 to +45min			RSS/MAG	MAG							
peri +45 to +60 min			RSS/MAG	MAG							
peri+1 to +2 hrs			RSS/MAG	MAG							
peri+2 to +3 hrs			RSS/MAG	MAG							
peri+3 to +4 hrs			RSS/MAG	MAG							
peri+4 to +5 hrs			RSS/MAG	MAG							
peri+5 to +7 hrs			RSS								
peri+7 to +12 hrs			RSS								
peri-12 to -6 hrs											
peri -6 to -5 hrs											
peri -5 to -4 hrs											
peri -4 to -3 hrs											
peri -3 to -2 hrs											
peri -2 to -1 hrs											
peri-60 to -45 min											
peri -45 to -30 min											
peri-30 to -10 min											
peri-10 to -0 min											
peri 0 to +10 min											
peri+10 to +30 min											
peri+30 to +45min											
peri +45 to +60 min											
peri+1 to +2 hrs											
peri+2 to +3 hrs											
peri+3 to +4 hrs											
peri+4 to +5 hrs											
peri+5 to +7 hrs											
peri+7 to +12 hrs											

Saturn's Rings at High Resolution



Saturn's Rings at High Resolution





Cassini Grand Finale

Rev	271	272	273	274	275	276	277	278	279	280	281
	Intermediate Altitude Periapses (~63,000 km)					High Altitude Periapses (~64,000 km)					
RCS control at periapse		RCS 3:08									
Sequence	S99	S99	S99	S99	S99	S100	S100	S100	S100	S100	S100
Segment owner	Saturn	XD	Maps	Rings	Saturn	Rings	Rings	Saturn	Maps	XD	Saturn
peri-12 to -6 hrs			RSS	RSS	RSS			RSS		RSS	
peri -6 to -5 hrs			RSS	RSS	RSS			RSS		RSS	
peri -5 to -4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -4 to -3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri-60 to -45 min	CIRS N Pol	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-45 to -30 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-30 to -10 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri-10 to -0 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri 0 to +10 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	HGA to RAM*
peri+10 to +30 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	Slew*
peri+30 to +45min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri +45 to +60 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS		RSS	CIRS S Pol
peri+1 to +2 hrs	CIRS S Pol	MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+2 to +3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+3 to +4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+4 to +5 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+5 to +7 hrs			RSS	RSS	RSS			RSS		RSS	
peri+7 to +12 hrs			RSS	RSS	RSS			RSS		RSS	
Rev	282	283	284	285	286	287	288	289	290	291	292
	Intermediate Altitude Periapses (~63,000 km)				Low Altitude Periapses (62,000 km)						
RCS control at periapse				RCS 3:55			RCS 2:17	RCS 2:10	RCS 3:19	RCS 2:15	RCS 2:15
Sequence	S100	S101	S101	S101	S101	S101	S101	S101	S101	S101	S101
Segment owner	Rings	Rings	Saturn	Maps	OST	Maps	Saturn	Maps	Saturn	Saturn	Saturn
peri-12 to -6 hrs			RSS								
peri -6 to -5 hrs			RSS								
peri -5 to -4 hrs			RSS/MAG	MAG							
peri -4 to -3 hrs			RSS/MAG	MAG							
peri -3 to -2 hrs			RSS/MAG	MAG							
peri -2 to -1 hrs			RSS/MAG	MAG							
peri-60 to -45 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	AUR INB	RADAR Saturn	INMS**	INMS***
peri-45 to -30 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR Saturn	INMS**	INMS***
peri-30 to -10 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri-10 to -0 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri 0 to +10 min	HGA to RAM	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri+10 to +30 min	Slew	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR/INMS	INMS**	INMS***
peri+30 to +45min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri +45 to +60 min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri+1 to +2 hrs	RADAR Rings		RSS/MAG	MAG	COLD AUR		RCS xtion		RCS xtion	RCS xtion	RCS xtion
peri+2 to +3 hrs			RSS/MAG	MAG	COLD AUR/ENC						
peri+3 to +4 hrs			RSS/MAG	MAG	COLD ENC						
peri+4 to +5 hrs			RSS/MAG	MAG	COLD ENC						
peri+5 to +7 hrs			RSS		COLD ENC						
peri+7 to +12 hrs			RSS								

It's hard...not everything goes perfectly

Puzzles and more puzzles

So far:

- the magnetic field is surprisingly well-aligned with the planet's rotation axis. The tilt is much smaller than 0.06 degrees -- which is the lower limit the spacecraft's magnetometer data placed on the value prior to the start of the Grand Finale. "The tilt seems to be much smaller than we had previously estimated and quite challenging to explain," said Michele Dougherty, Cassini magnetometer investigation lead at Imperial College, London

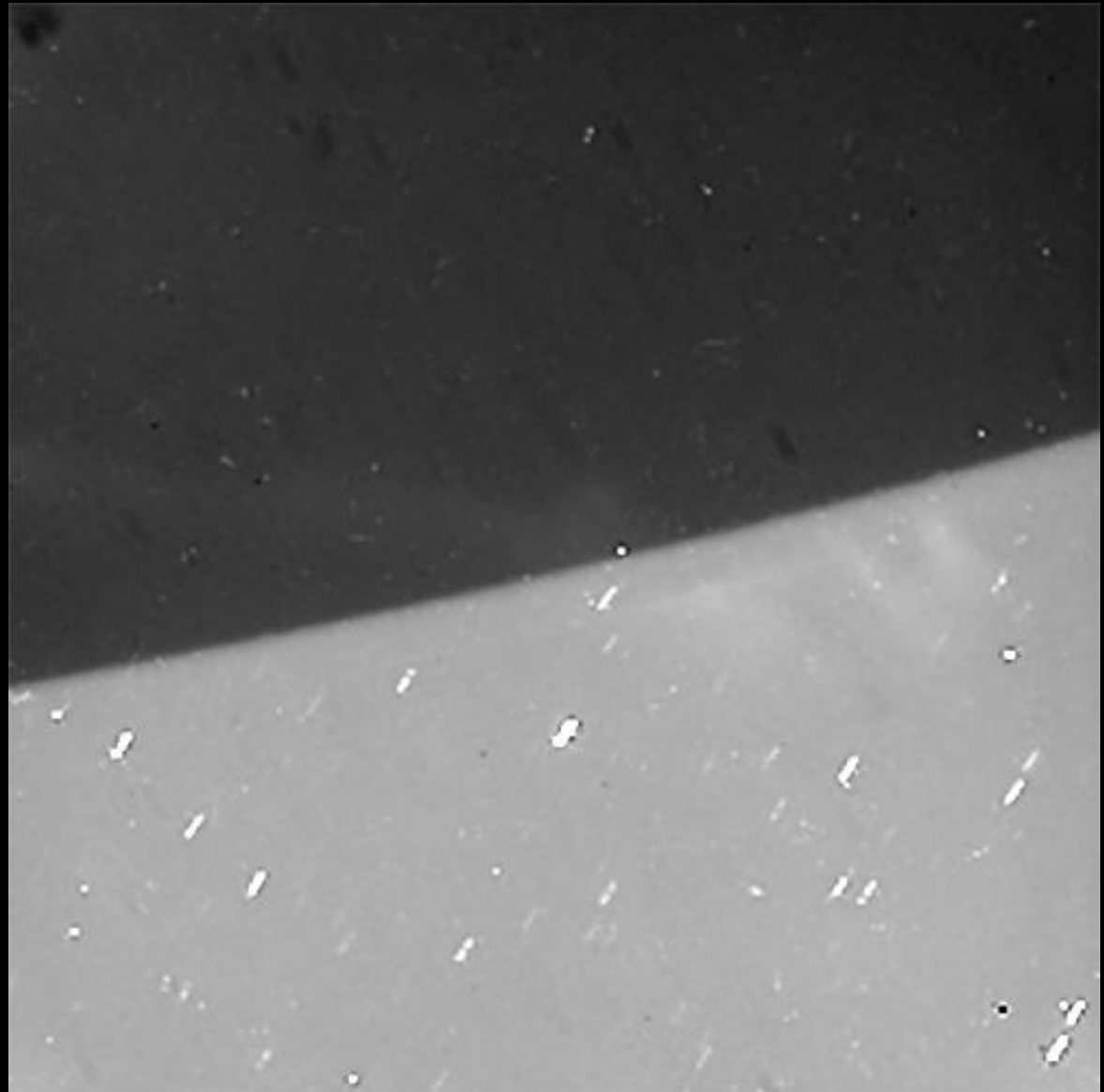
Cassini Grand Finale

Rev	271	272	273	274	275	276	277	278	279	280	281
	Intermediate Altitude Periapses (~63,000 km)					High Altitude Periapses (~64,000 km)					
RCS control at periapse		RCS 3:08									
Sequence	S99	S99	S99	S99	S99	S100	S100	S100	S100	S100	S100
Segment owner	Saturn	XD	Maps	Rings	Saturn	Rings	Rings	Saturn	Maps	XD	Saturn
peri-12 to -6 hrs			RSS	RSS	RSS			RSS		RSS	
peri -6 to -5 hrs			RSS	RSS	RSS			RSS		RSS	
peri -5 to -4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -4 to -3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri-60 to -45 min	CIRS N Pol	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-45 to -30 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-30 to -10 min											
peri-10 to -0 min											
peri 0 to +10 min											
peri+10 to +30 min											
peri+30 to +45min	ISS Saturn		RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri +45 to +60 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri+1 to +2 hrs	CIRS S Pol	MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+2 to +3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+3 to +4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+4 to +5 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+5 to +7 hrs			RSS	RSS	RSS			RSS		RSS	
peri+7 to +12 hrs			RSS	RSS	RSS			RSS		RSS	
Rev	282	283	284	285	286	287	288	289	290	291	292
	Intermediate Altitude Periapses (~63,000 km)				Low Altitude Periapses (62,000 km)						
RCS control at periapse				RCS 3:55			RCS 2:17	RCS 2:10	RCS 3:19	RCS 2:15	RCS 2:15
Sequence	S100	S101	S101	S101	S101	S101	S101	S101	S101	S101	S101
Segment owner	Rings	Rings	Saturn	Maps	SOST	Maps	Saturn	Maps	Saturn	Saturn	Saturn
peri-12 to -6 hrs			RSS								
peri -6 to -5 hrs			RSS								
peri -5 to -4 hrs			RSS/MAG	MAG							
peri -4 to -3 hrs			RSS/MAG	MAG							
peri -3 to -2 hrs			RSS/MAG	MAG							
peri -2 to -1 hrs			RSS/MAG	MAG							
peri-60 to -45 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	AUR INB	RADAR Saturn	INMS**	INMS***
peri-45 to -30 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR Saturn	INMS**	INMS***
peri-30 to -10 min					COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri-10 to -0 min					COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri 0 to +10 min					COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri+10 to +30 min					COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR/INMS	INMS**	INMS***
peri+30 to +45min					COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri +45 to +60 min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri+1 to +2 hrs	RADAR Rings		RSS/MAG	MAG	COLD AUR		RCS xtion		RCS xtion	RCS xtion	RCS xtion
peri+2 to +3 hrs			RSS/MAG	MAG	COLD AUR/ENC						
peri+3 to +4 hrs			RSS/MAG	MAG	COLD ENC						
peri+4 to +5 hrs			RSS/MAG	MAG	COLD ENC						
peri+5 to +7 hrs			RSS		COLD ENC						
peri+7 to +12 hrs			RSS								

Saturn Southern Aurora



Nov 29, 2010



July 20, 2017

Cassini Grand Finale

Rev	271	272	273	274	275	276	277	278	279	280	281
	Intermediate Altitude Periapses (~63,000 km)					High Altitude Periapses (~64,000 km)					
RCS control at periapse		RCS 3:08									
Sequence	S99	S99	S99	S99	S99	S100	S100	S100	S100	S100	S100
Segment owner	Saturn	XD	Maps	Rings	Saturn	Rings	Rings	Saturn	Maps	XD	Saturn
peri-12 to -6 hrs			RSS	RSS	RSS			RSS		RSS	
peri -6 to -5 hrs			RSS	RSS	RSS			RSS		RSS	
peri -5 to -4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -4 to -3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri-60 to -45 min	CIRS N Pol	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-45 to -30 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-30 to -10 min											
peri-10 to -0 min											
peri 0 to +10 min											
peri+10 to +30 min											
peri+30 to +45min	ISS Saturn		RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri +45 to +60 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri+1 to +2 hrs	CIRS S Pol	MAG	RSS/MAG	RSS	RSS			RSS		RSS	CIRS S Pol
peri+2 to +3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+3 to +4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+4 to +5 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+5 to +7 hrs			RSS	RSS	RSS			RSS		RSS	
peri+7 to +12 hrs			RSS	RSS	RSS			RSS		RSS	
Rev	282	283	284	285	286	287	288	289	290	291	292
	Intermediate Altitude Periapses (~63,000 km)				Low Altitude Periapses (62,000 km)						
RCS control at periapse				RCS 3:55			RCS 2:17	RCS 2:10	RCS 3:19	RCS 2:15	RCS 2:15
Sequence	S100	S101	S101	S101	S101	S101	S101	S101	S101	S101	S101
Segment owner	Rings	Rings	Saturn	Maps	SOST	Maps	Saturn	Maps	Saturn	Saturn	Saturn
peri-12 to -6 hrs			RSS								
peri -6 to -5 hrs			RSS								
peri -5 to -4 hrs			RSS/MAG	MAG							
peri -4 to -3 hrs			RSS/MAG	MAG							
peri -3 to -2 hrs			RSS/MAG	MAG							
peri -2 to -1 hrs			RSS/MAG	MAG							
peri-60 to -45 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	AUR INB	RADAR Saturn	INMS**	INMS***
peri-45 to -30 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR Saturn	INMS**	INMS***
peri-30 to -10 min						INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri-10 to -0 min						INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri 0 to +10 min						INMS/CDA	INMS/CDA*	COLD	RADAR/INMS	INMS**	INMS***
peri+10 to +30 min						INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR/INMS	INMS**	INMS***
peri+30 to +45min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri +45 to +60 min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri+1 to +2 hrs			RSS/MAG	MAG	COLD AUR		RCS xtion		RCS xtion	RCS xtion	RCS xtion
peri+2 to +3 hrs			RSS/MAG	MAG	COLD AUR/ENC						
peri+3 to +4 hrs			RSS/MAG	MAG	COLD ENC						
peri+4 to +5 hrs			RSS/MAG	MAG	COLD ENC						
peri+5 to +7 hrs			RSS		COLD ENC						
peri+7 to +12 hrs			RSS								

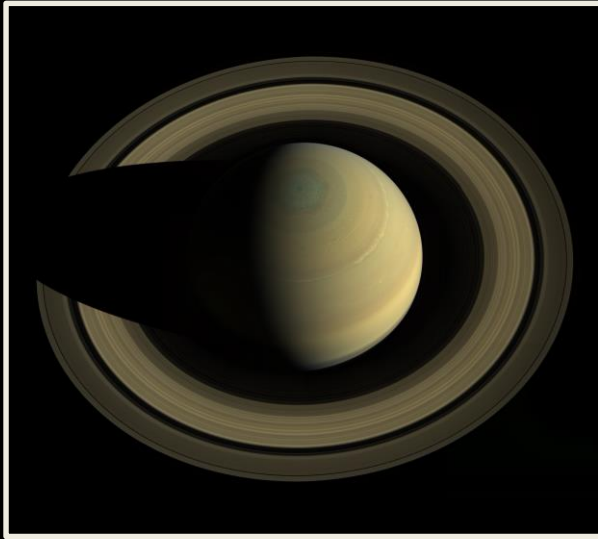
Project Manager Significant Event Report for 8/09/17 - 8/15/17

- On August 13th, 2017 Cassini successfully completed its 18th ringplane passage between Saturn and its innermost rings, out of a total of 22. This passage was the first of these crossings where the spacecraft briefly passed through the upper reaches of Saturn's atmosphere
- The Ion and Neutral Mass Spectrometer (INMS) was prime during the passage, and it performed the first-ever direct sampling of Saturn's atmosphere. As expected, the spacecraft had to utilize its thrusters to offset the torque imparted by atmospheric drag. The torque was higher than predicted, which was good news about atmospheric density for INMS, but it remained well within the attitude control system's control authority.

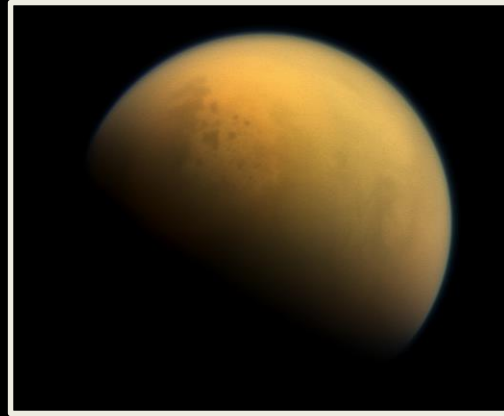
Cassini Grand Finale

Rev	271	272	273	274	275	276	277	278	279	280	281
	Intermediate Altitude Periapses (~63,000 km)					High Altitude Periapses (~64,000 km)					
RCS control at periapse		RCS 3:08									
Sequence	S99	S99	S99	S99	S99	S100	S100	S100	S100	S100	S100
Segment owner	Saturn	XD	Maps	Rings	Saturn	Rings	Rings	Saturn	Maps	XD	Saturn
peri-12 to -6 hrs			RSS	RSS	RSS			RSS		RSS	
peri -6 to -5 hrs			RSS	RSS	RSS			RSS		RSS	
peri -5 to -4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -4 to -3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -3 to -2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri -2 to -1 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri-60 to -45 min	CIRS N Pol ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri -45 to -30 min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	RADAR Rings	ISS Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri-30 to -10 min											
peri-10 to -0 min											
peri 0 to +10 min											
peri+10 to +30 min	ISS Saturn										
peri+30 to +45min	ISS Saturn	MAG	RSS/MAG	RSS/CDA	RSS/CDA	ISS Rings	RADAR Rings	RSS/CDA	INMS/CDA	RSS/CDA	ISS Saturn
peri +45 to +60 min	CIRS S Pol	MAG	RSS/MAG	RSS	RSS	ISS Rings	RADAR Rings	RSS		RSS	CIRS S Pol
peri+1 to +2 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+2 to +3 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+3 to +4 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+4 to +5 hrs		MAG	RSS/MAG	RSS	RSS			RSS		RSS	
peri+5 to +7 hrs			RSS	RSS	RSS			RSS		RSS	
peri+7 to +12 hrs			RSS	RSS	RSS			RSS		RSS	
Rev	282	283	284	285	286	287	288	289	290	291	292
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Sequence	S100	S101	S101	S101	S101	S101	S101	S101	S101	S101	S101
Segment owner	Rings	Rings	Saturn	Maps	SOST	Maps	Saturn	Maps	Saturn	Saturn	Saturn
peri-12 to -6 hrs			RSS								
peri -6 to -5 hrs			RSS								
peri -5 to -4 hrs			RSS/MAG	MAG							
peri -4 to -3 hrs			RSS/MAG	MAG							
peri -3 to -2 hrs			RSS/MAG	MAG							
peri -2 to -1 hrs			RSS/MAG	MAG							
peri-60 to -45 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	AUR INB	RADAR Saturn	INMS**	INMS***
peri -45 to -30 min	UVIS Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	COLD	RADAR Saturn	INMS**	INMS***
peri-30 to -10 min											
peri-10 to -0 min											
peri 0 to +10 min											
peri+10 to +30 min											
peri+30 to +45min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri +45 to +60 min	RADAR Rings	INMS/CDA	RSS/MAG	MAG	COLD AUR	INMS/CDA	INMS/CDA*	CIRS S Pol	RADAR Saturn	INMS**	INMS***
peri+1 to +2 hrs			RSS/MAG	MAG	COLD AUR		RCS xtion		RCS xtion	RCS xtion	RCS xtion
peri+2 to +3 hrs			RSS/MAG	MAG	COLD AUR/ENC						
peri+3 to +4 hrs			RSS/MAG	MAG	COLD ENC						
peri+4 to +5 hrs			RSS/MAG	MAG	COLD ENC						
peri+5 to +7 hrs			RSS		COLD ENC						
peri+7 to +12 hrs			RSS								

The Last Day



Saturn and Rings



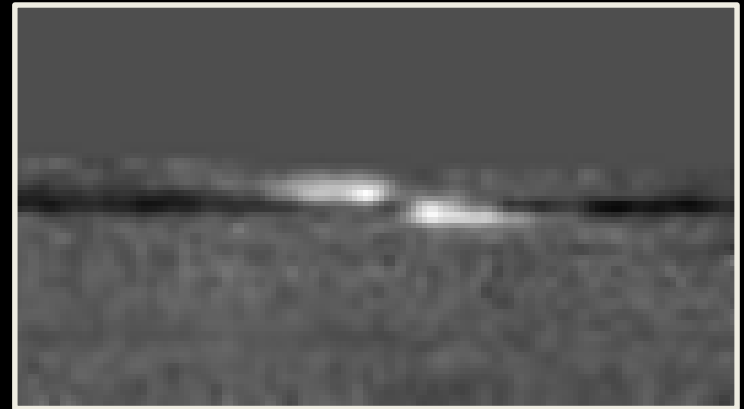
Titan



Peggy

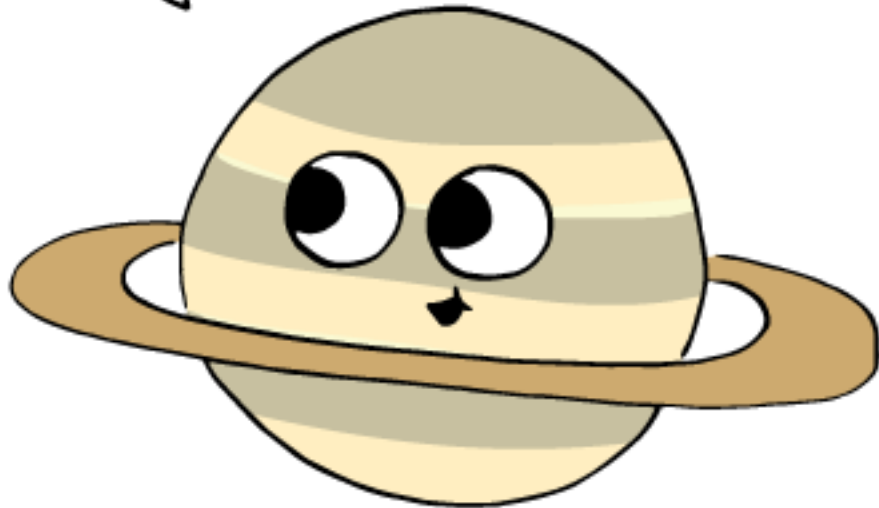


***Enceladus setting
behind Saturn***

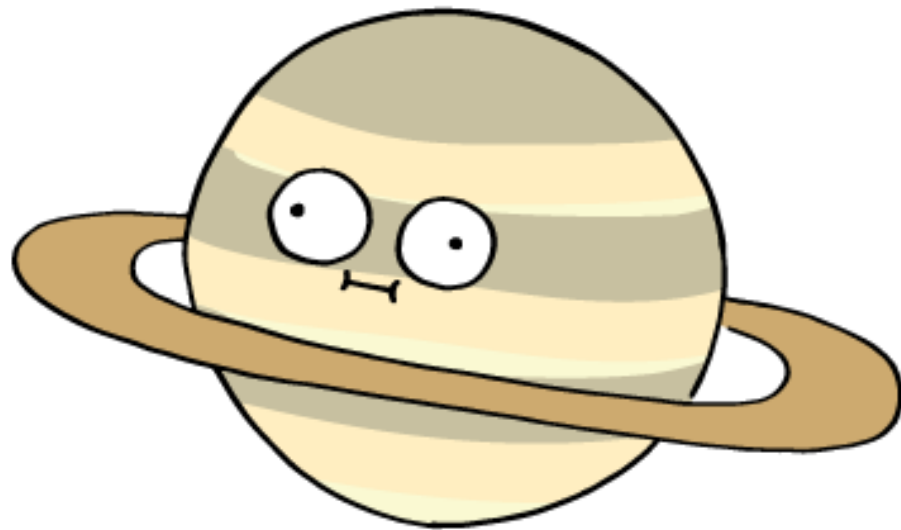


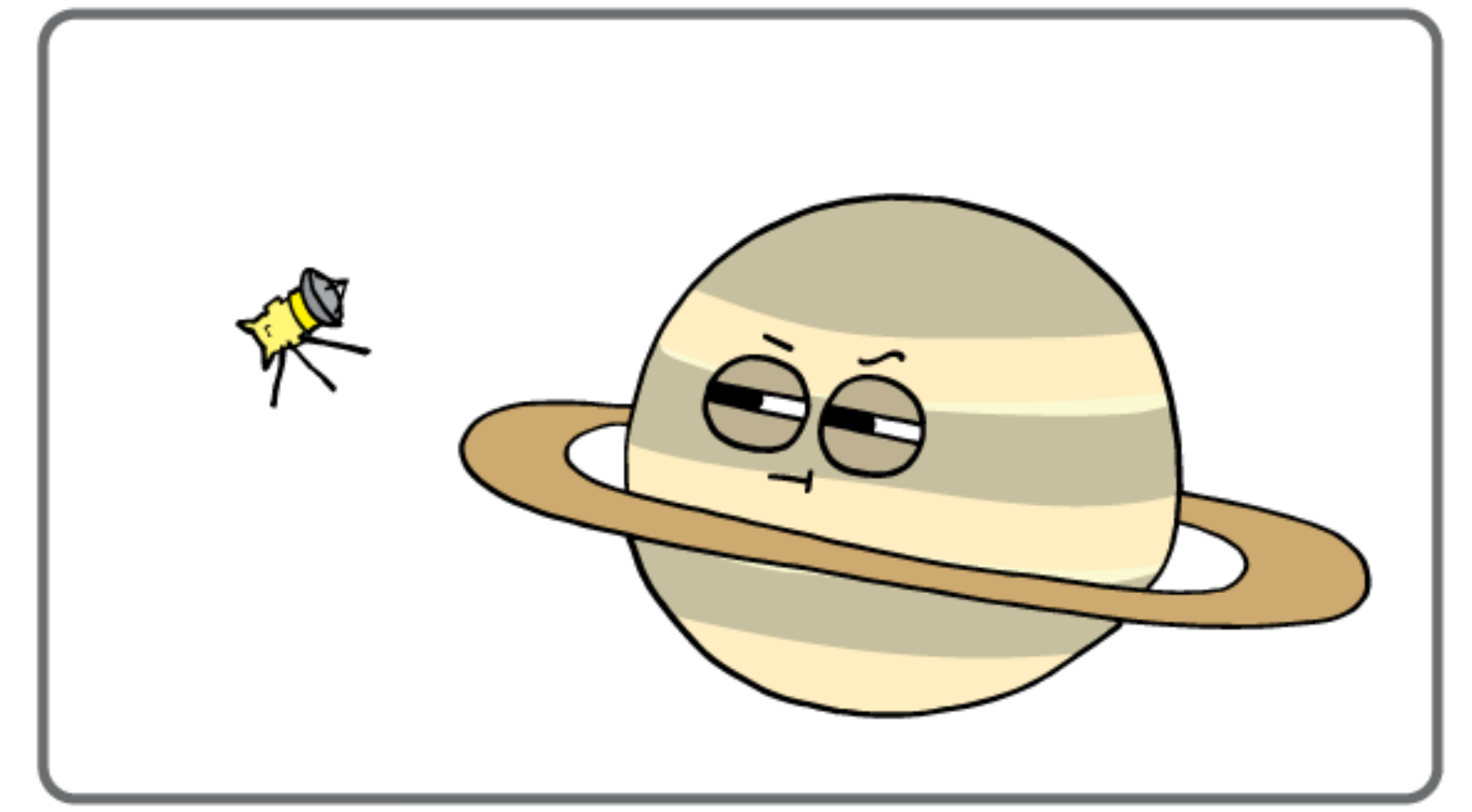
Propellers

So, Cassini! I hear you're retiring in September 2017. Congrats! How do you want to celebrate? Maybe do lunch with me and all my moons, or something?



Nah. I'll just go barreling straight into your atmosphere, learning as much as I can before I'm crushed to death and vaporized in a spectacular whirling inferno beneath your mysterious, stormy clouds.





THAT'S AWESOME!



Beatrice the Biologist

Saturn.jpl.nasa.gov



WEEKLY IMAGE

Hail the Hexagon ▾



Next: Grand Finale Dive No. 3
COMPLETED



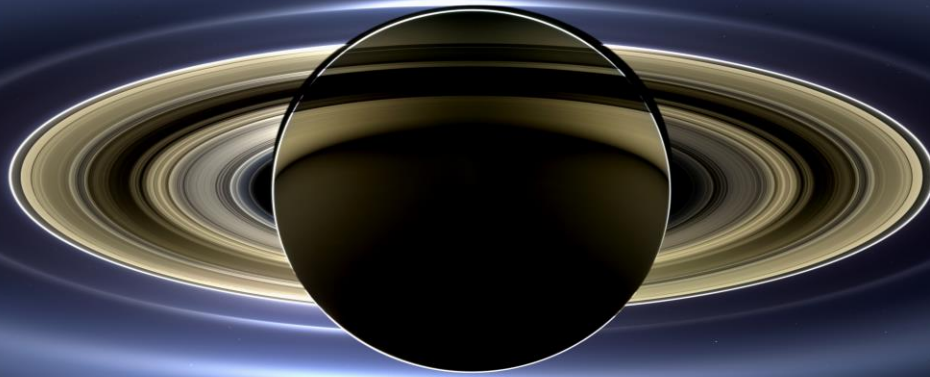
Distance from Saturn
136,605 mi



End of Mission: 15 Sep 2017
4:6:02:41:25



Questions?



<http://saturn.jpl.nasa.gov>