

XXXIX Universitat Catalana d'Estiu

Física

Astronomia i astrofísica: l'univers proper i llunyà

Sistema Solar i exoplanetes

II: El Sistema Solar: Particularitats

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Centro Astronómico Hispano-Alemán (CAHA)

Prada del Conflent,

22 d'agost 2007

Sistema Solar i exoplanetes

II: El Sistema Solar: Particularitats

- Característiques físiques i orbitals particulars dels components del Sistema Solar

El Sistema Solar

Consta de:

- Estel central (el Sol)
- 8 planetes: Mercuri, Venus, la Terra, Mart, Júpiter, Saturn, Urà, Neptú
- 2 cinturons principals d'asteroides: el cinturó clàssic (entre Mart i Júpiter) i el cinturó de Kuiper (objectes transneptunians)
- Asteroides addicionals i cometes
- Matèria interplanetària (meteoroides, vent solar)

Distàncies promig dels planetes al Sol

en milions de quilòmetres (Gm),
unitats astronòmiques (au)
i en temps-llum

Planeta	Gm	au	temps-llum
MERCURI	57.9	0.387	3 ^m 13 ^s
VENUS	108.2	0.723	6 ^m 01 ^s
LA TERRA	149.6	1.000	8 ^m 19 ^s
MART	227.9	1.524	12 ^m 40 ^s
JÚPITER	778.3	5.203	43 ^m 16 ^s
SATURN	1429	9.555	1 ^h 19 ^m
URÀ	2875	19.218	2 ^h 40 ^m
NEPTÚ	4504	30.110	4 ^h 10 ^m
PLUTÓ	5916	39.545	5 ^h 29 ^m

Diàmetres planetaris

Planeta	km	Terra = 1
MERCURI	4 879	0.38
VENUS	12 104	0.95
LA TERRA	12 756	1.00
MART	6 794	0.53
JÚPITER	142 984	11.2
SATURN	120 536	9.4
URÀ	51 118	4.0
NEPTÚ	49 528	3.9
PLUTÓ	2 300	0.18
EL SOL	1 392 000	109.1

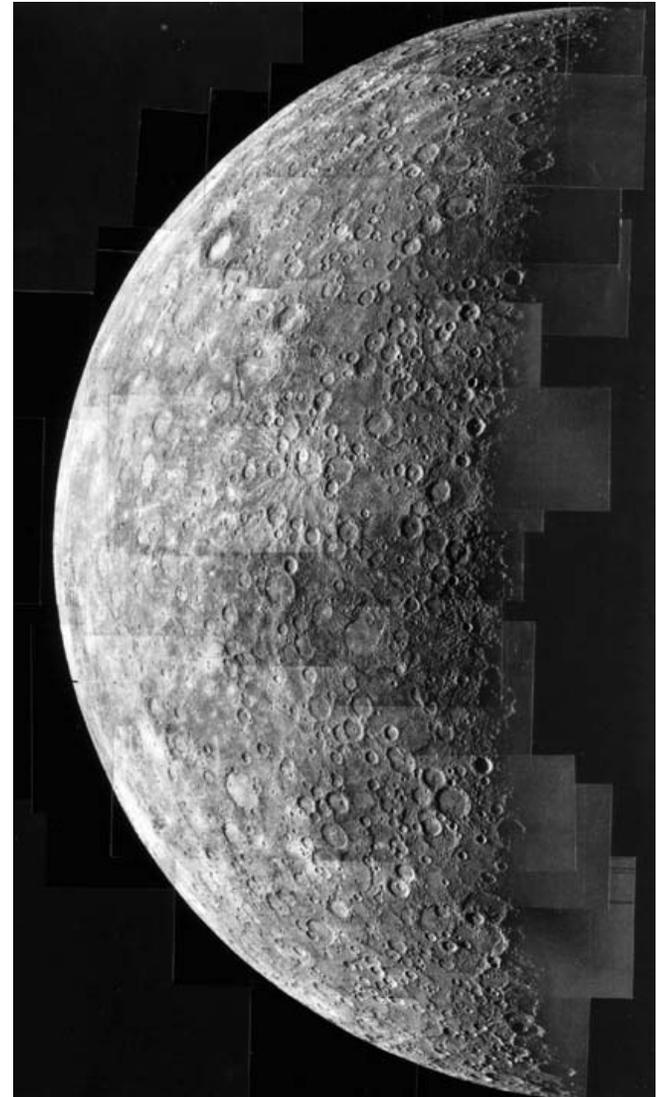
Períodes orbitals

Planeta	anys	dies
MERCURI	0.241	087.97
VENUS	0.615	224.70
LA TERRA	1.00	
MART	1.88	
JÚPITER	11.86	
SATURN	29.42	
URÀ	83.75	
NEPTÚ	163.72	
PLUTÓ	248.02	

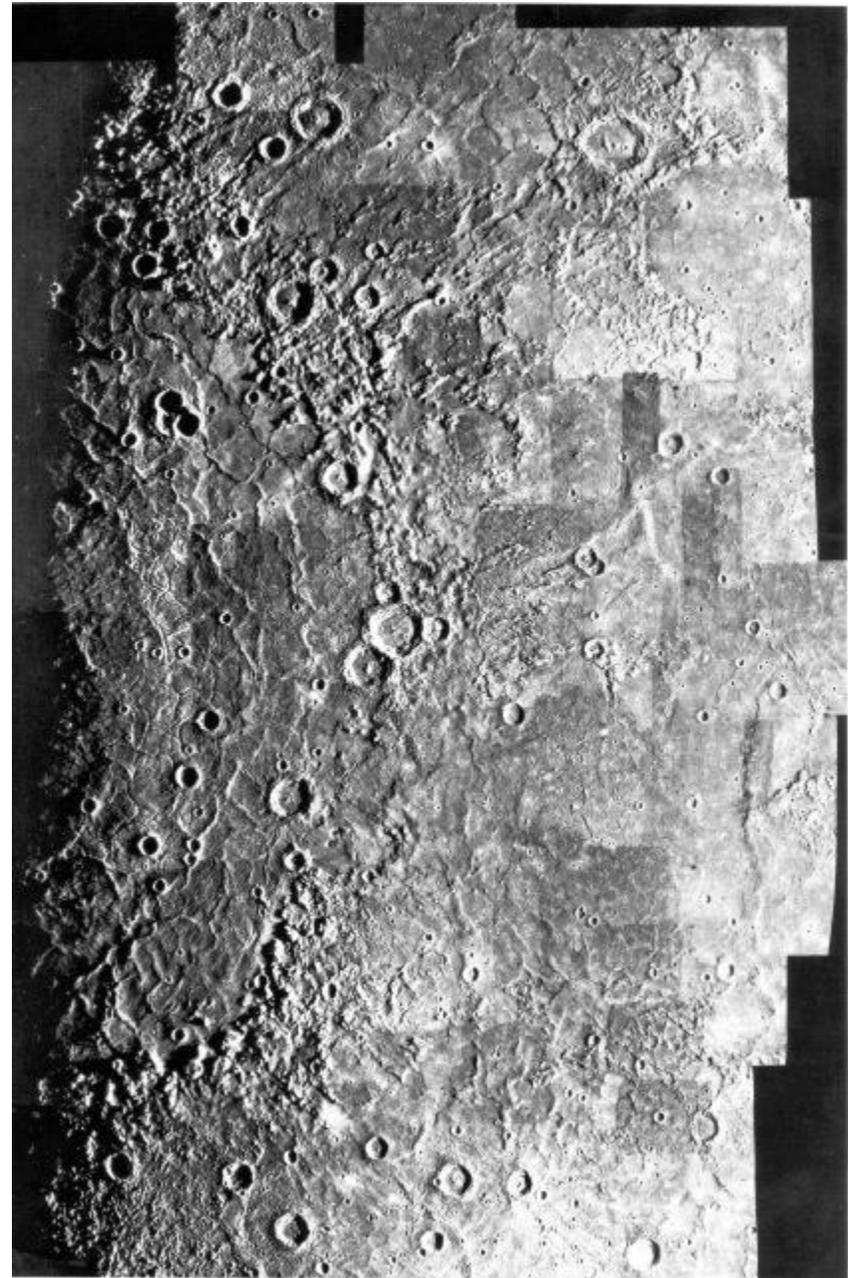
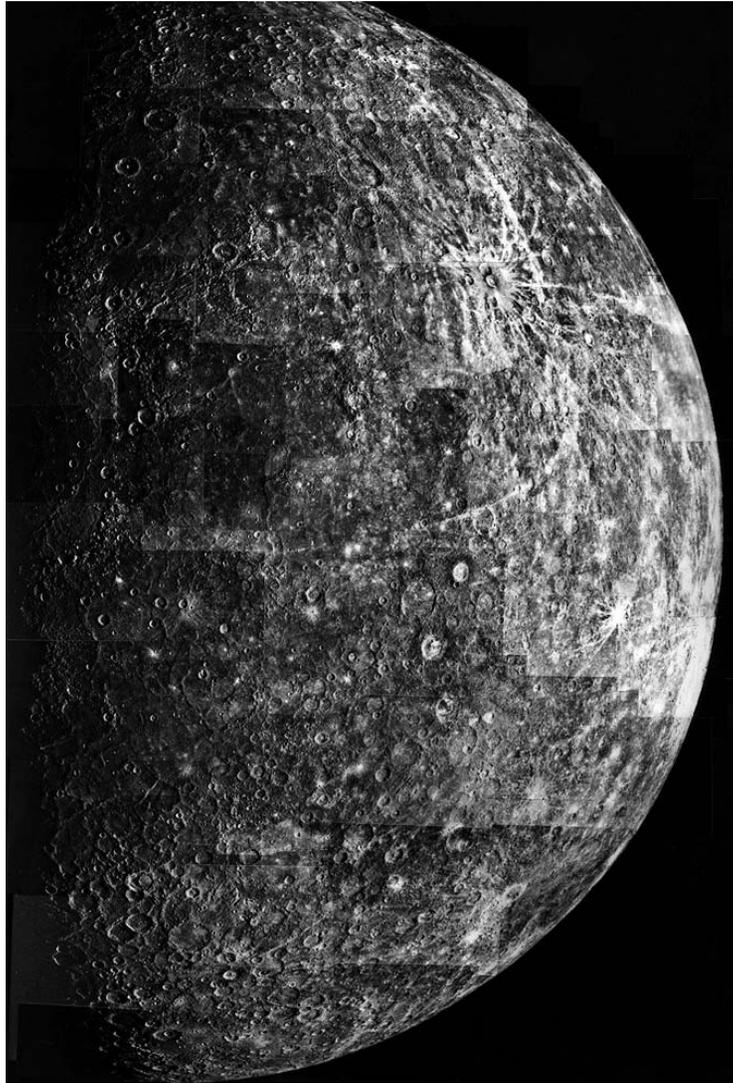
Mercuri

Mercuri

Diàmetre	4 879 km
Massa	0.055 Terres
Rotació	58.25 dies
Obliqüitat	0°
Gravetat	0.37 G
Densitat	5.43 g/cm ³



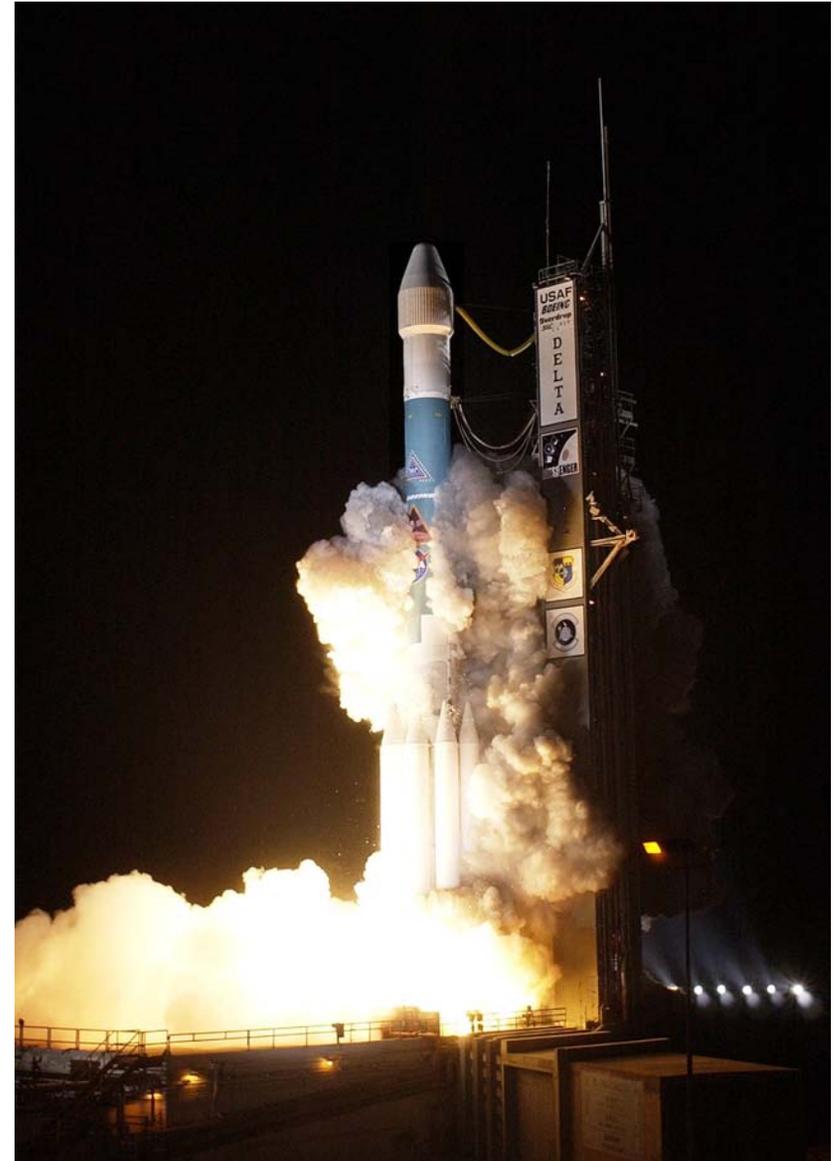
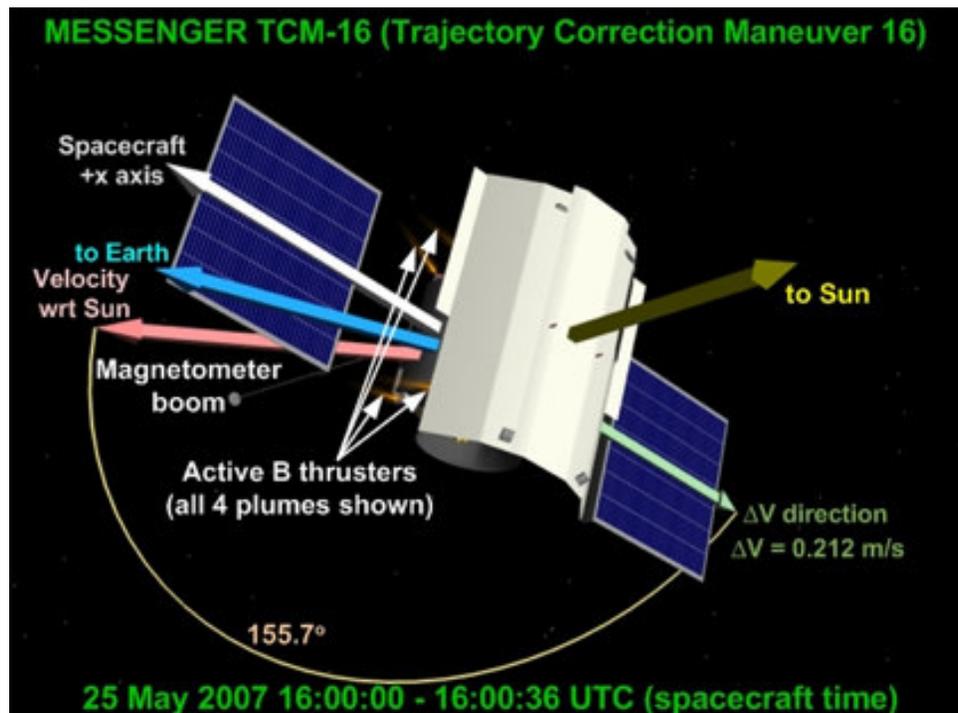
Mercuri



Mercuri: *Messenger*

llançament: 2 d'agost del 2004

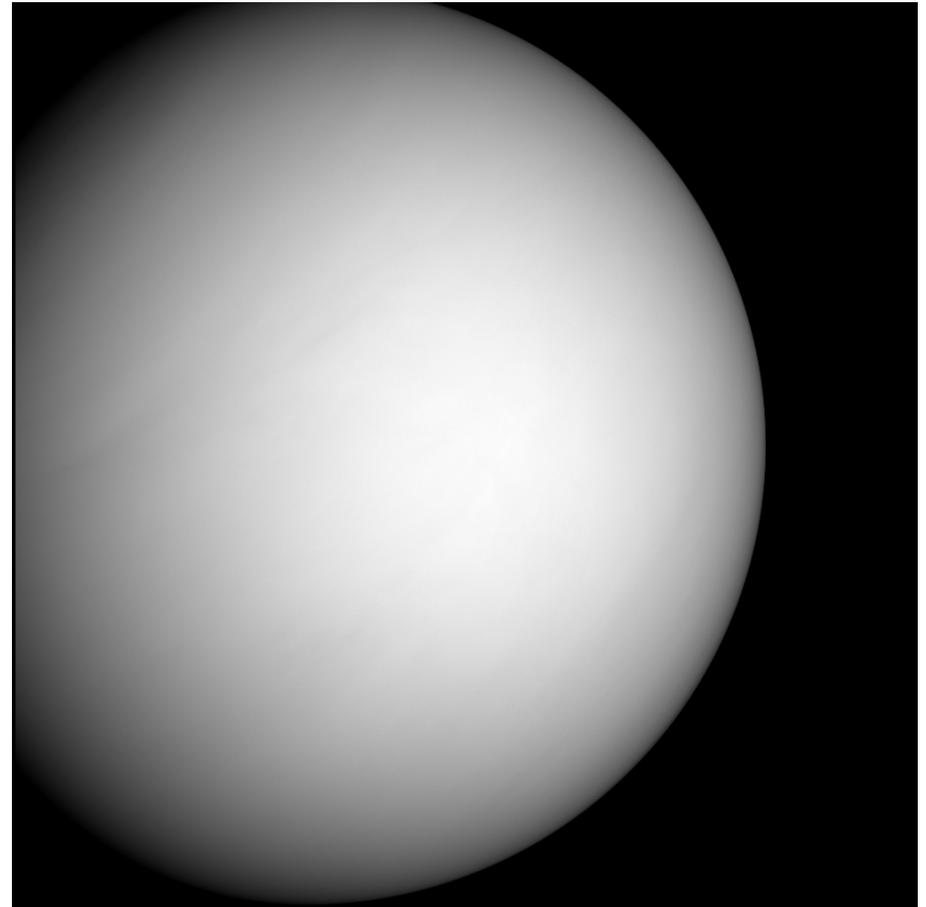
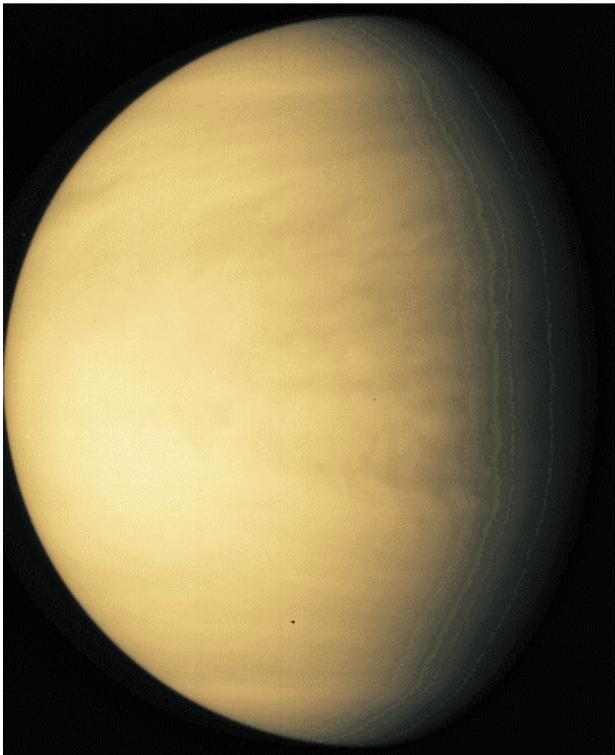
- La Terra: 1 d'agost 2005
- Venus 1: 24 d'octubre 2006
- Venus 2: 6 de juny 2007
- Mercuri 1: 15 de gener 2008
- Mercuri 2: 6 d'octubre 2008
- Mercuri 3: 30 de setembre 2009
- Òrbita de Mercuri: 18 de març 2011



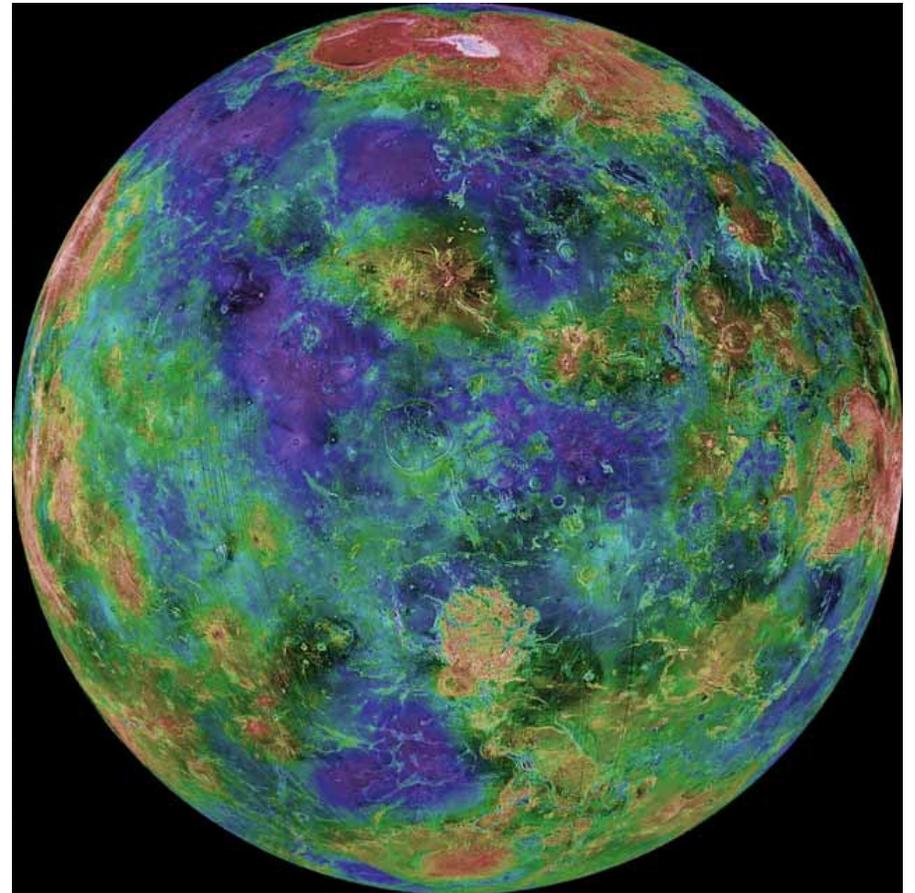
Venus

Diàmetre	12 104 km
Massa	0.815 Terres
Rotació	--243.01 dies
Obliqüitat	177° 18'
Gravetat	0.91 G
Densitat	5.25 g/cm ³

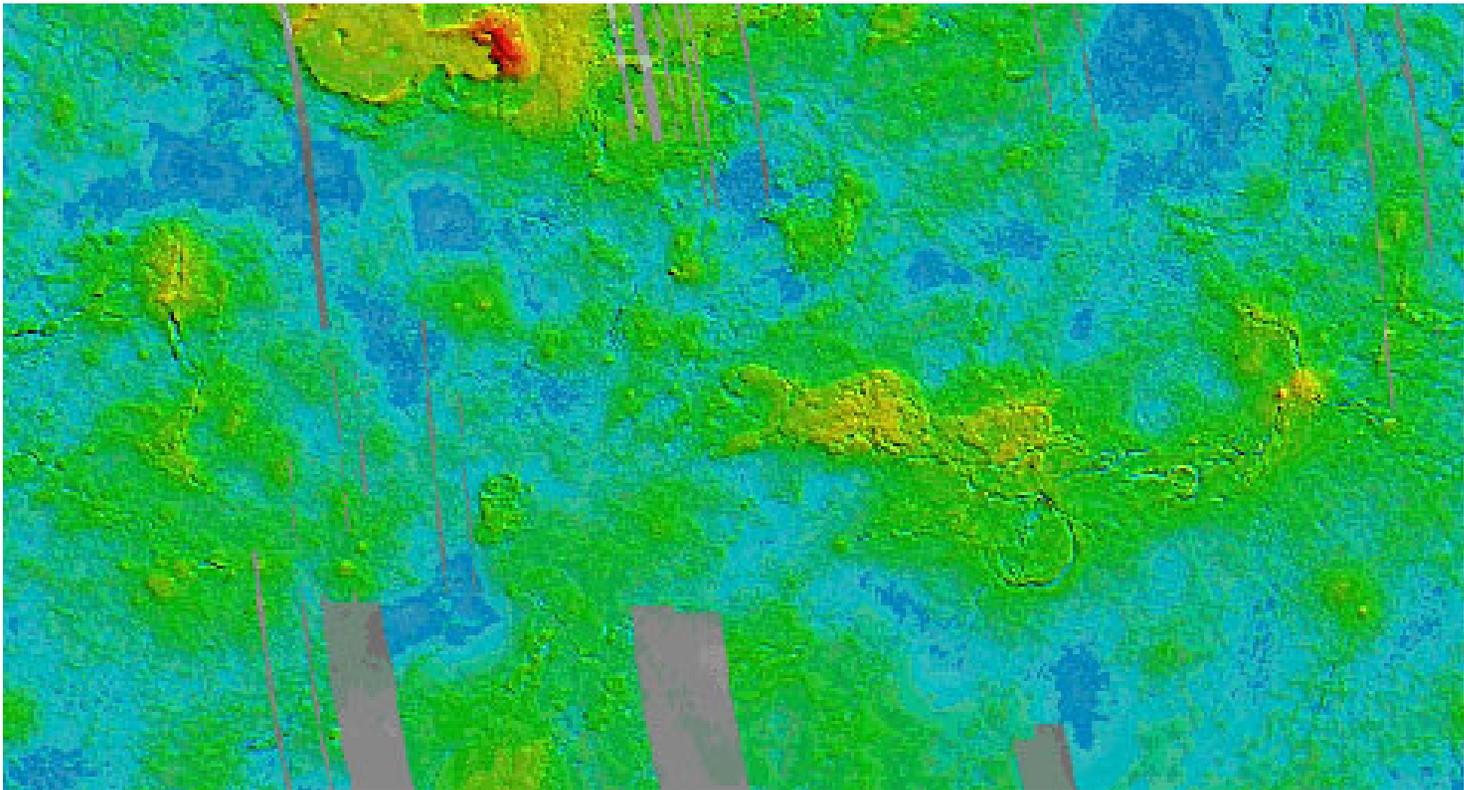
Venus



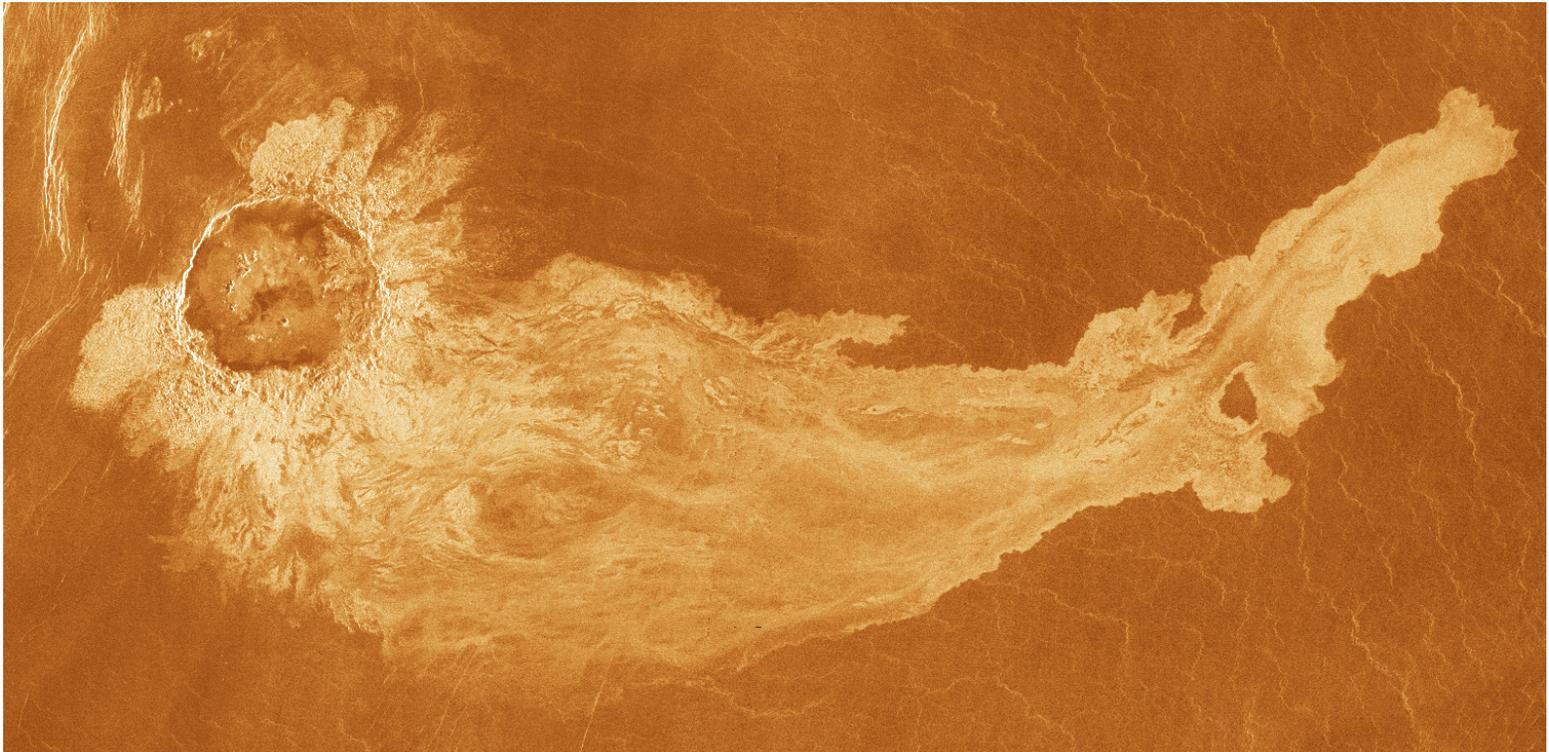
Venus: mapes per radar



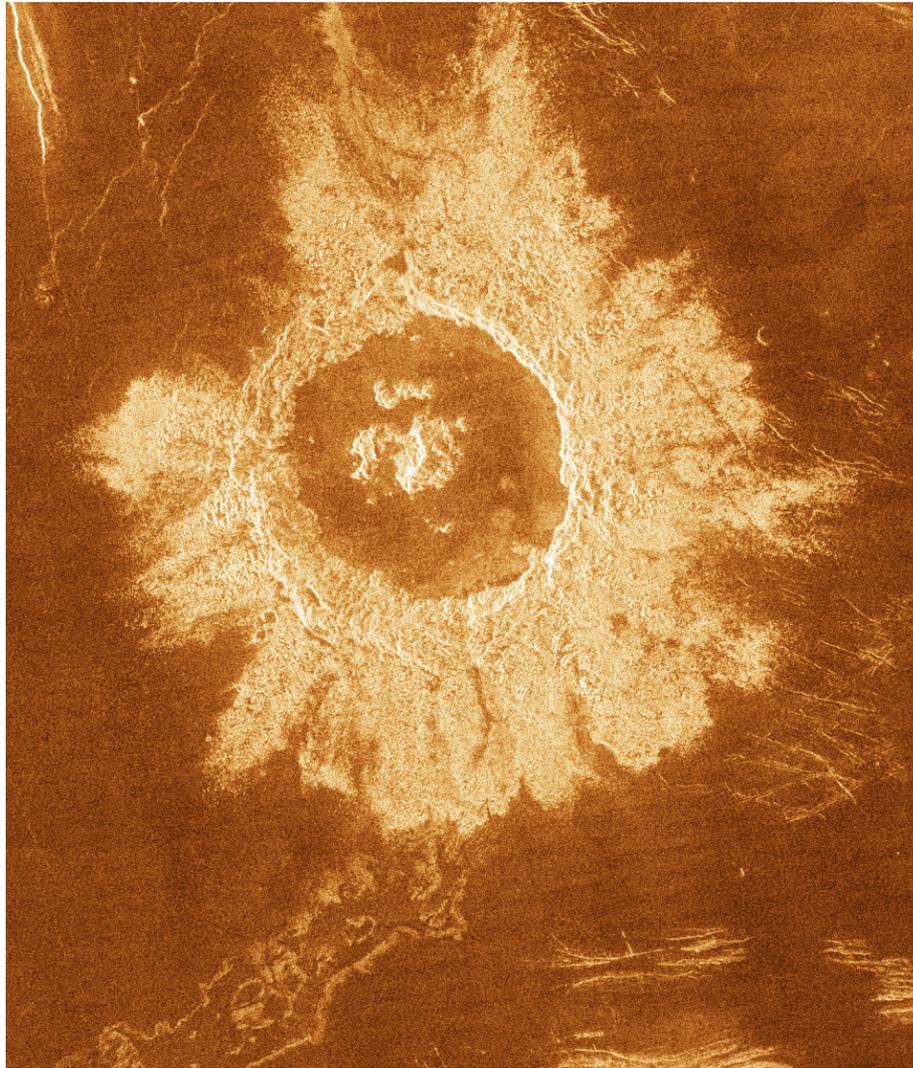
Venus: planisferi radar



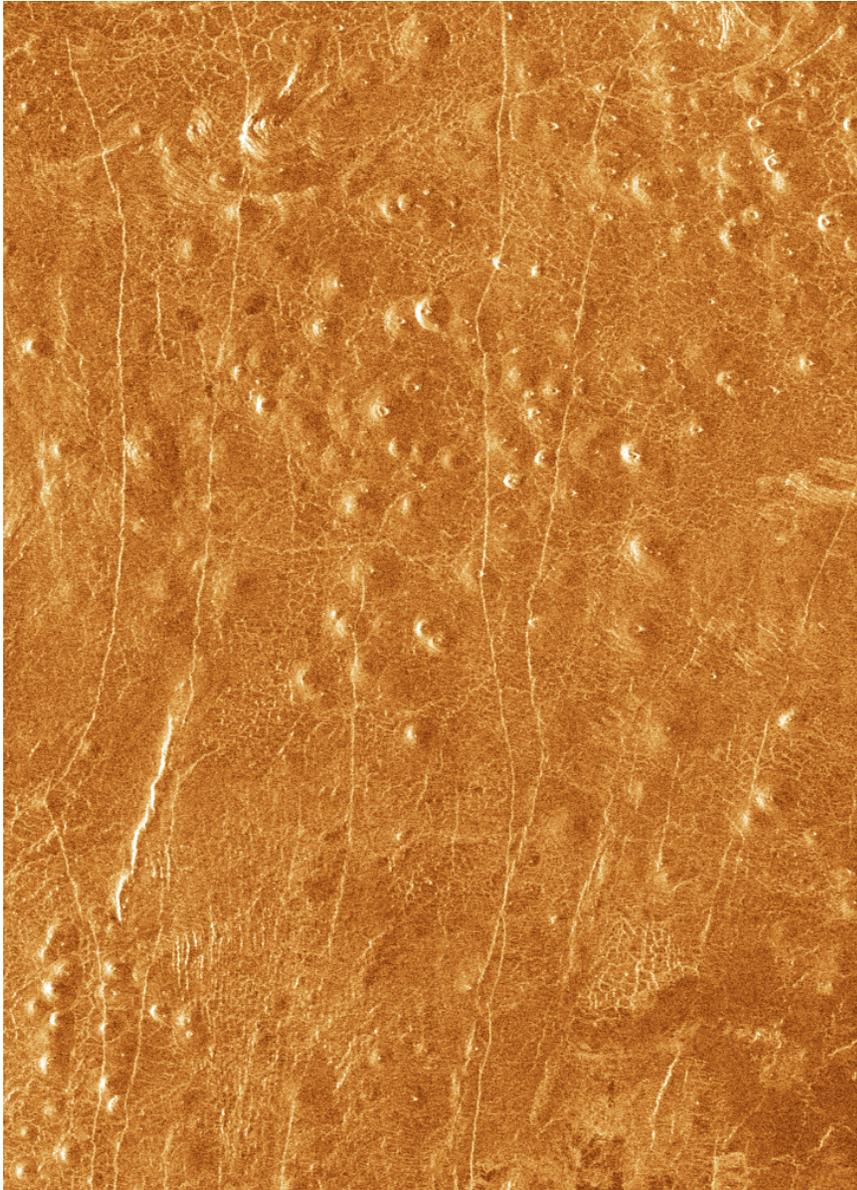
Venus: crâters d'impacte



Venus: crâters d'impacte



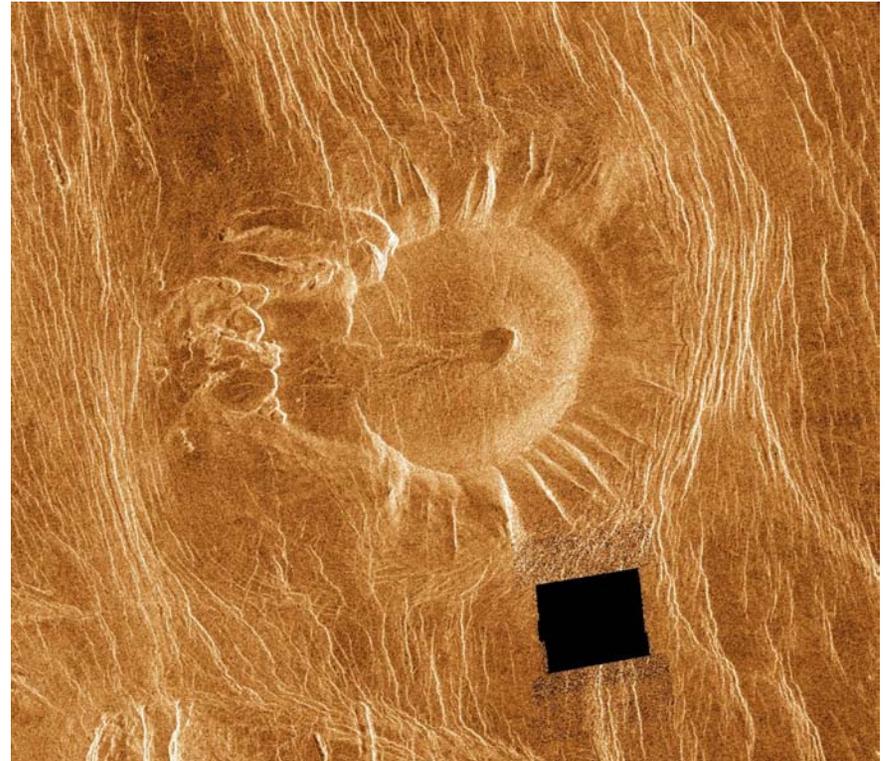
Venus: volcanisme



Venus • Pancake Volcanoes

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Venus: volcanisme



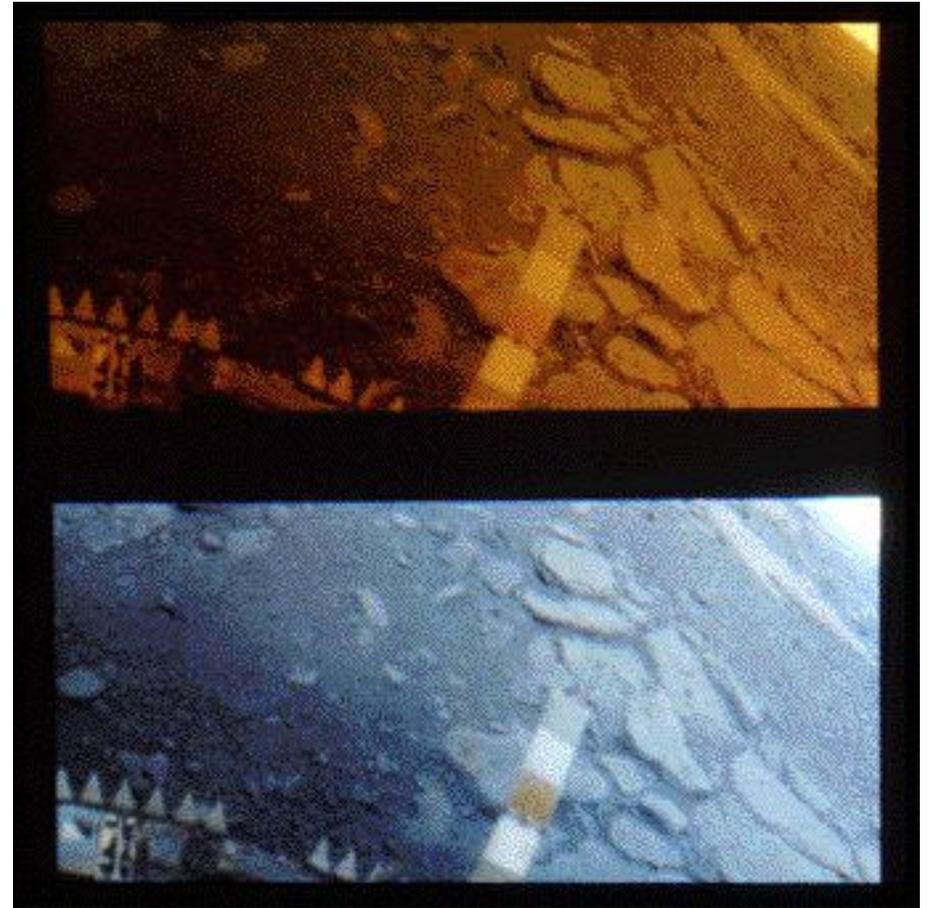
Venus: superfície



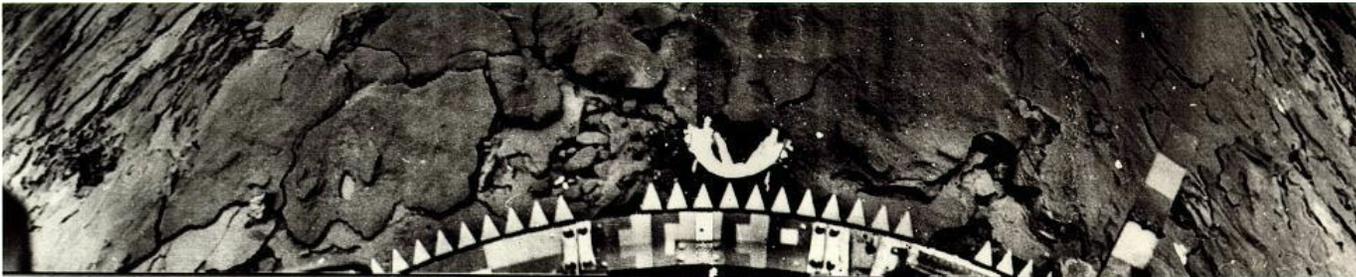
ВЕНЕРА-9 22.10.1975 ОБРАБОТКА ИППИ АН СССР 28.2.1976

ВЕНЕРА-10 25.10.1975 ОБРАБОТКА ИППИ АН СССР 28.2.1976

Venus: superfície



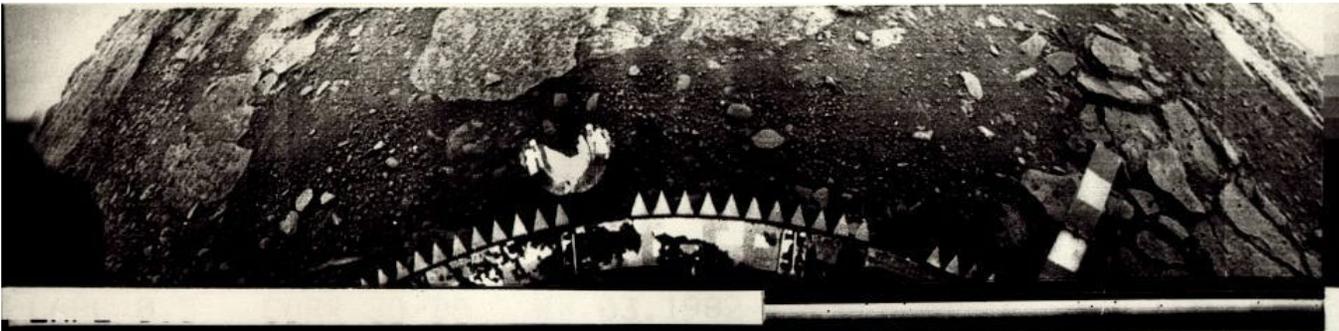
Venus: superficie



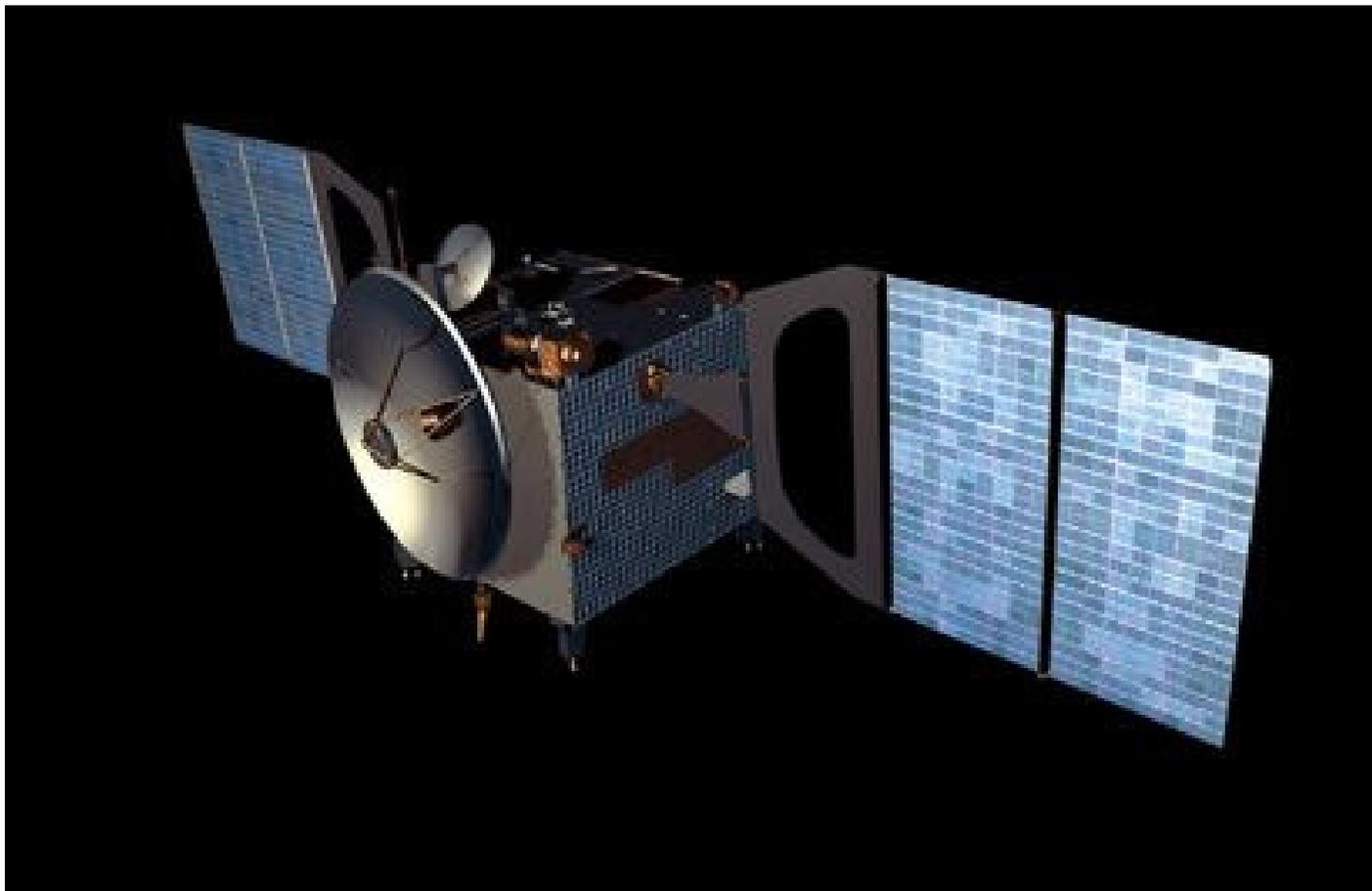
ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС



ВЕНЕРА-14 ОБРАБОТКА ИППИ АН СССР И ЦДКС



Venus Express (ESA)



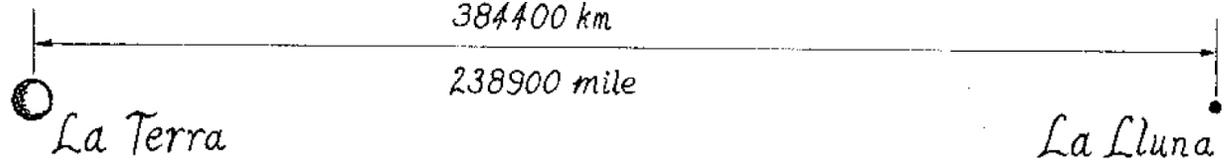
La Terra

La Terra

Diàmetre	12 756 km
Massa	1 Terra
Rotació	$23^{\text{h}} 56^{\text{m}} 4^{\text{s}}$
Obliqüitat	$23^{\circ} 27'$
Gravetat	1 G (=9.81 m/s ²)
Densitat	5.52 g/cm ³



La Lluna



La Lluna

Diàmetre	3 476 km
Massa	0.012 Terres (1.2 %)
Rotació	27 ^d 7 ^h 43 ^m 11 ^s
Obliqüitat	18°-28°
Gravetat	0.17 G (=1.63 m/s ²)
Densitat	3.34 g/cm ³



La Lluna



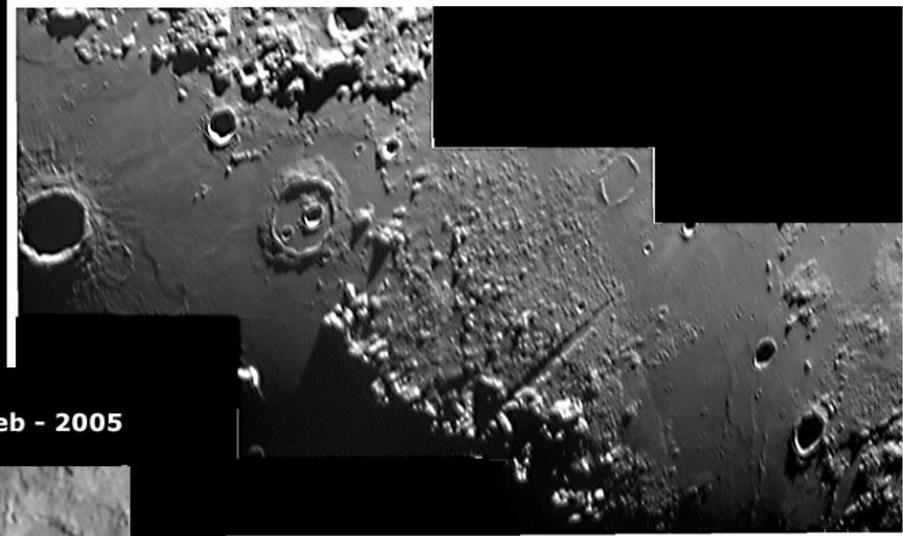
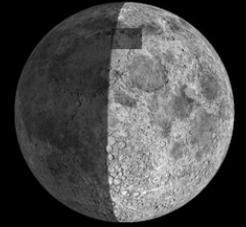
La Lluna

Vallis Alpes - Montes Alpes - Cassini

19.11.2004 19:30 UT

Maksutov 127 mm
Philips Toucam II
Registax+Photoshop

Francisco J. Bellido
Córdoba



Paco Bellido
Córdoba - (Spain)

Clavius

18 - Feb - 2005

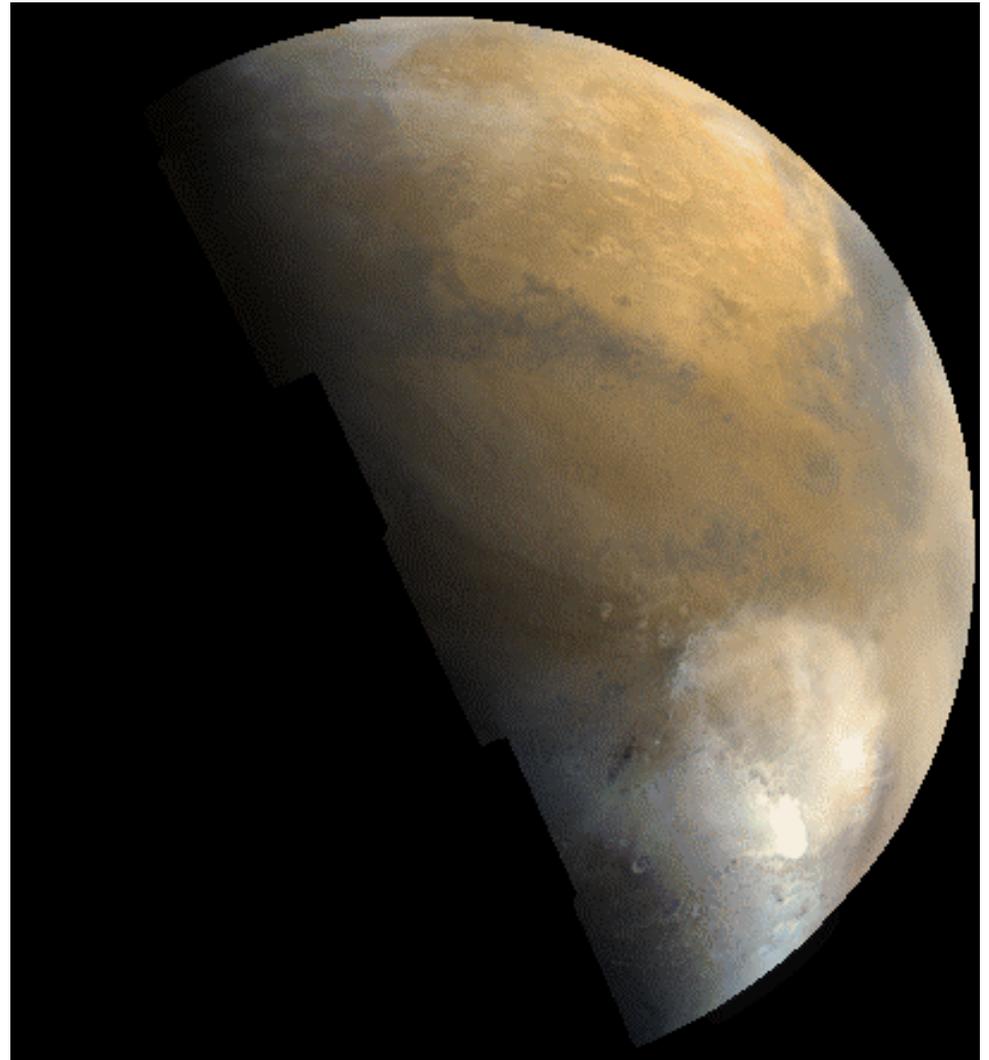
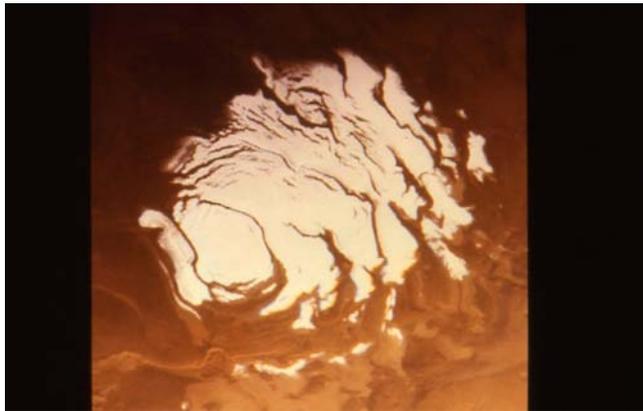


Maksutov 127 mm + Barlow 2X + Philips ToUcam Pro

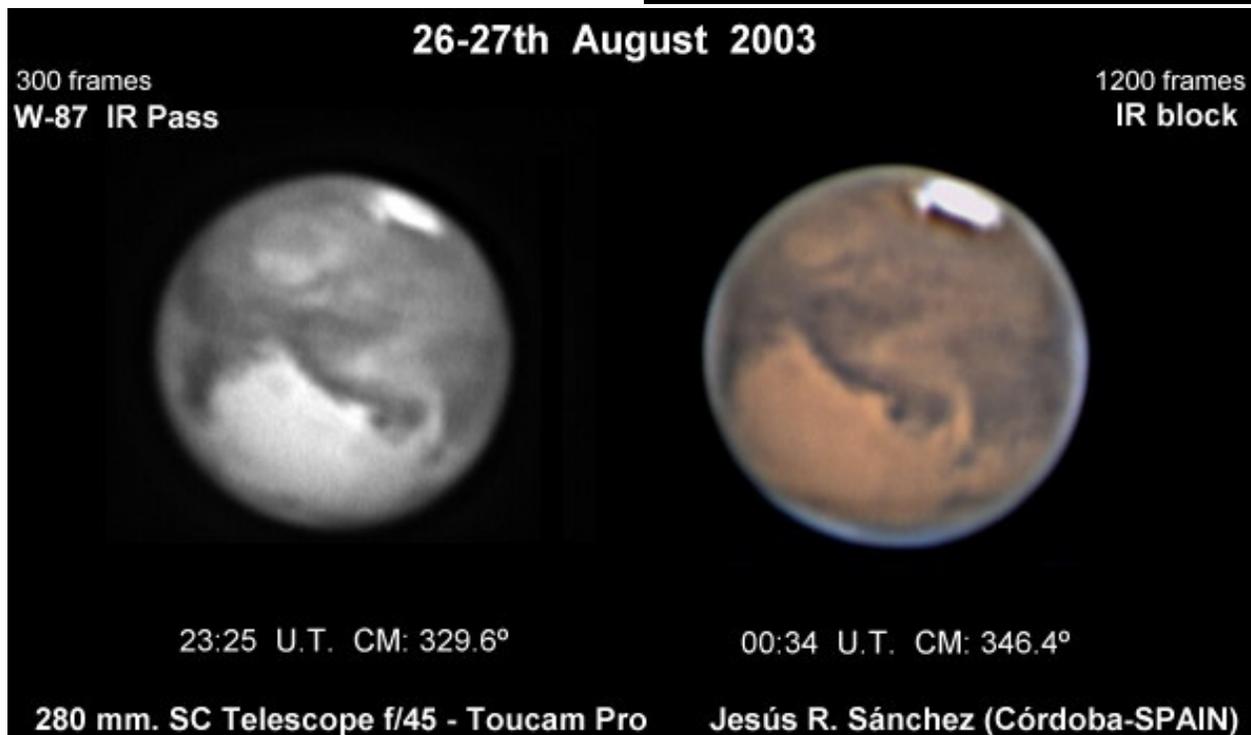
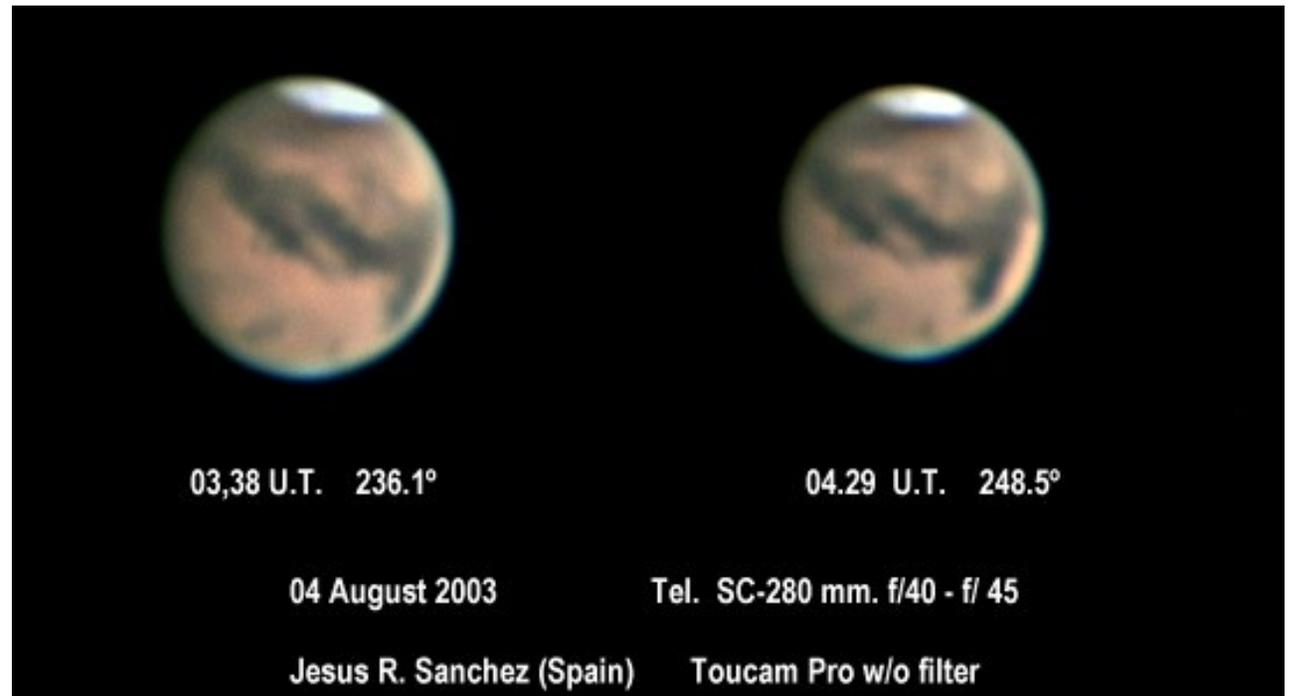
Mart

Mart

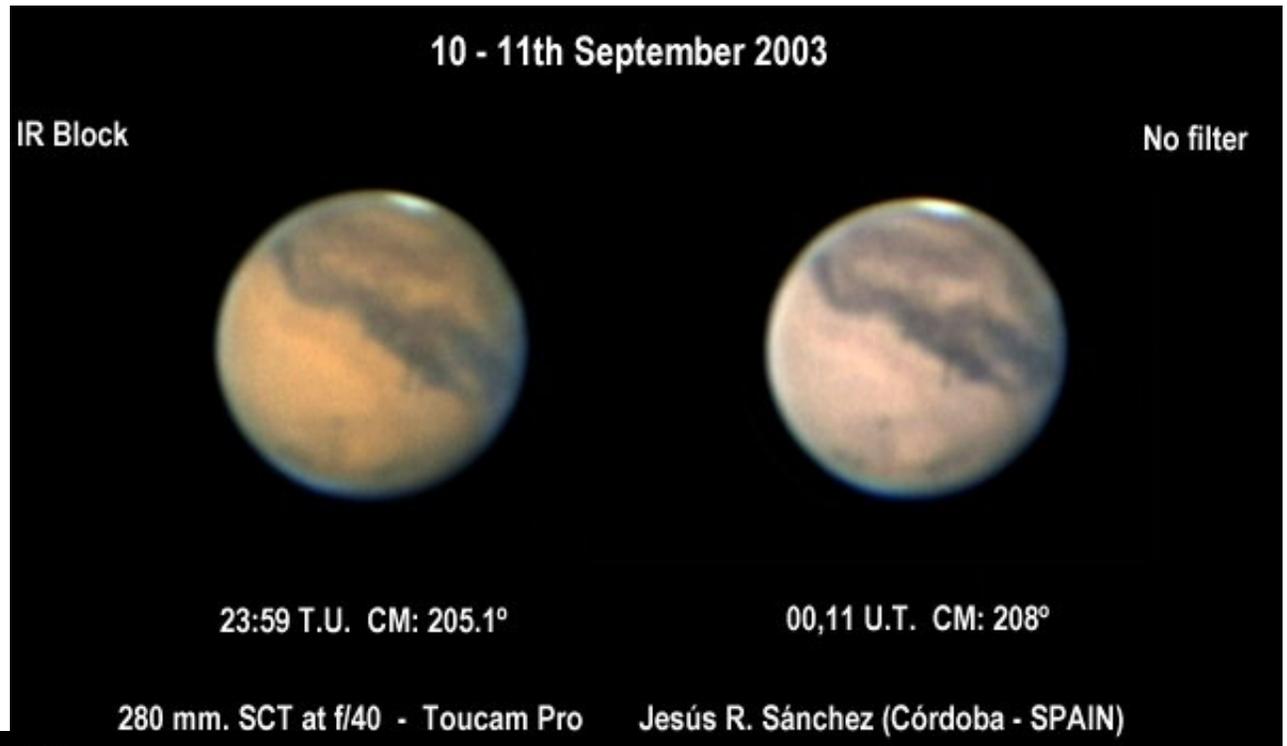
Diàmetre	6 794 km
Massa	0.107 Terres
Rotació	24 ^h 37 ^m 23 ^s
Obliqüitat	25° 11'
Gravetat	0.38 G
Densitat	3.94 g/cm ³

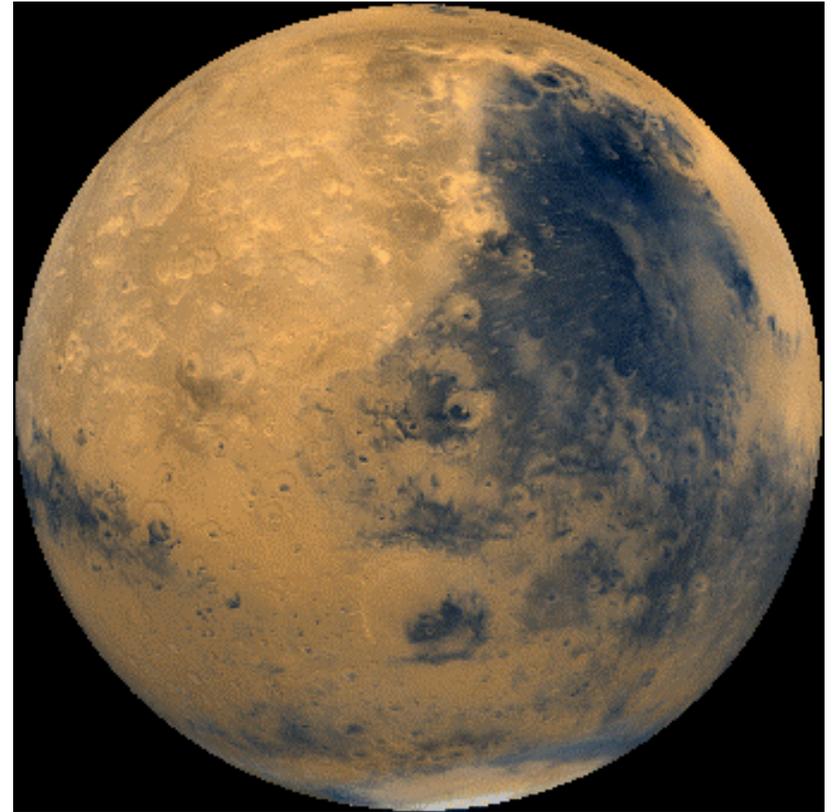
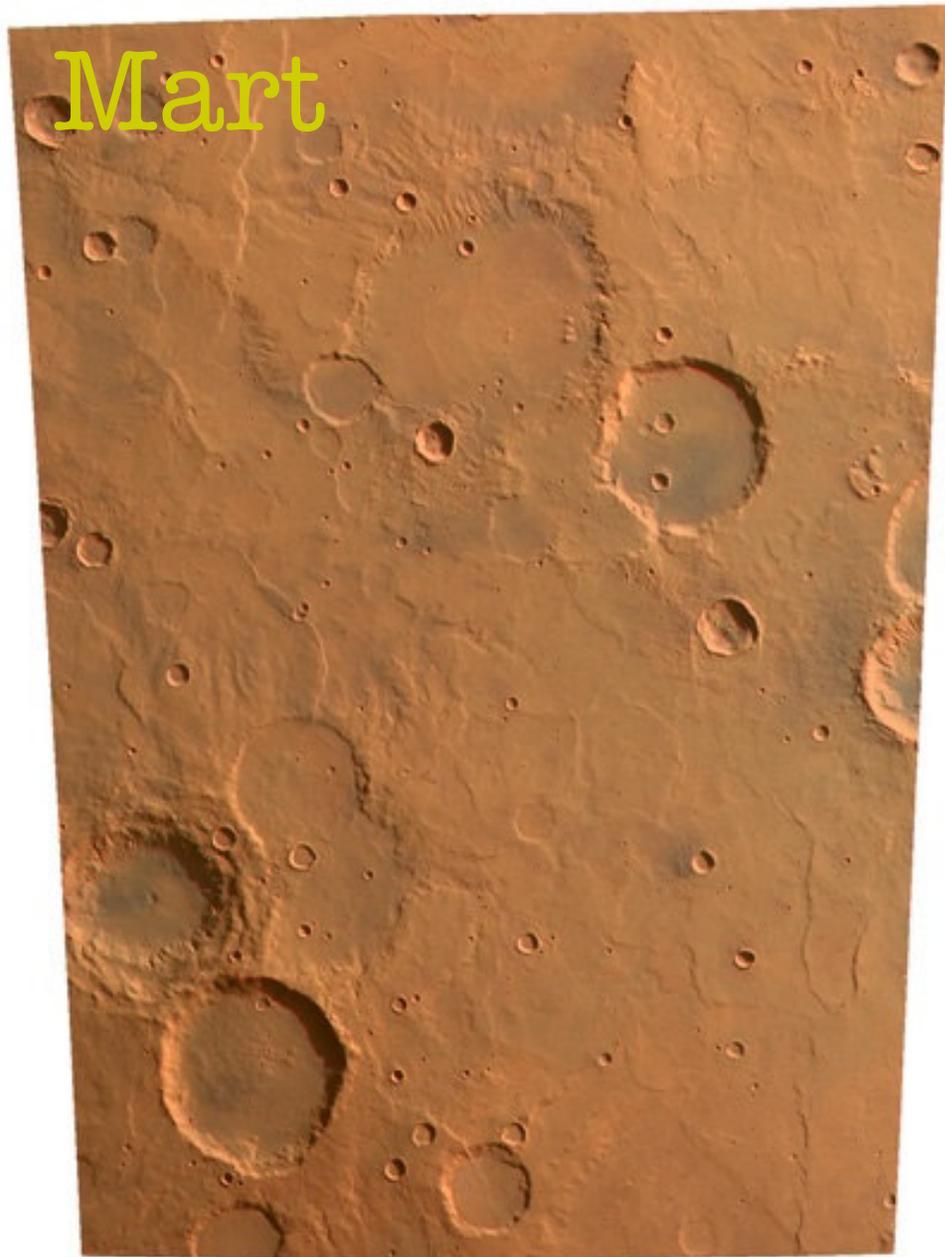


Mart

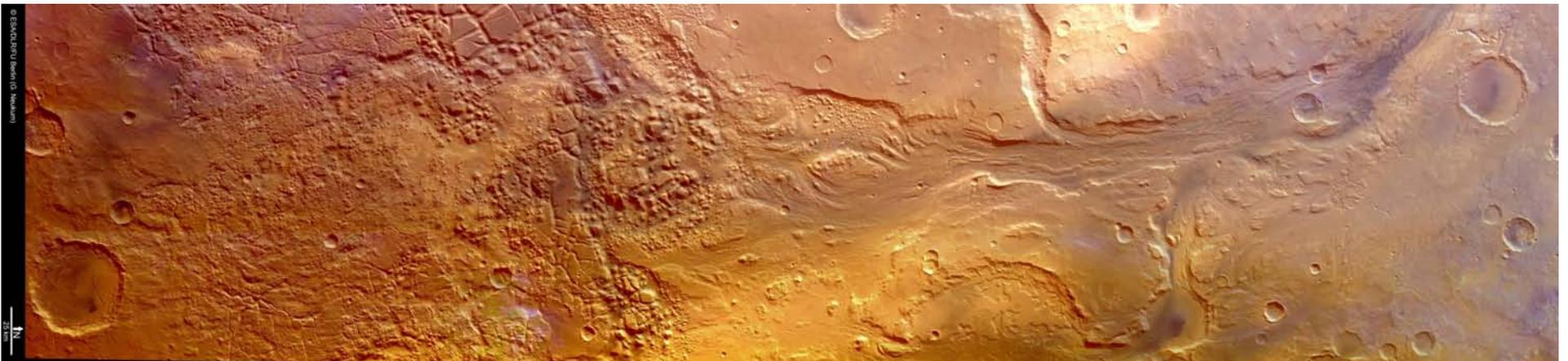


Mart

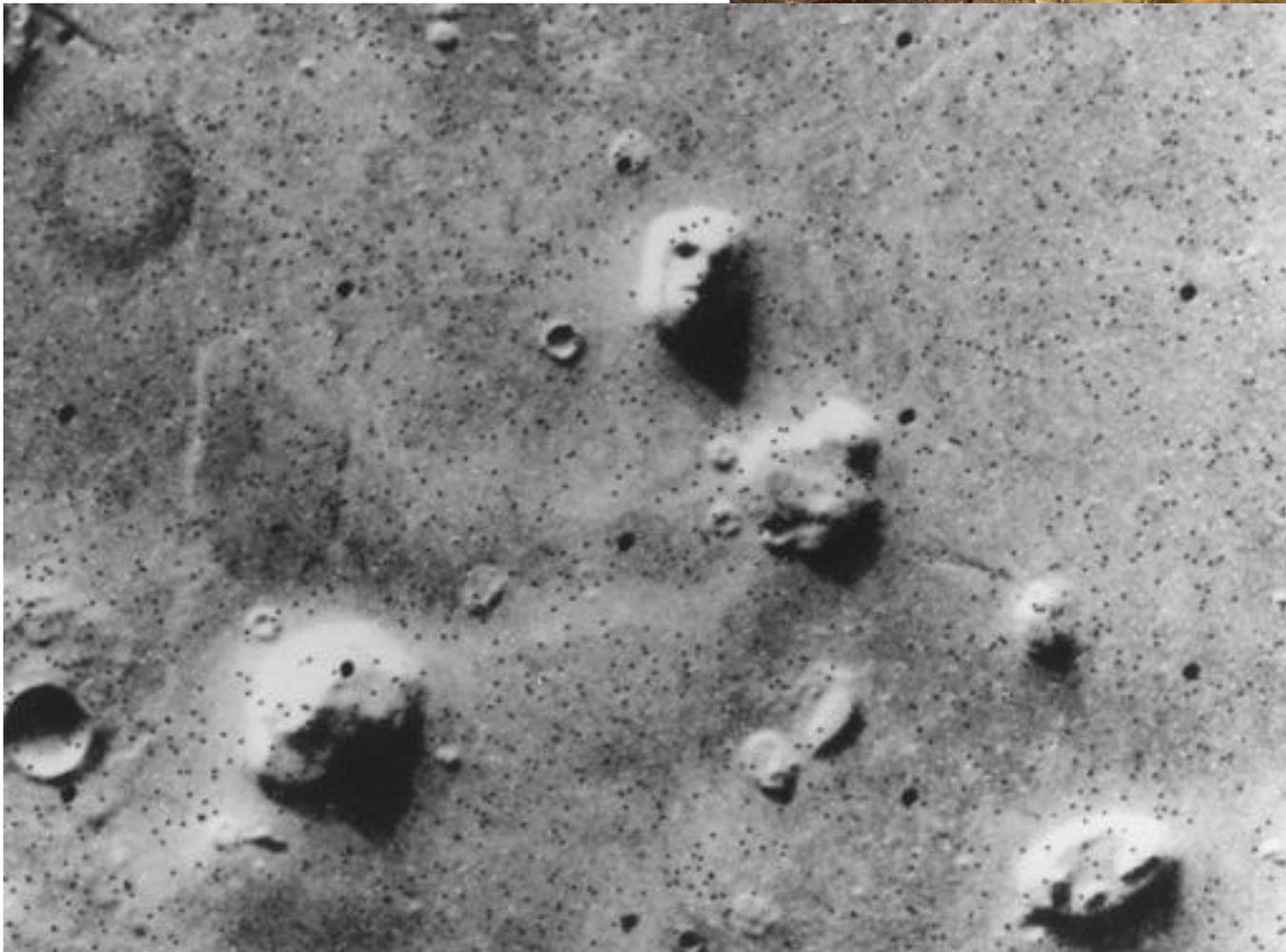
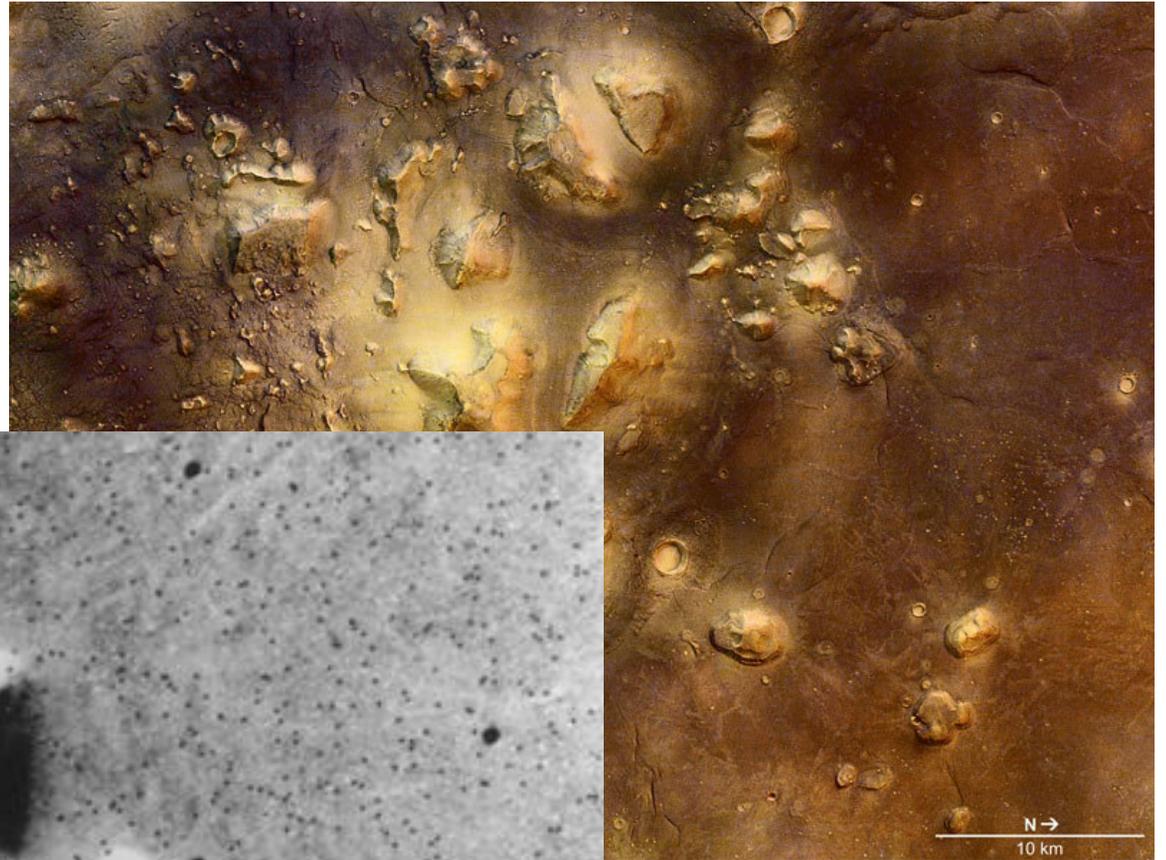




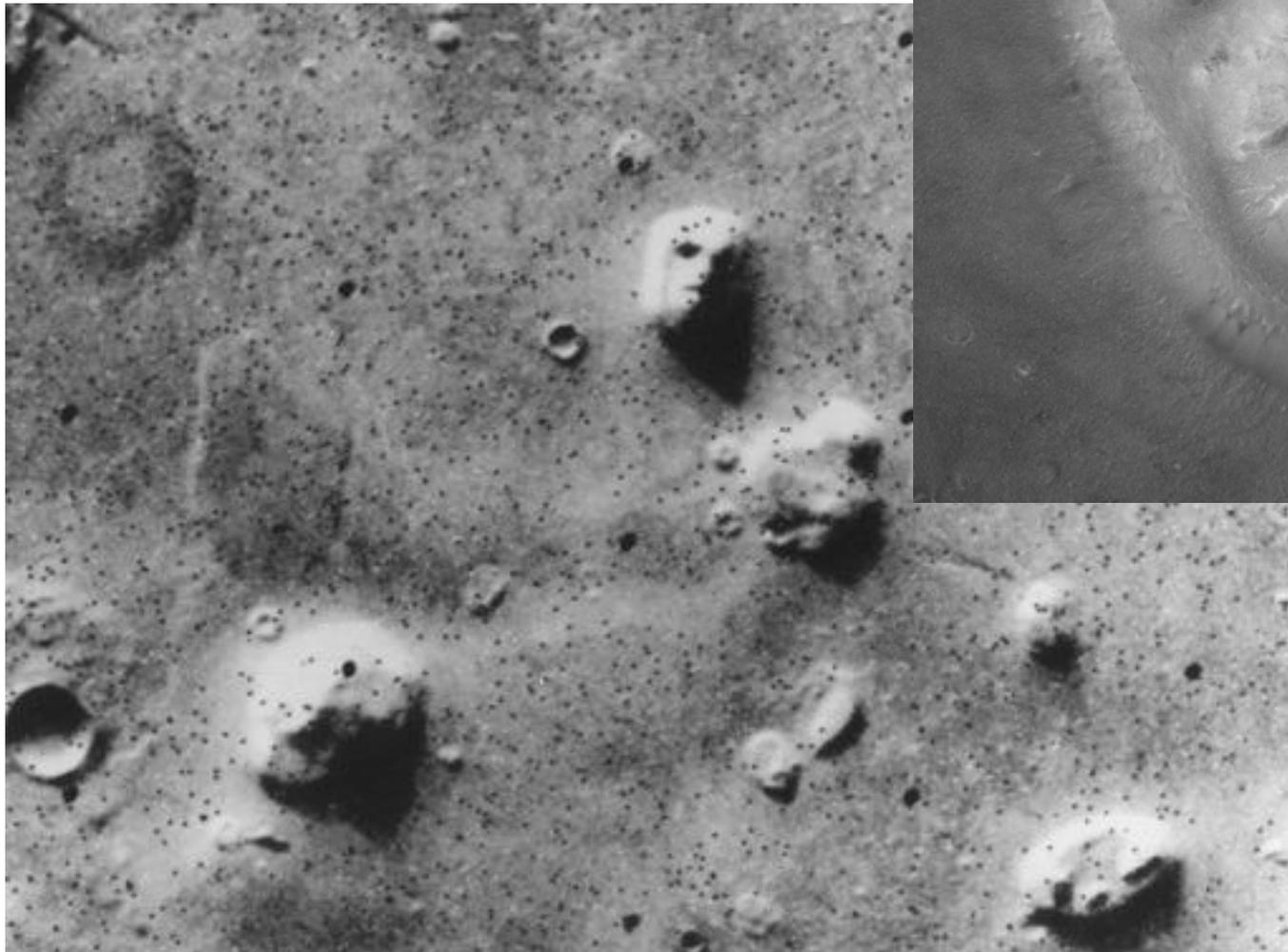
Mars



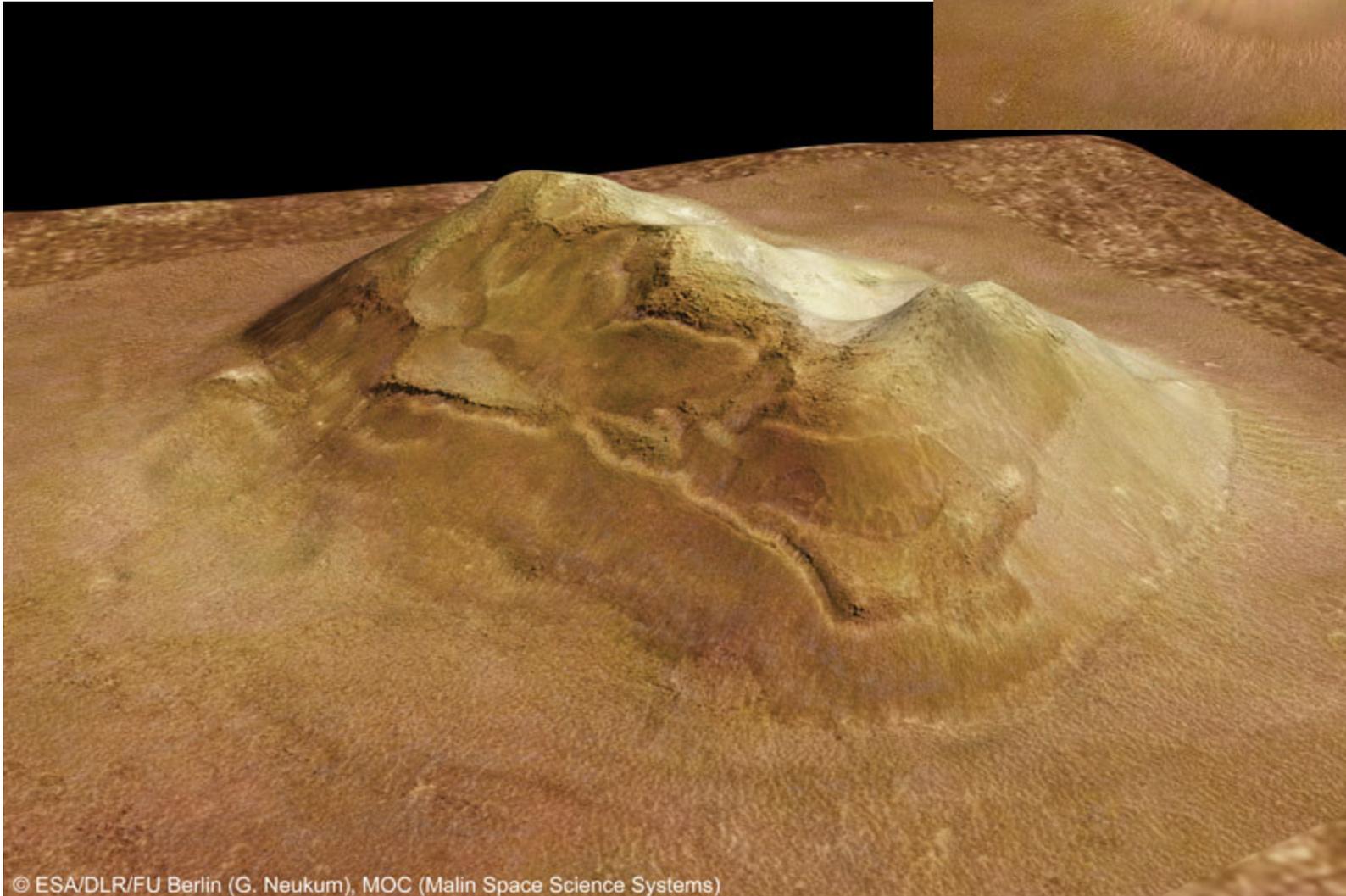
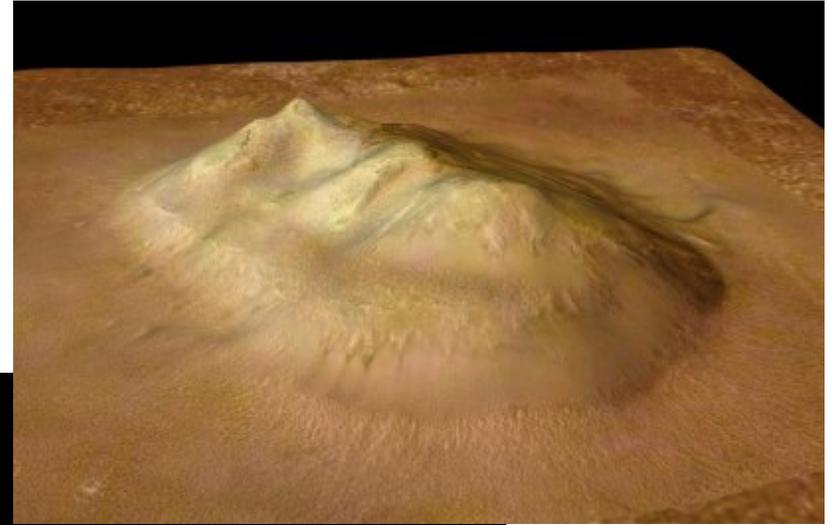
Mart



Mart



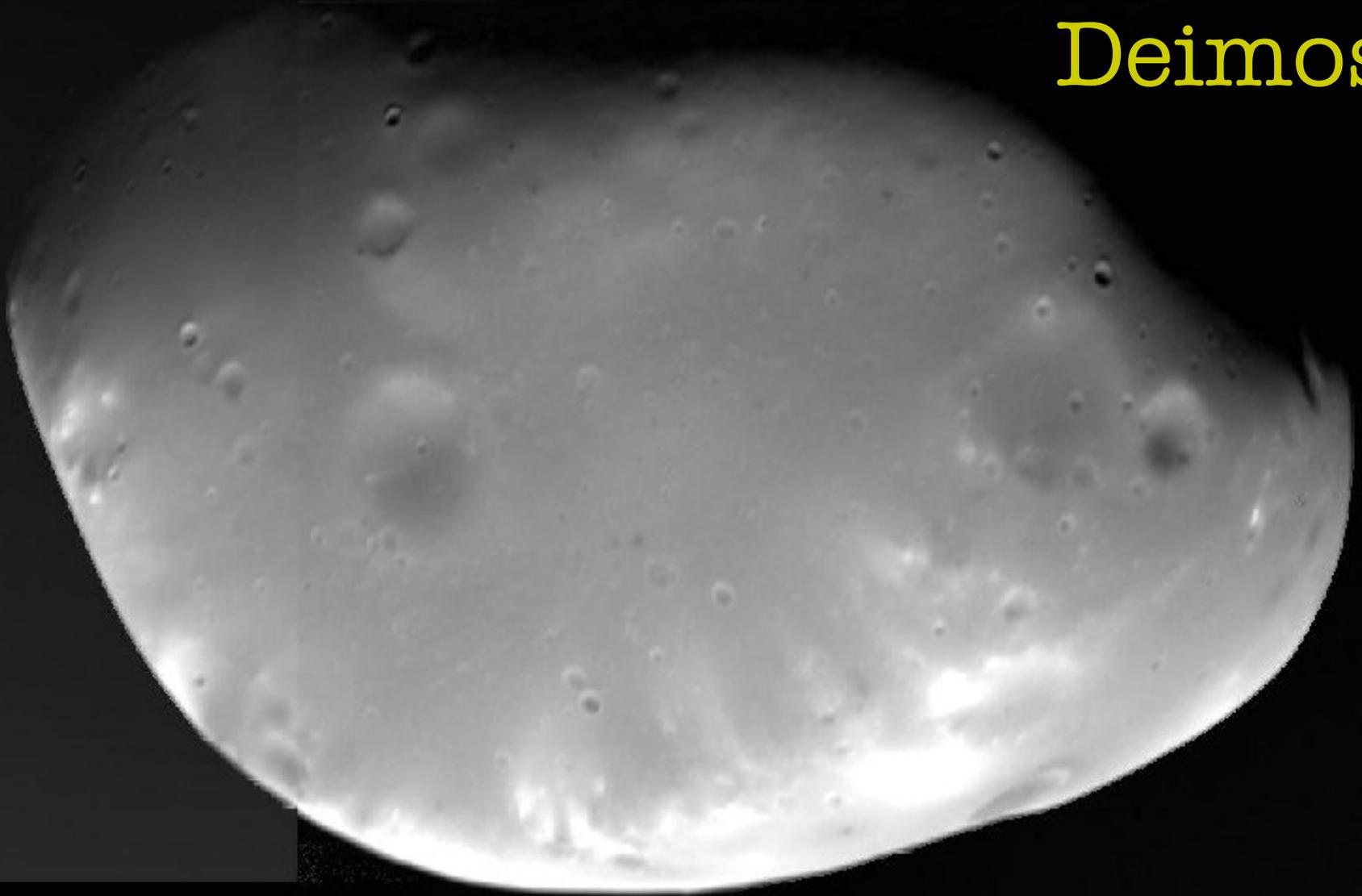
Mart



Mart: Fobos



Mart:
Deimos



Asteroides

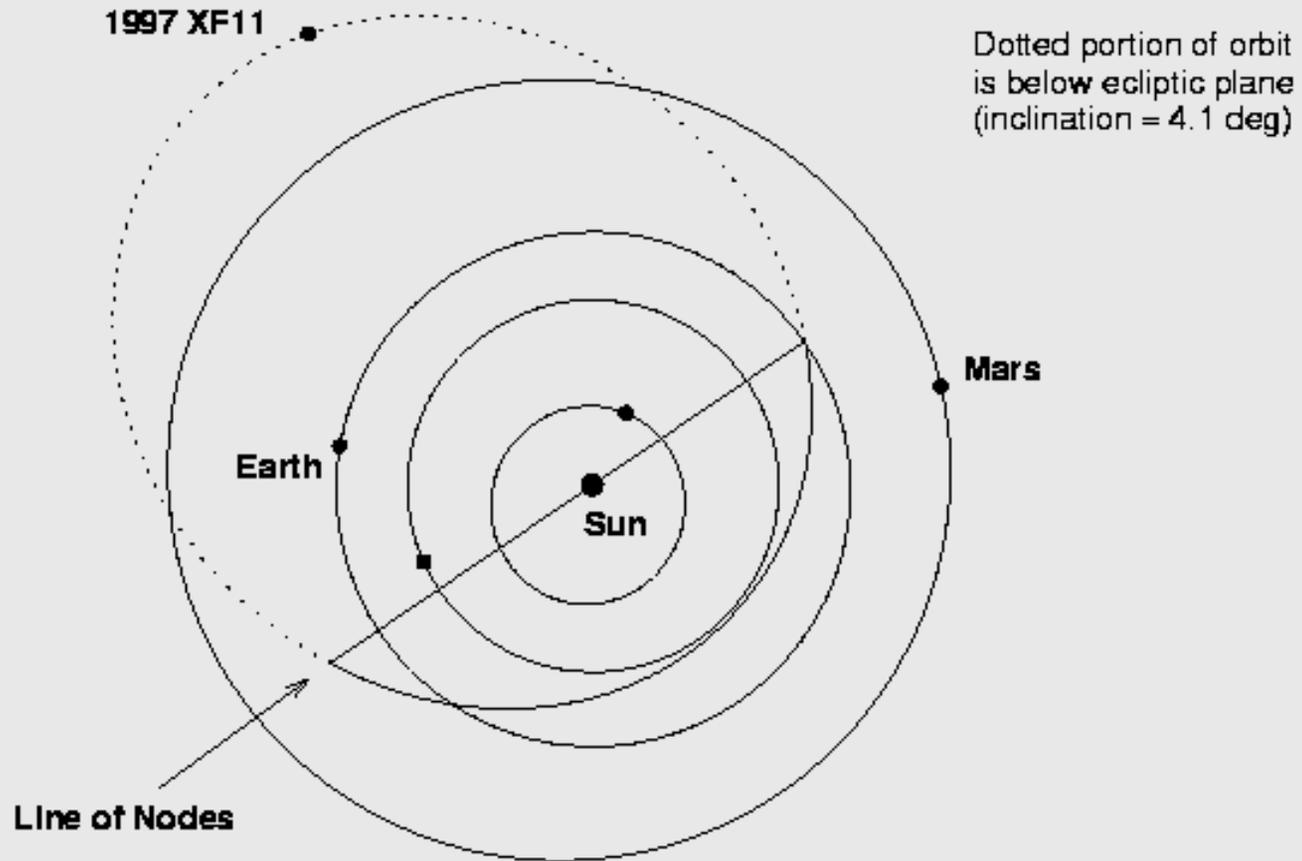


Asteroides

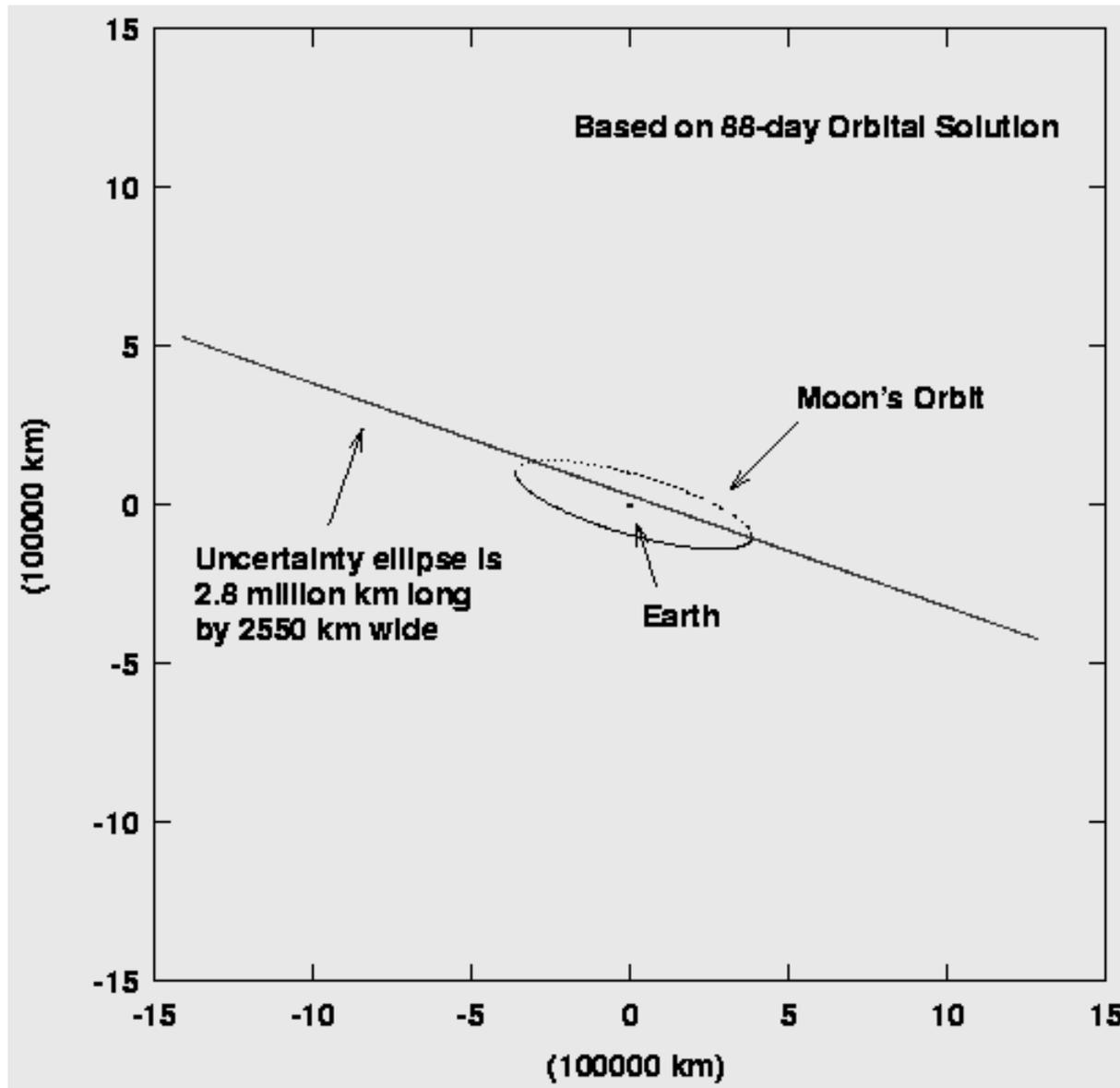


Asteroides

Positions of 1997 XF11 and Inner Planets on March 12, 1998

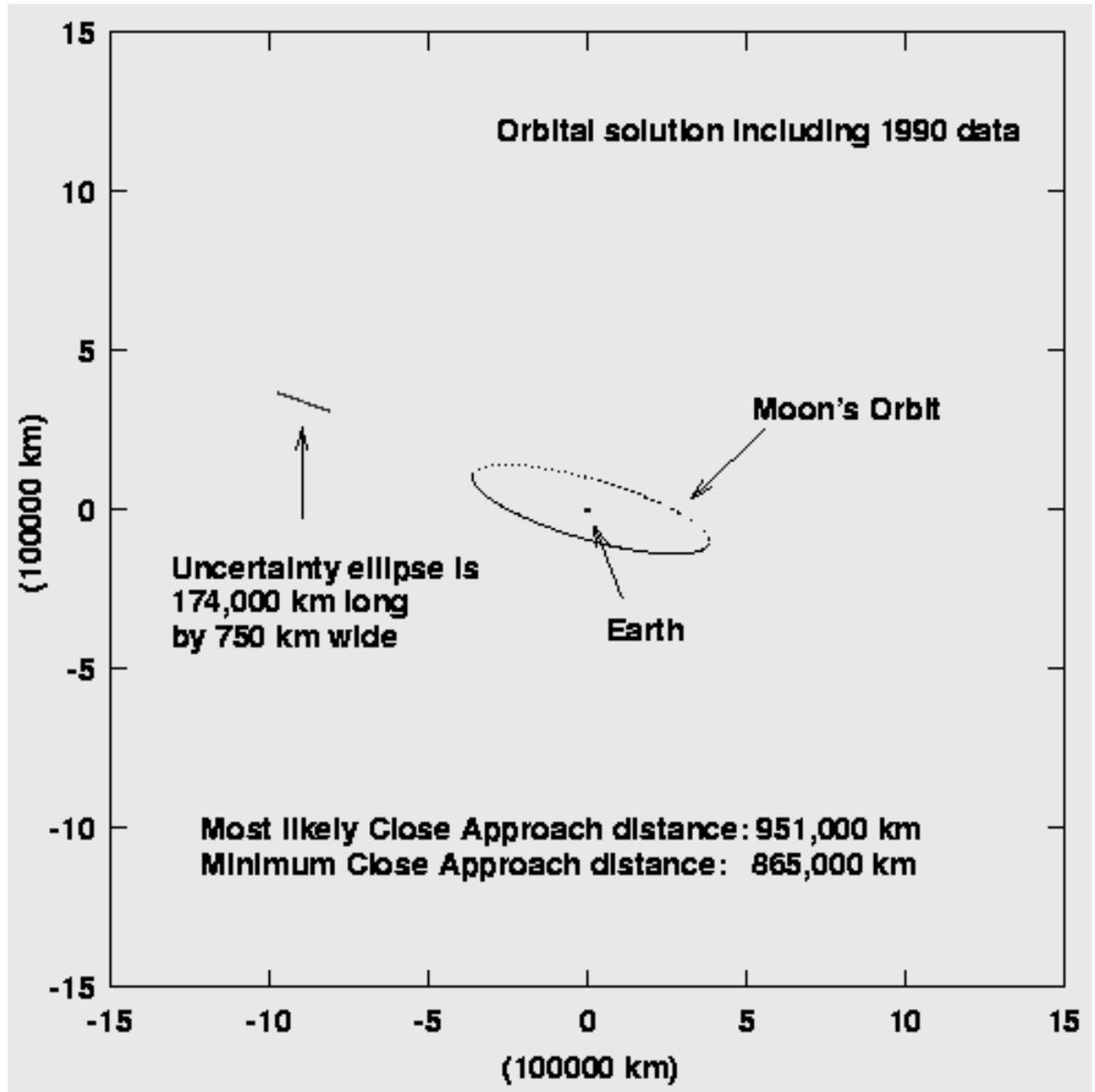


Asteroides



Asteroides

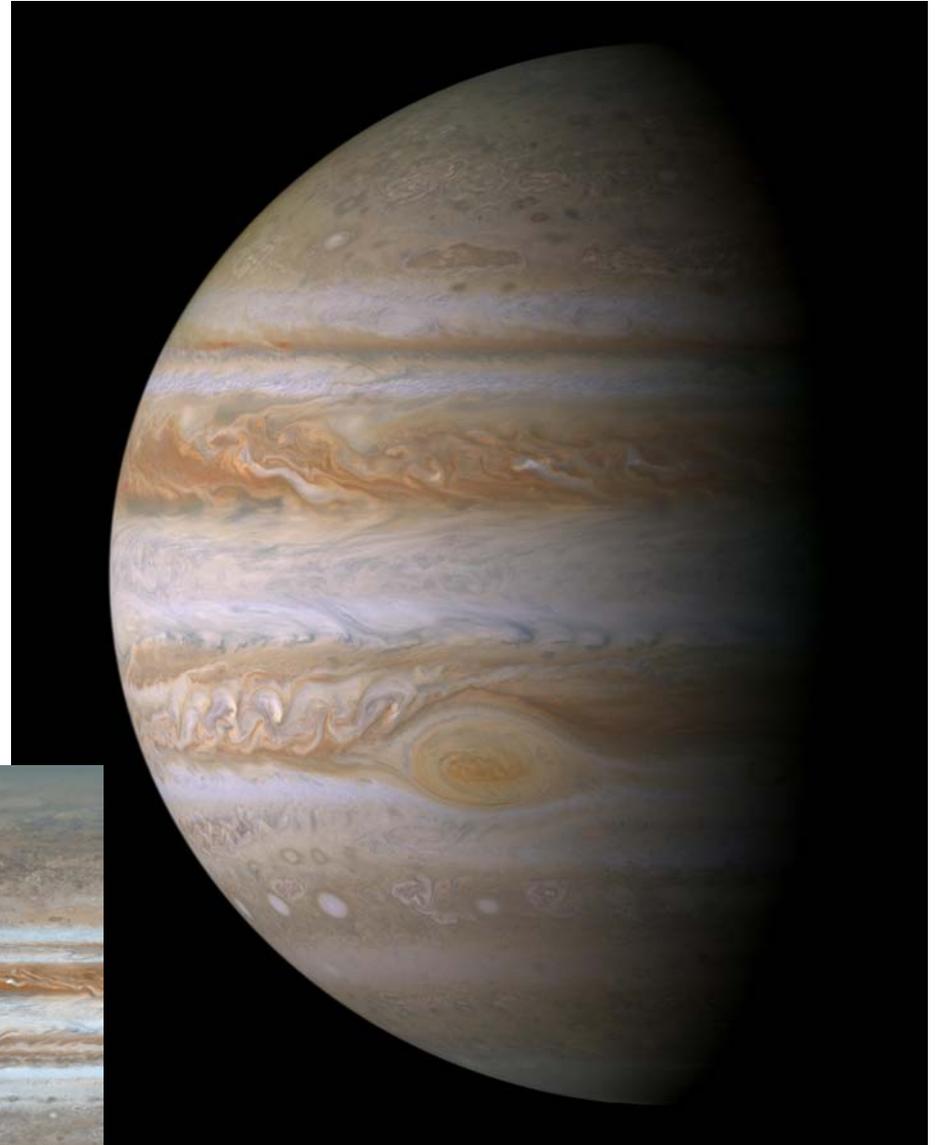
2004 MN4,
13 abril 2029



Júpiter

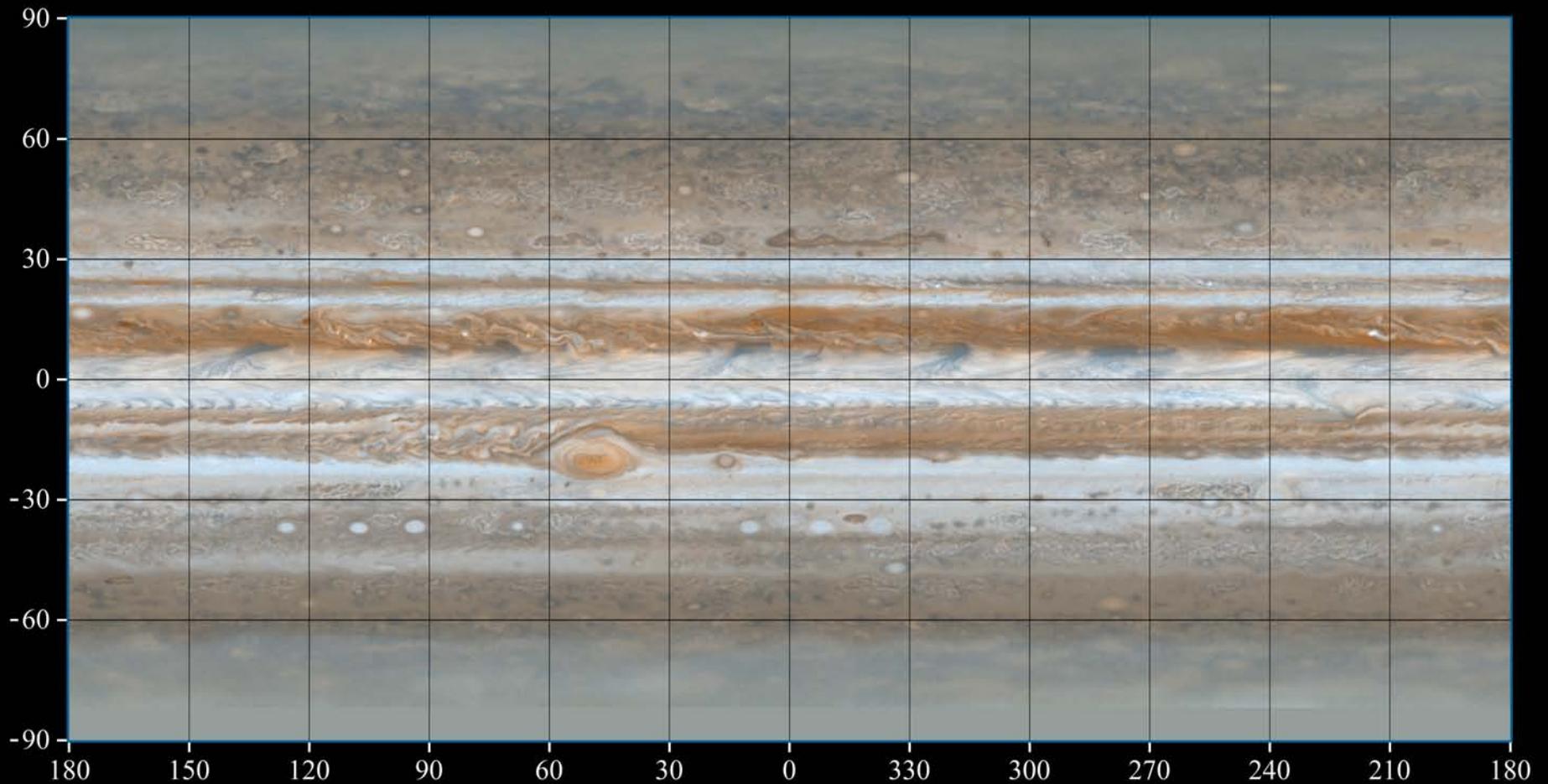
Júpiter

Diàmetre	142 984 km
Massa	318 Terres
Rotació	9 ^h 55 ^m
Obliqüitat	3° 12'
Gravetat	2.36 G
Densitat	1.33 g/cm ³

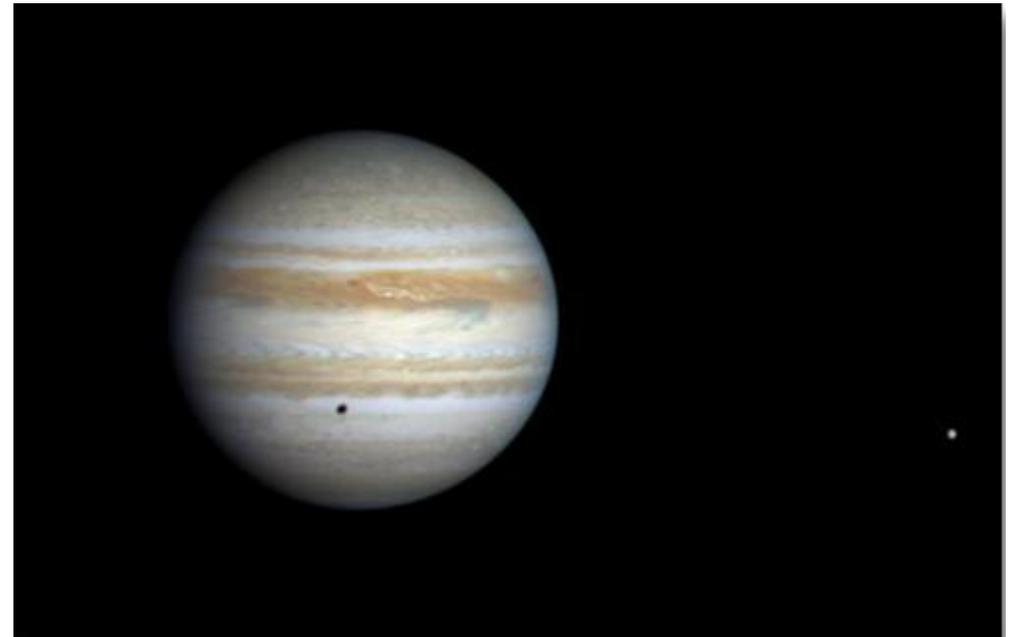
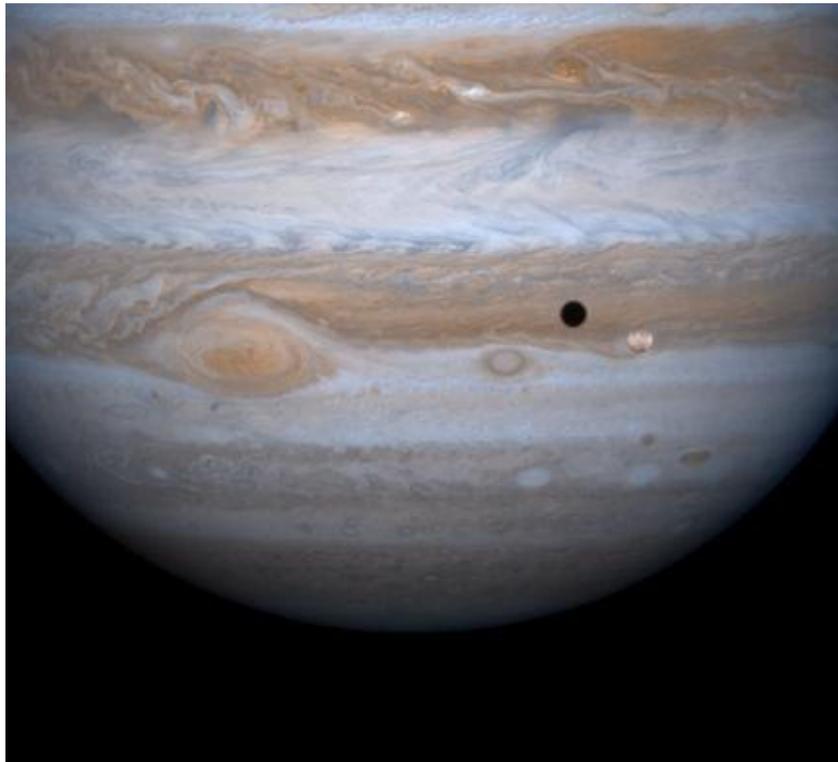
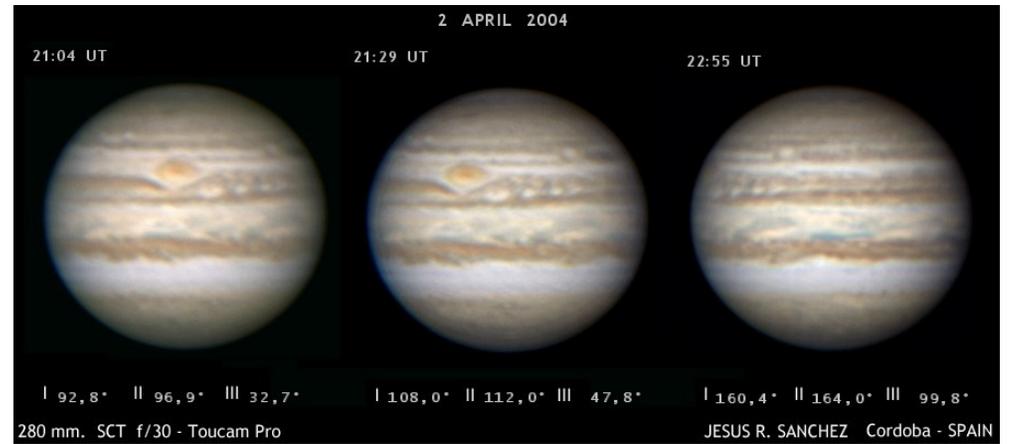


Júpiter

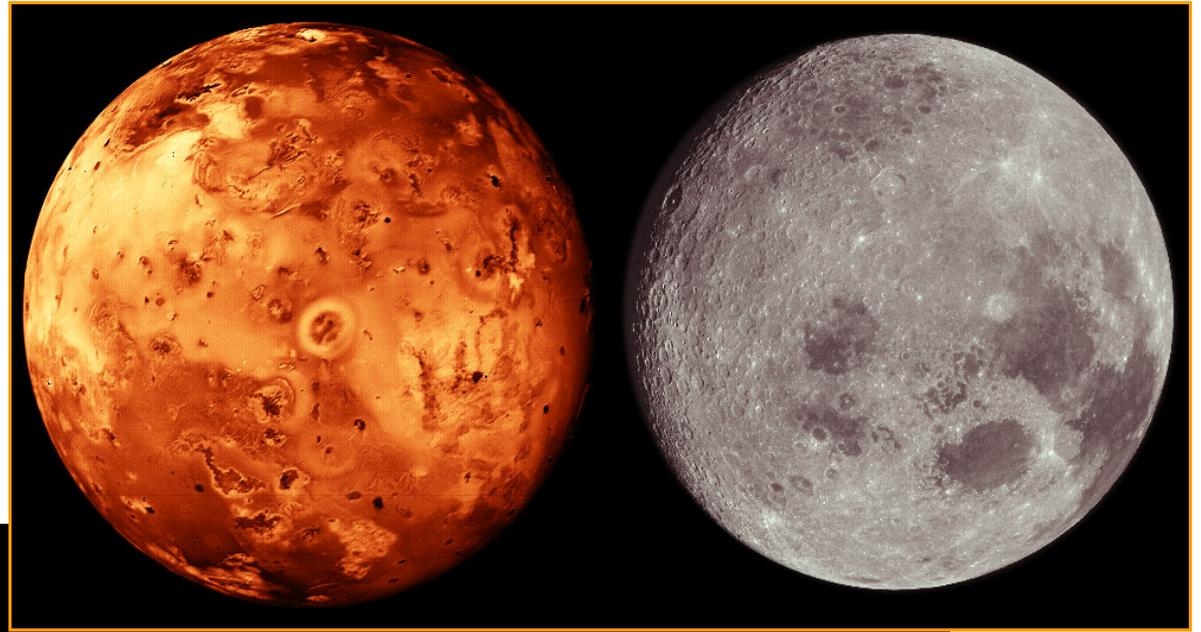
Jupiter Cylindrical Map - Dec 2000



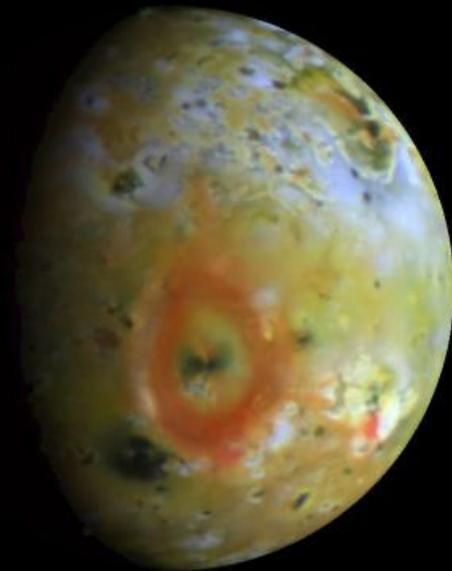
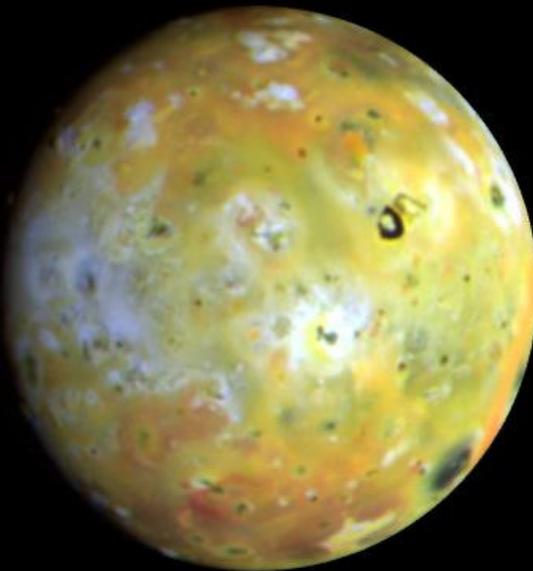
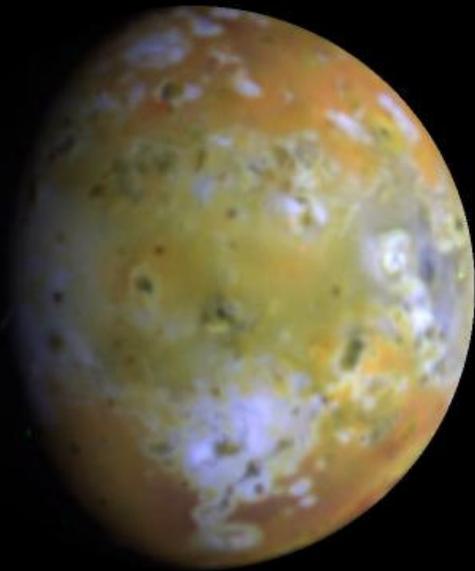
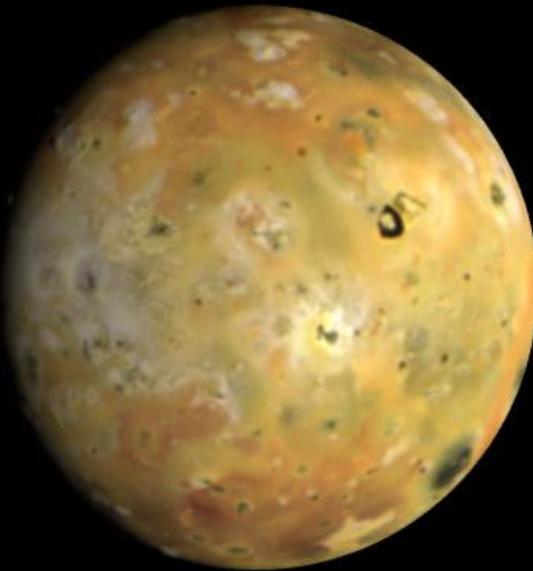
Júpiter



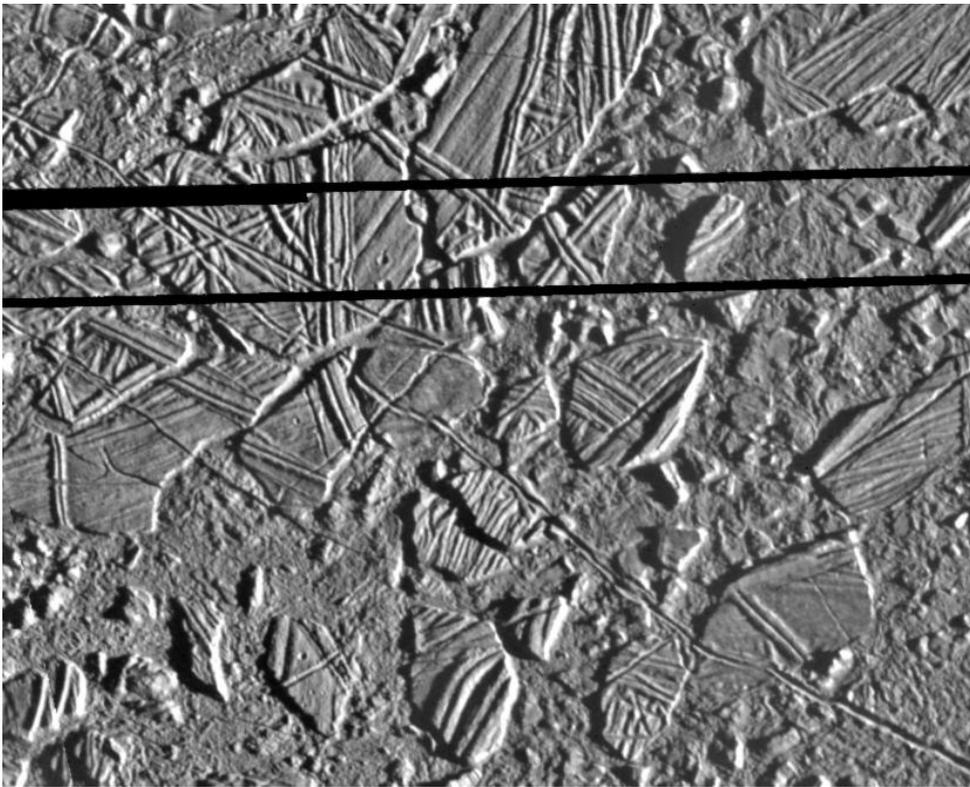
Júpiter: satèl·lits



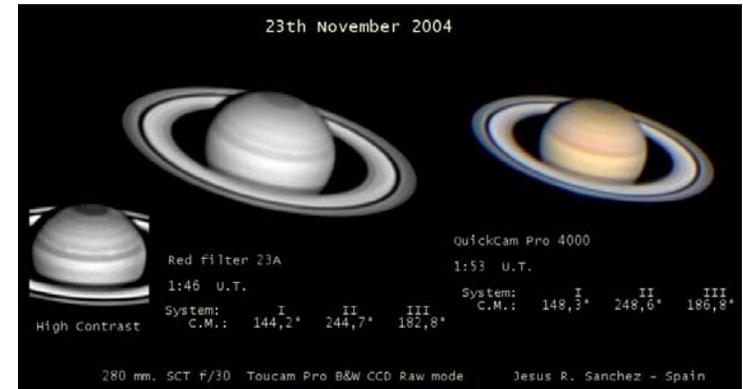
Júpiter: Io



Júpiter: Europa i Ganímedes

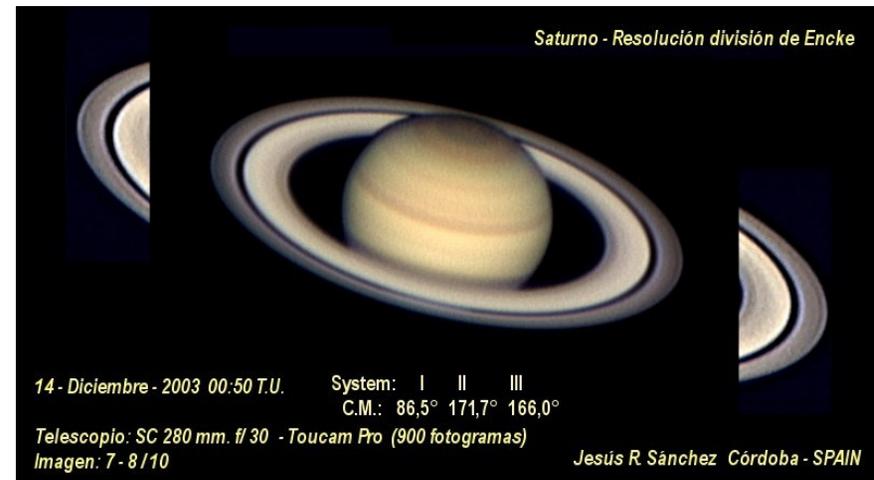


Saturn



Saturn

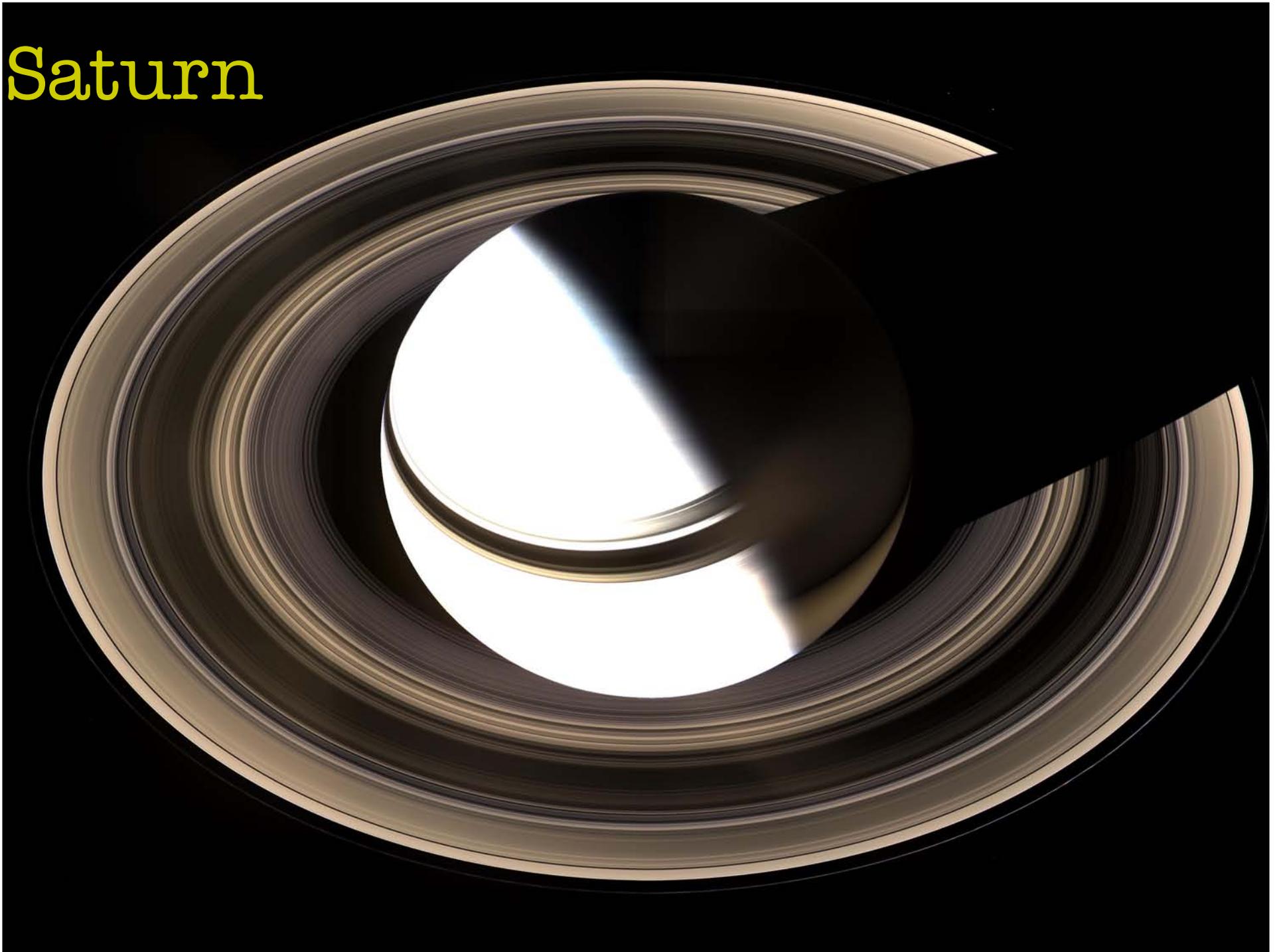
Diàmetre	120 536 km
Massa	95.2 Terres
Rotació	10 ^h 39 ^m
Obliqüitat	26° 44'
Gravetat	0.91 G
Densitat	0.71 g/cm ³



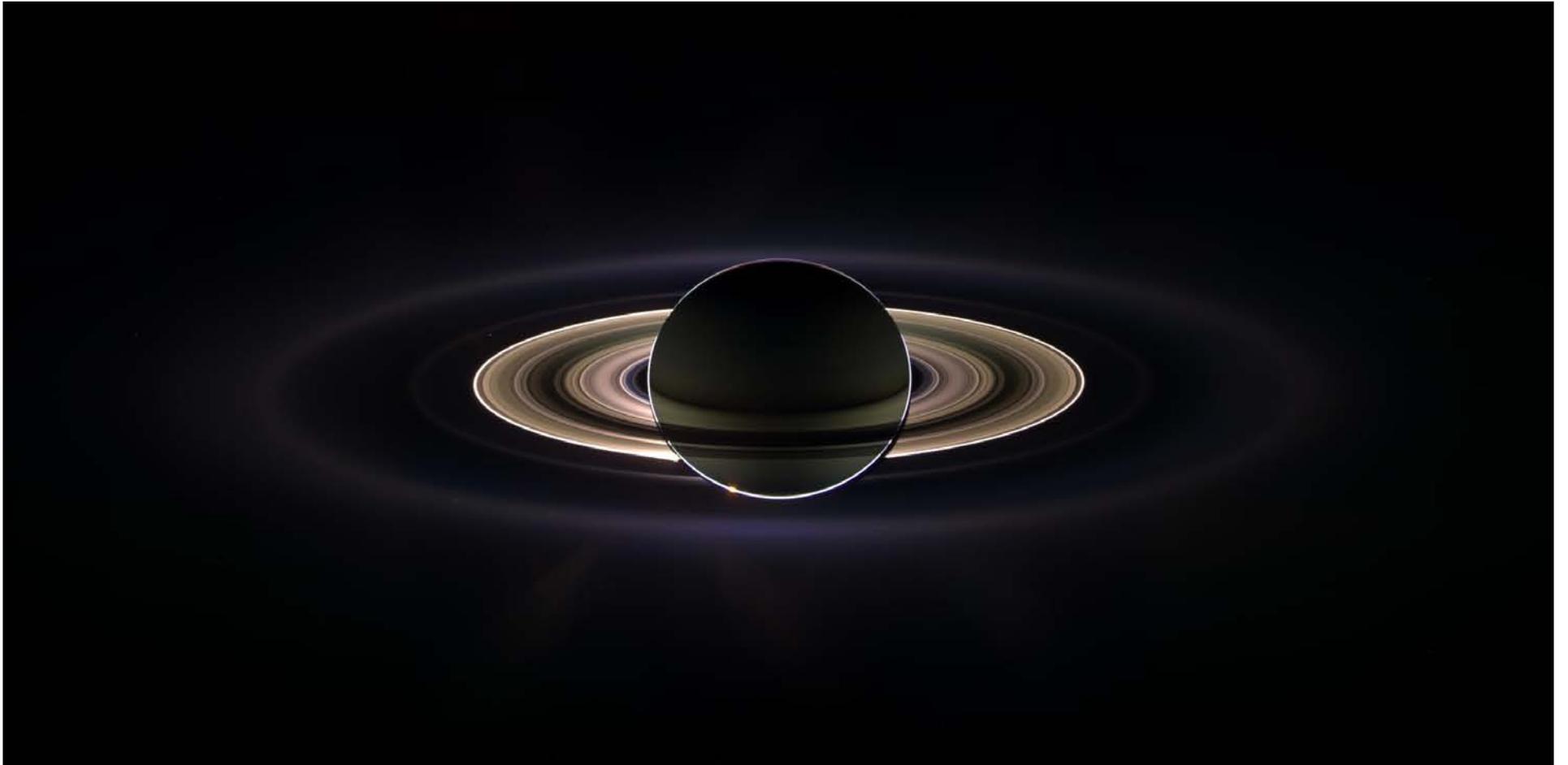
Regions principals dels anells de Saturn

Regió	Límit intern		Límit extern	
	km	milles	km	milles
A	119 800	74 400	136 600	84 900
B	90 500	56 200	117 100	72 800
C	74 600	46 400		

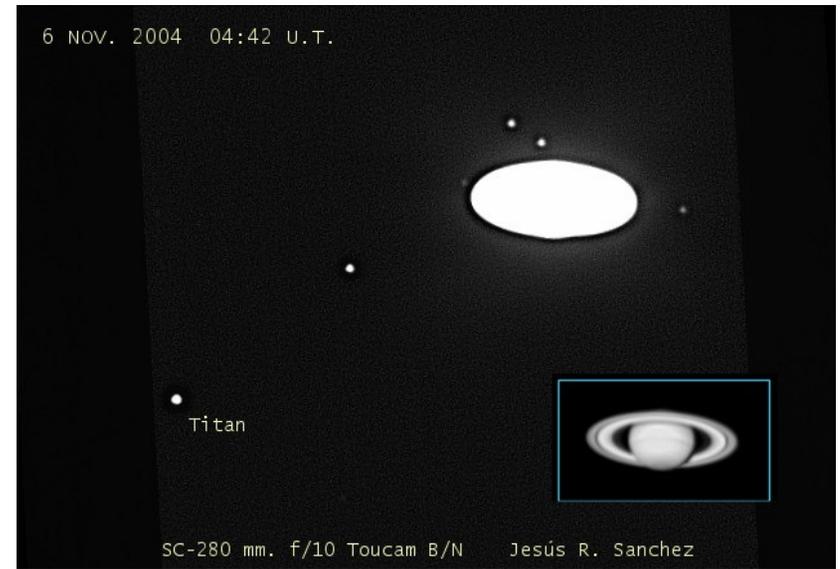
Saturn



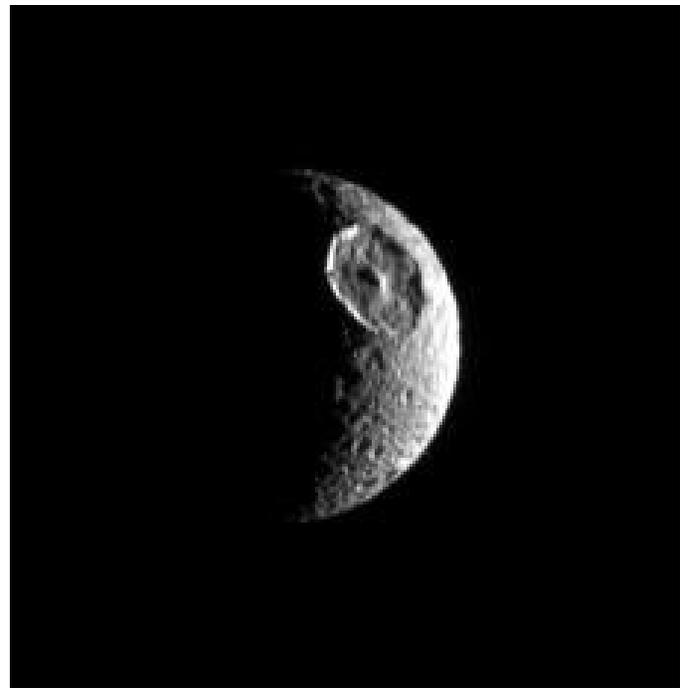
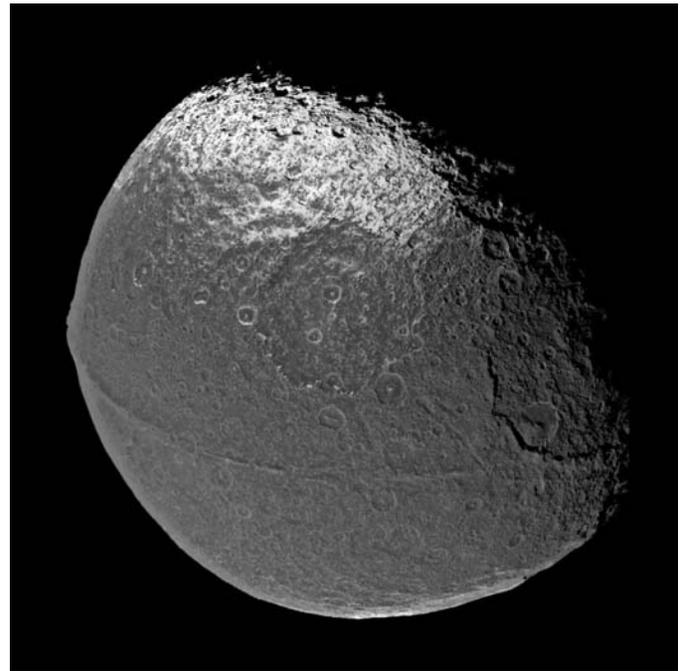
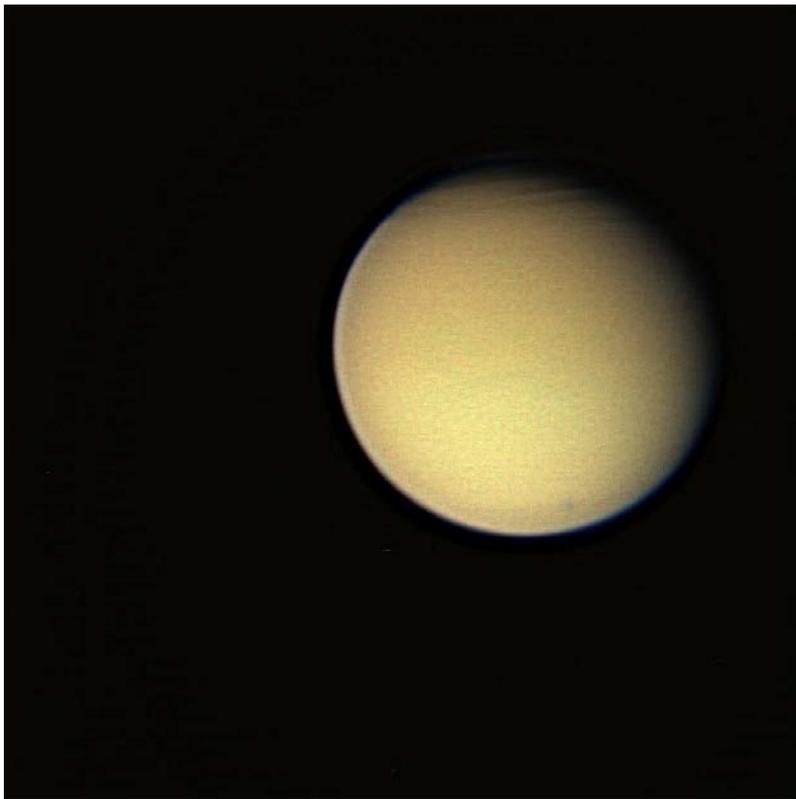
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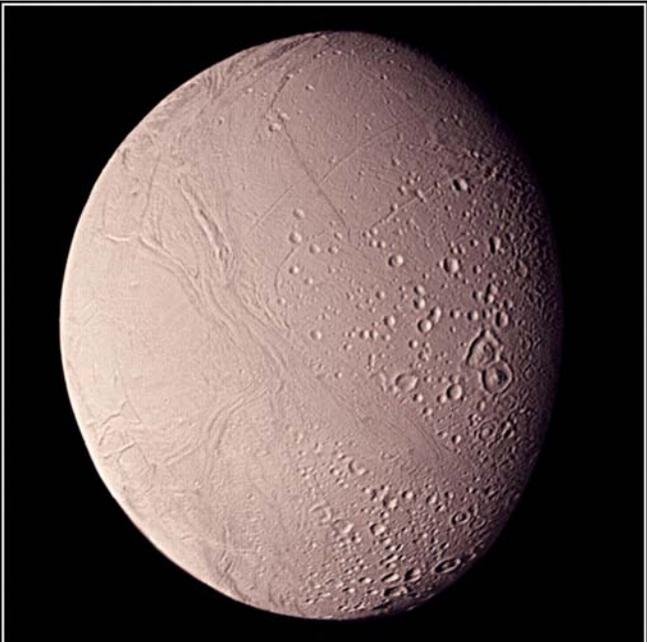


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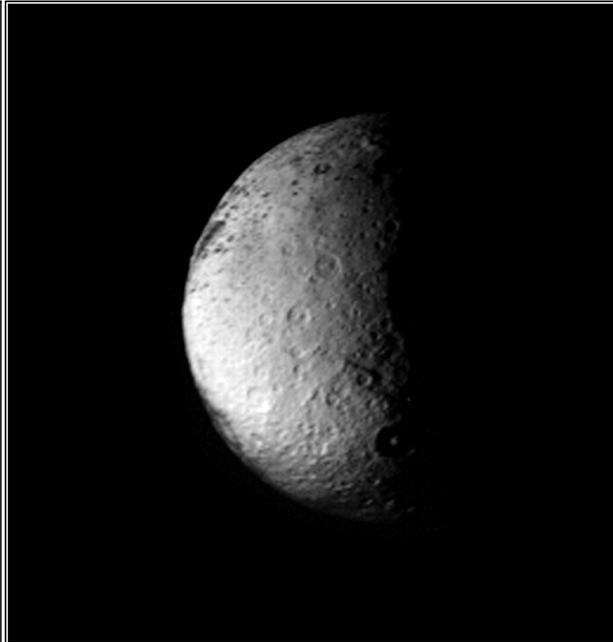
Saturn: satèl·lits





Enceladus

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Iapetus

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Mimas • Herschel Crater

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Rhea



Tethys

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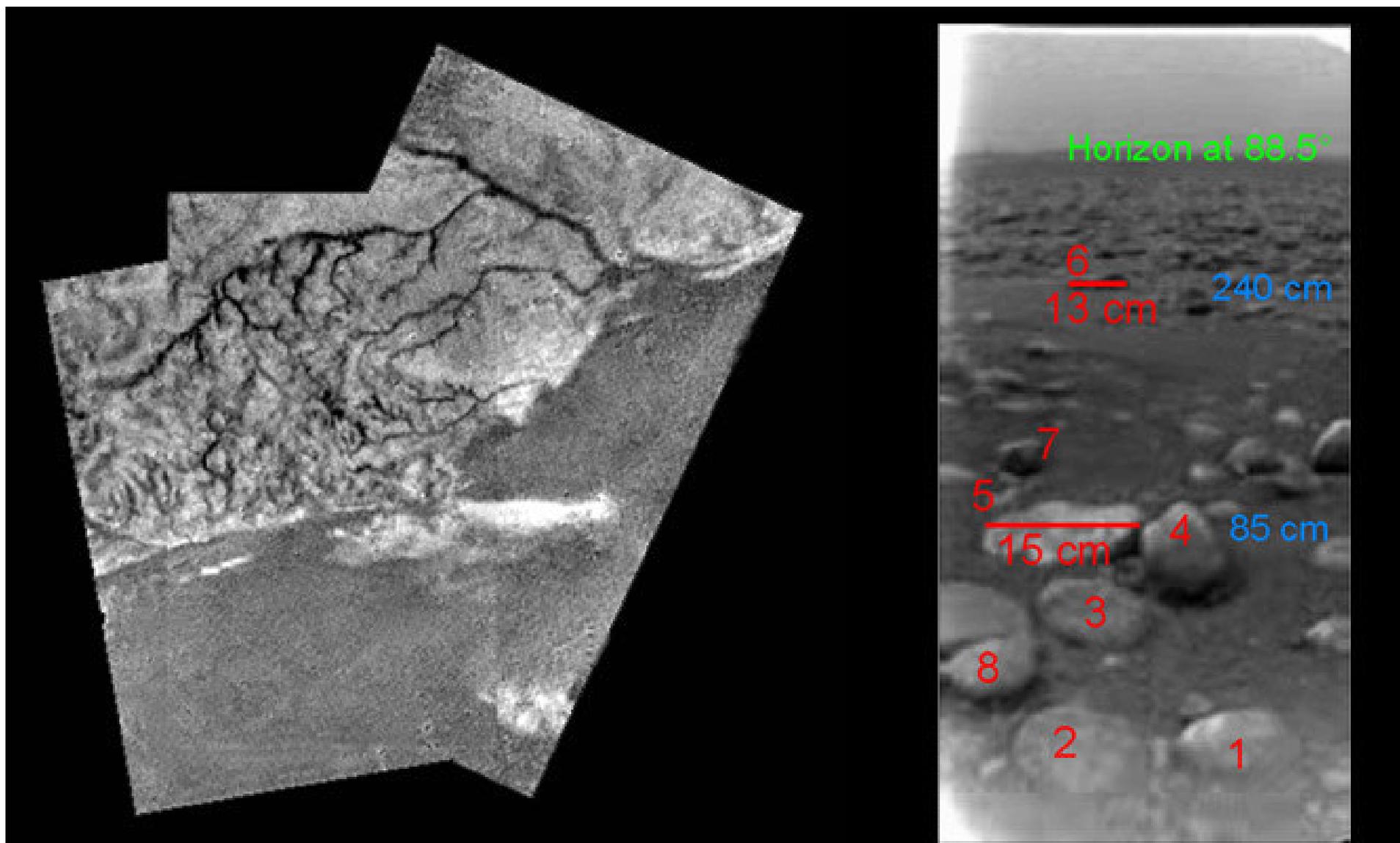
Saturn:

satèl·lits

Tità

51

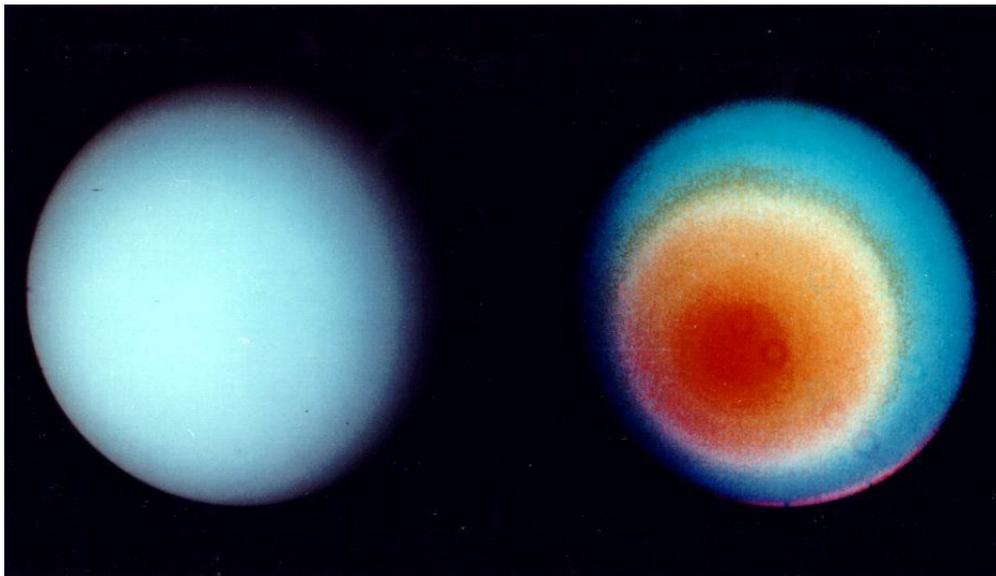
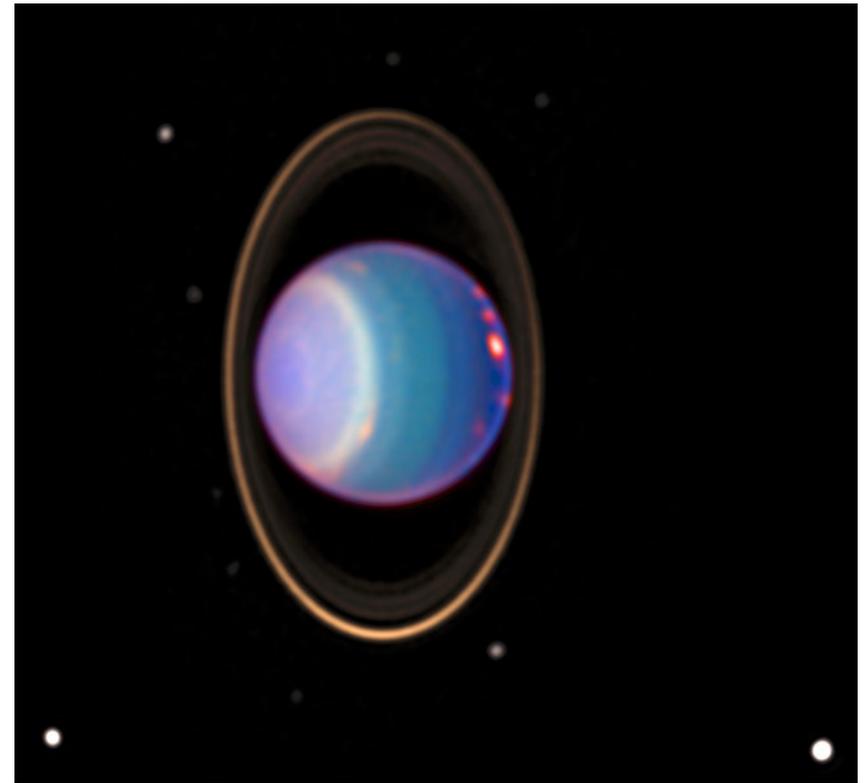
Saturn: Tità



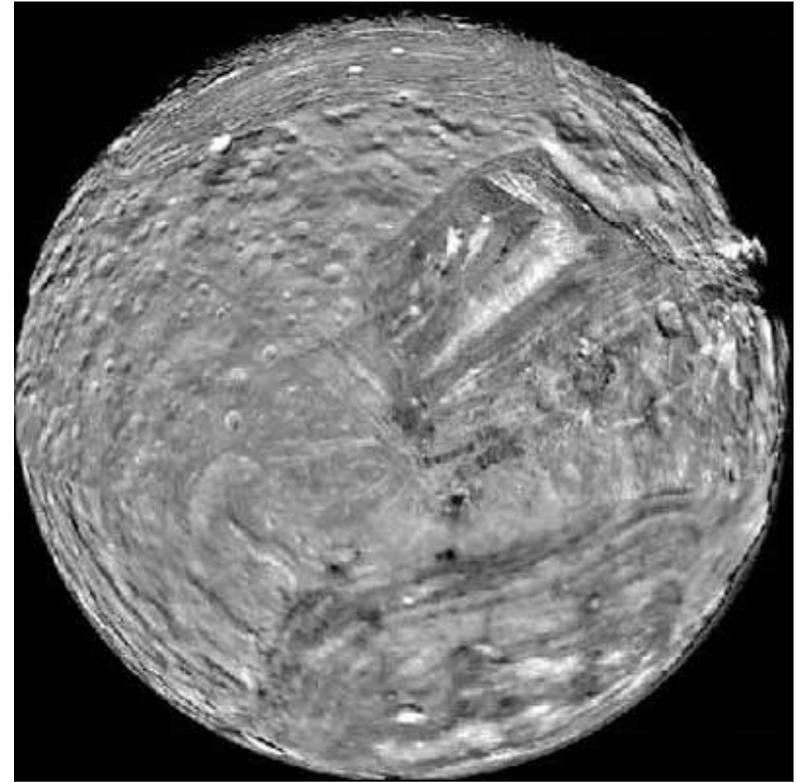
Urà

Urà

Diàmetre	51 118 km
Massa	14.6 Terres
Rotació	-17 ^h 14 ^m
Obliqüitat	97° 52'
Gravetat	0.88 G
Densitat	1.24 g/cm ³

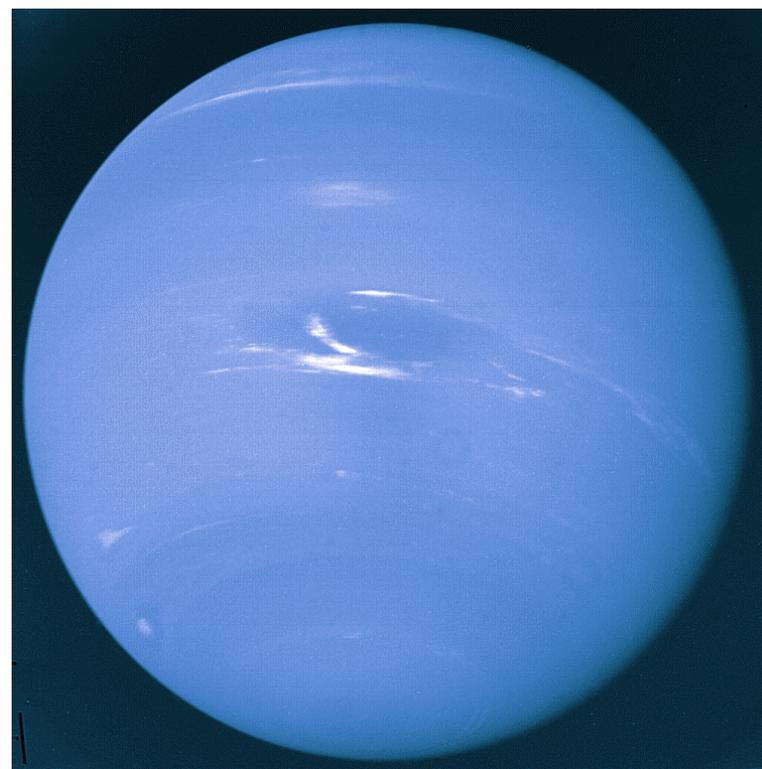
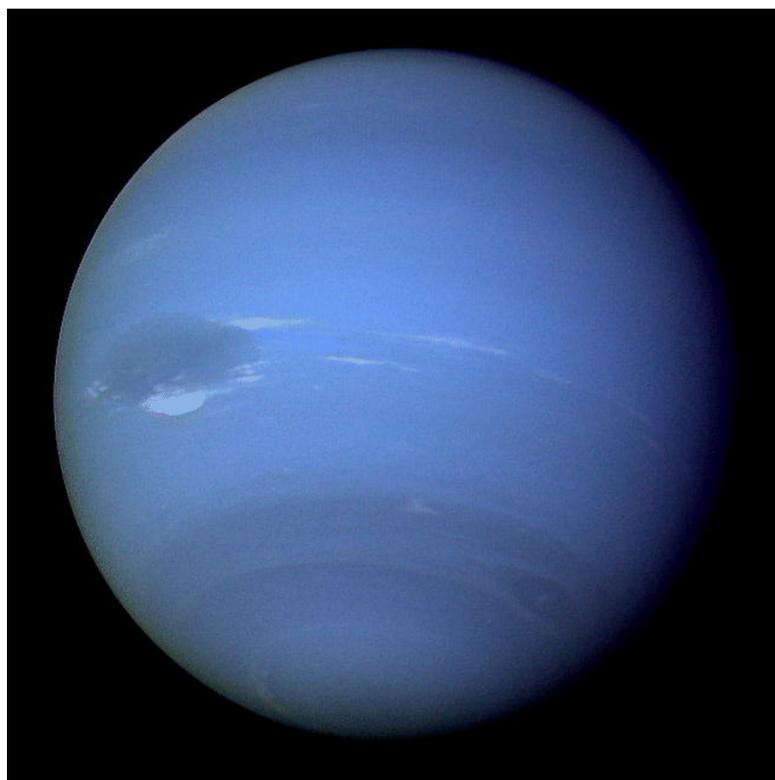


Urà: satèl·lits

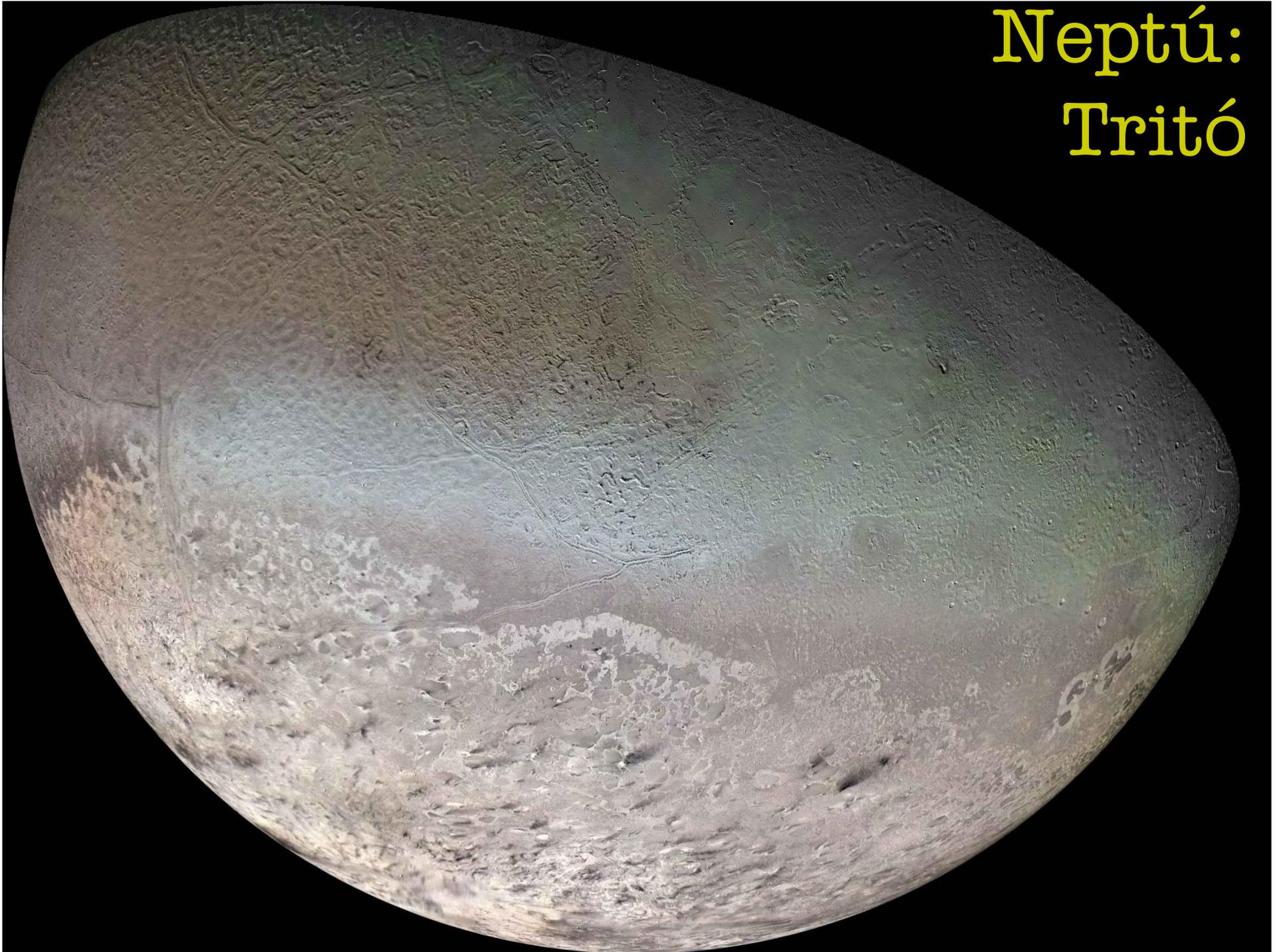


Neptú

Neptú	
Diàmetre	49 528 km
Massa	17.1 Terres
Rotació	16 ^h 6 ^m
Obliqüitat	28° 48'
Gravetat	1.12 G
Densitat	1.67 g/cm ³



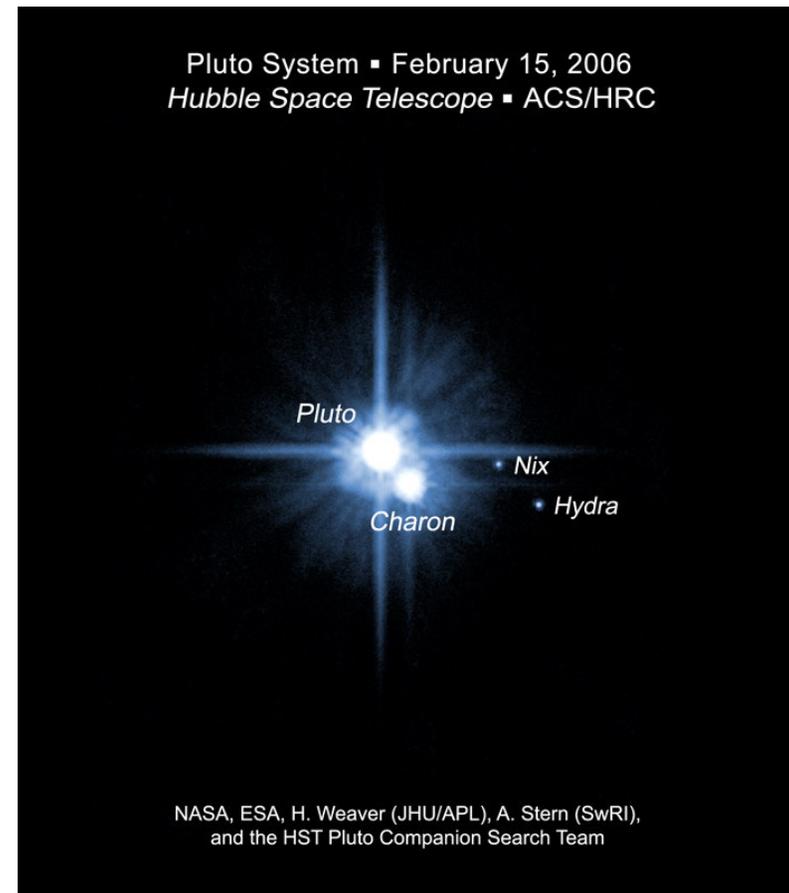
Neptú:
Tritó



Cinturó de Kuiper:

segon cinturó d'asteroides del Sistema Solar

- Plutó: pimer membre descobert (1930)
- Objecte més gran conegut fins ara: Eris
- Format per molts milers de cossos gelats



Largest known trans-Neptunian objects (TNOs)

Dysnomia



Eris



Charon

Pluto



2005 FY₉



2003 EL₆₁



Sedna



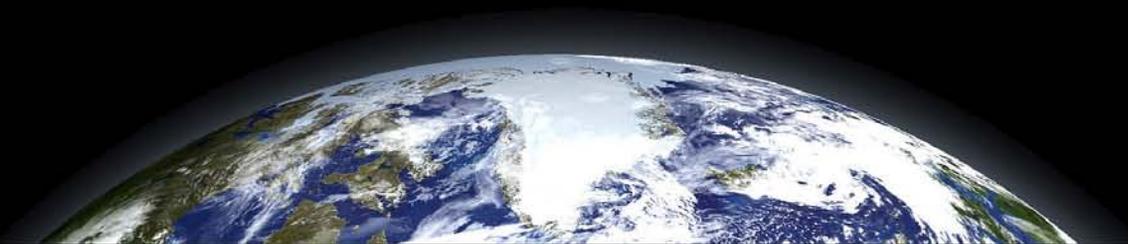
Orcus



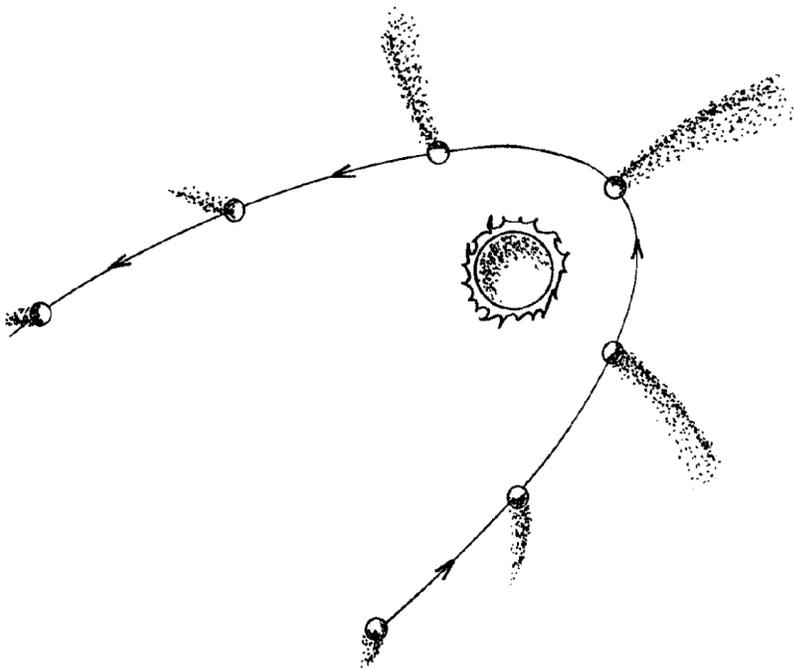
Quaoar



Varuna



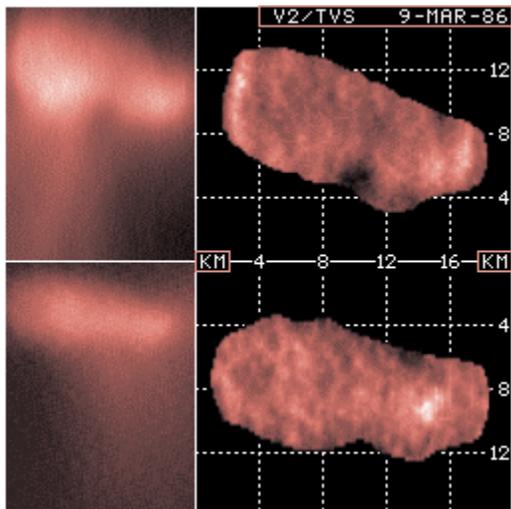
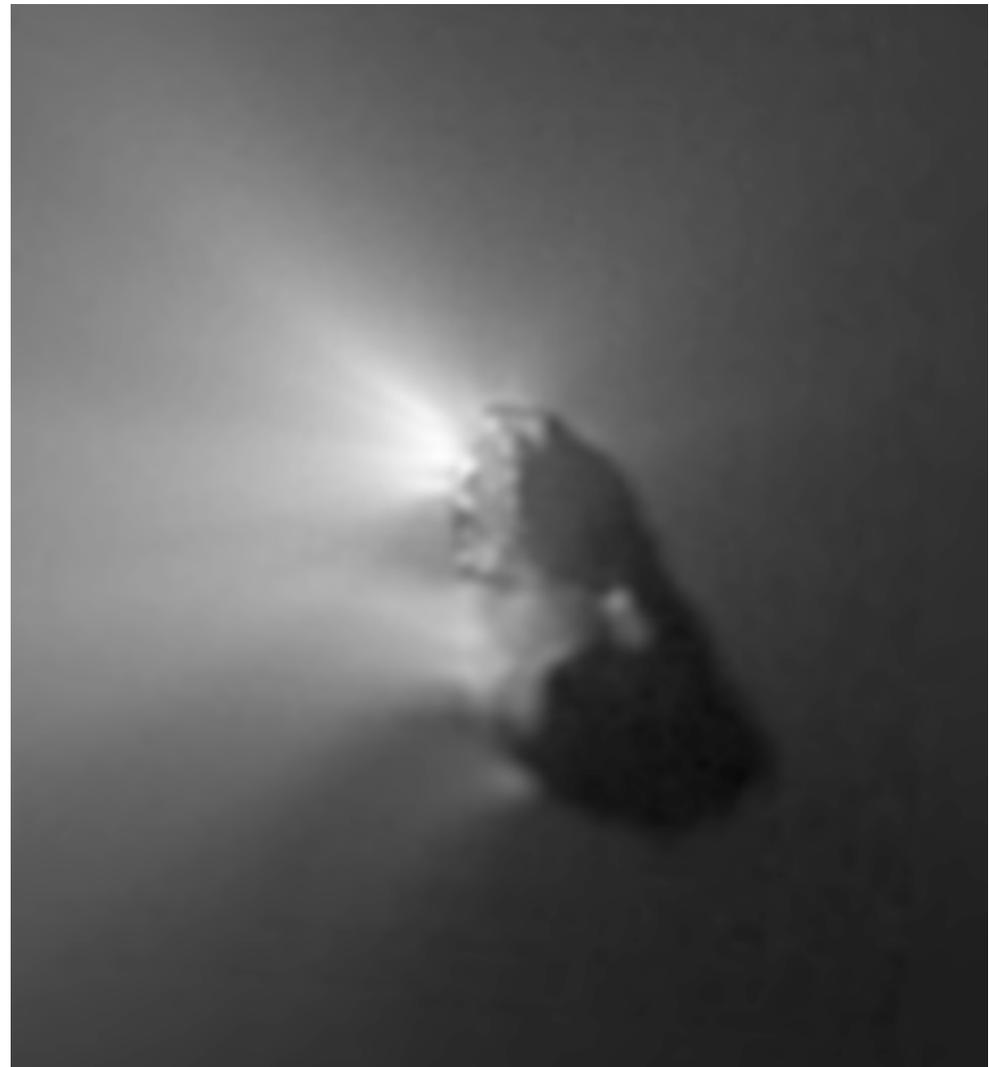
Cometes



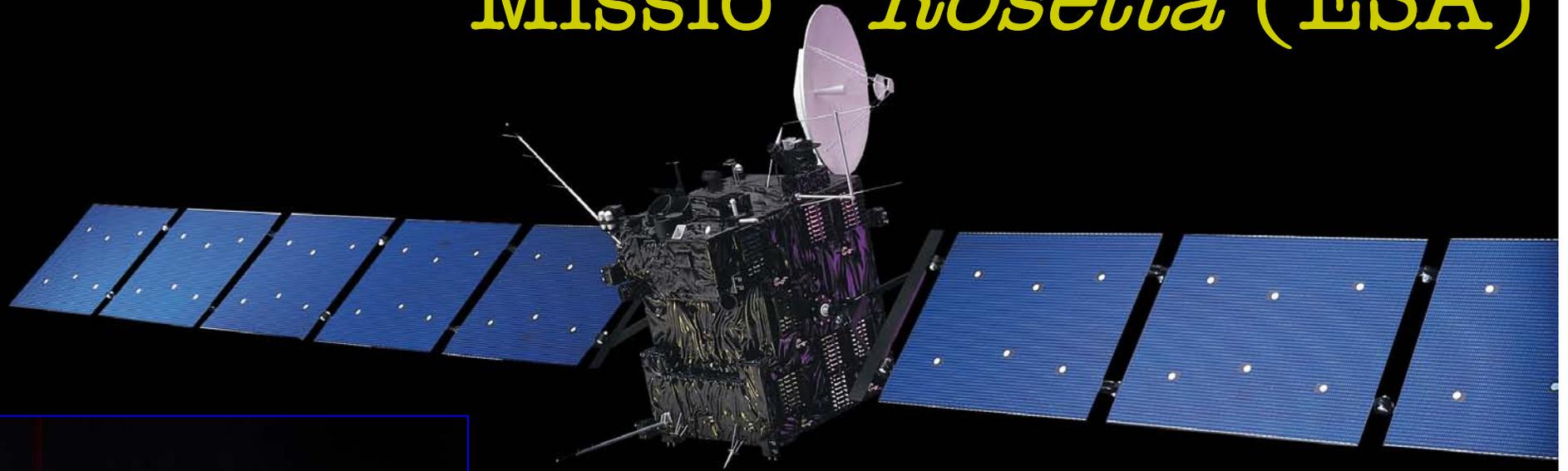
Cometes



Cometes: nuclei del cometa Halley



Missió *Rosetta* (ESA)



- llançament: 2 de març del 2004
- Terra 1: novembre 2005
- Mart: febrer 2007
- Terra 2: novembre 2007
- Terra 3: novembre 2009
- Hibernació: mayo 2011 - gener 2014
- Churyumov-Gerasimenko: gener-maig 2014
- Cartografiat del cometa: agost 2014
- Aterratge al cometa: novembre 2014
- Seguiment del cometa: fins desembre 2015

Meteoroides: Pluja d'estels

