



–Ontstaan uit sterrenstof

Identiteitskaart van het heelal (binnen de waarnemings horizon)

- Diameter (zichtbaar): ca. 27.4 miljard lichtjaar
- Leeftijd (=straal): ca. 13.7 miljard jaar
- Aantal sterrenstelsels: 100 à 300 miljard
 - Dimensies: 4 (1 tijdsachtige, 3 ruimteachtigen)
 - Krachten: 4

Gravitatie, sterke wisselwerking, zwakke wisselwerking, elektromagnetisme

Leven: ja

universum

heelal

onze
kosmos



Wat wij zien is een schaduw van de werkelijkheid

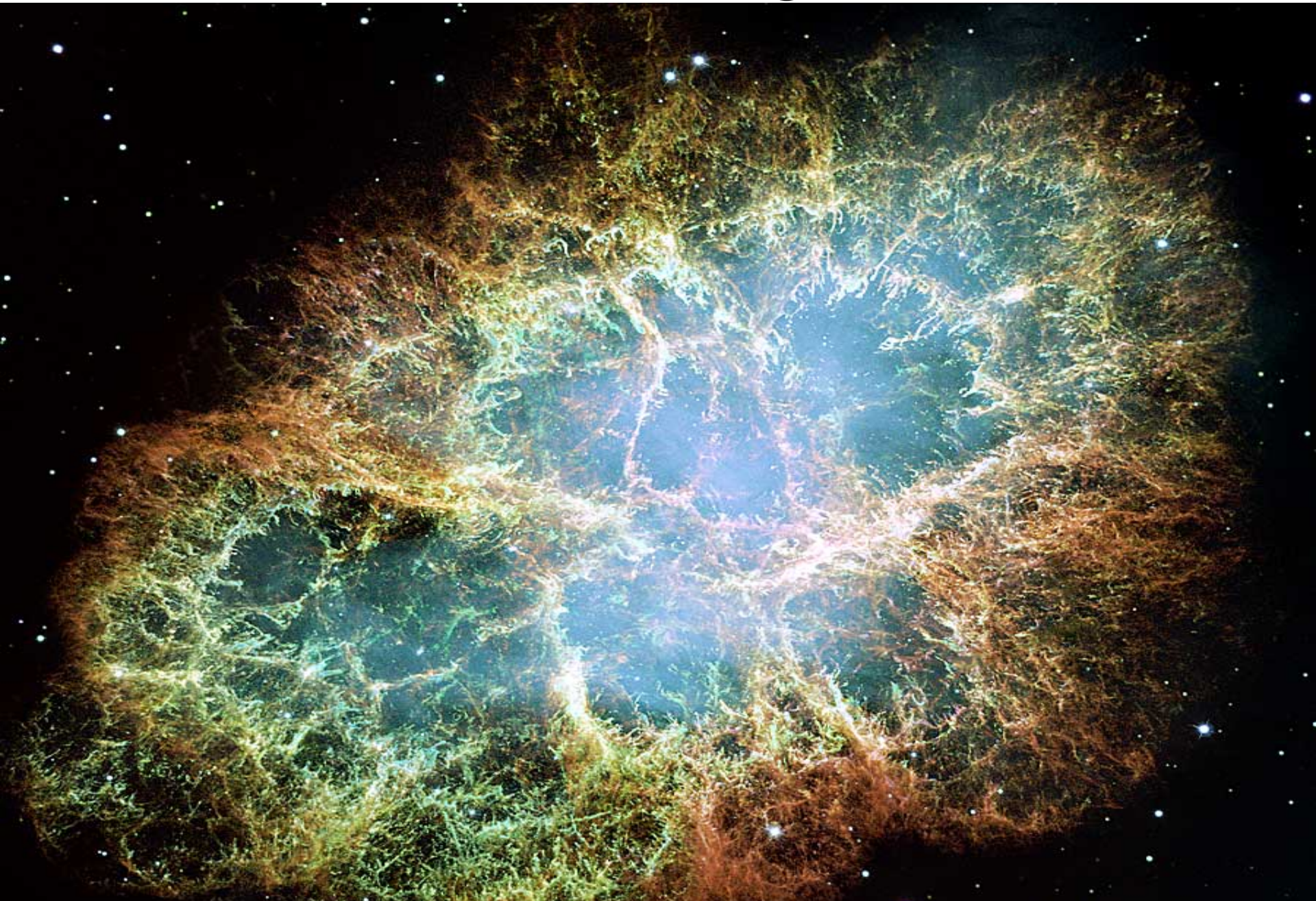
plato

De natuur is alleen te beheersen,
als wij haar gehoorzamen

Francis Bacon

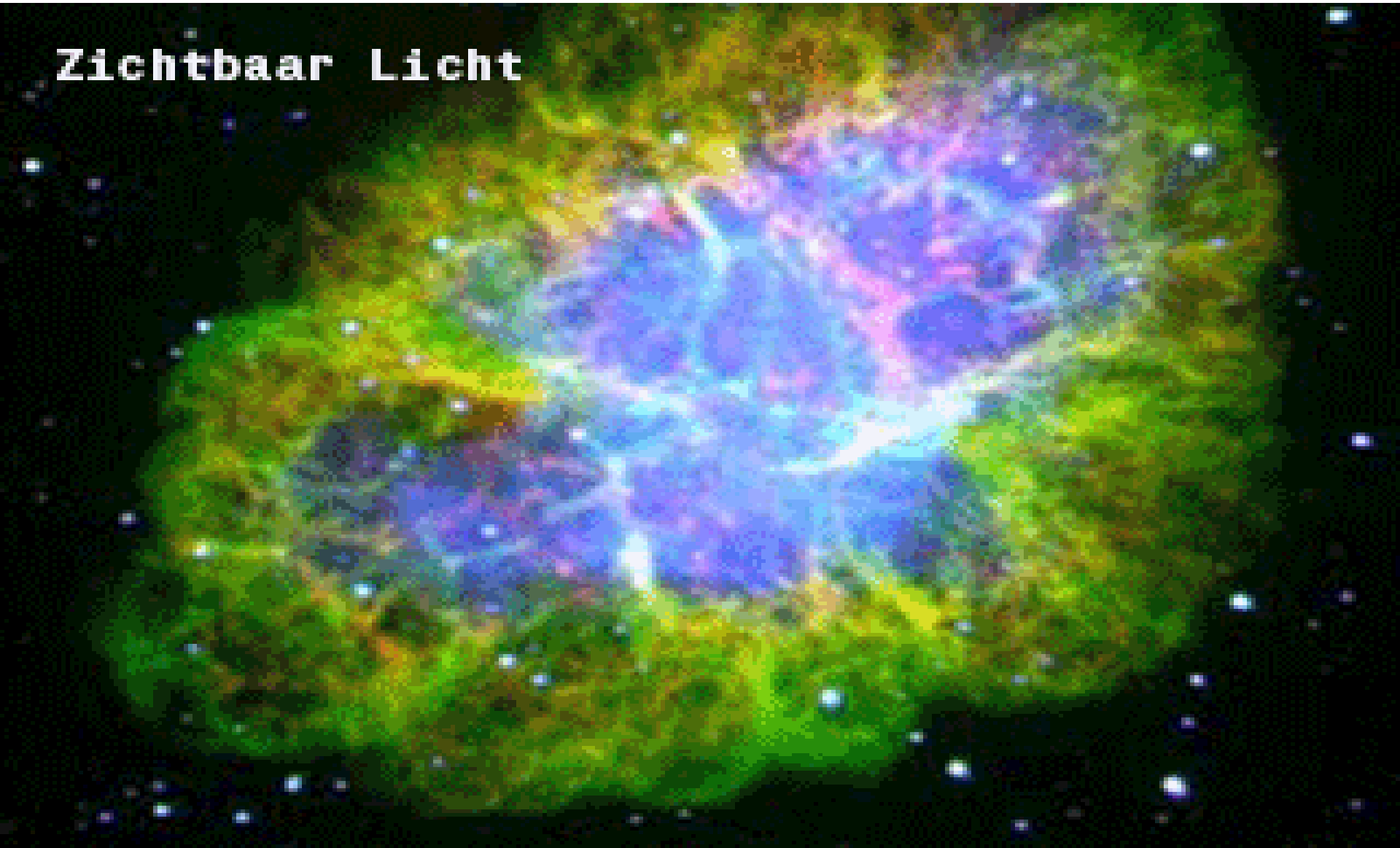
Sec	1000	1.000.000	1.000.000.000
	17 min.	12 dagen	33 jaar

Krabnevel(6000 lj) geboortewolk



KRABNEVEL

Zichtbaar Licht

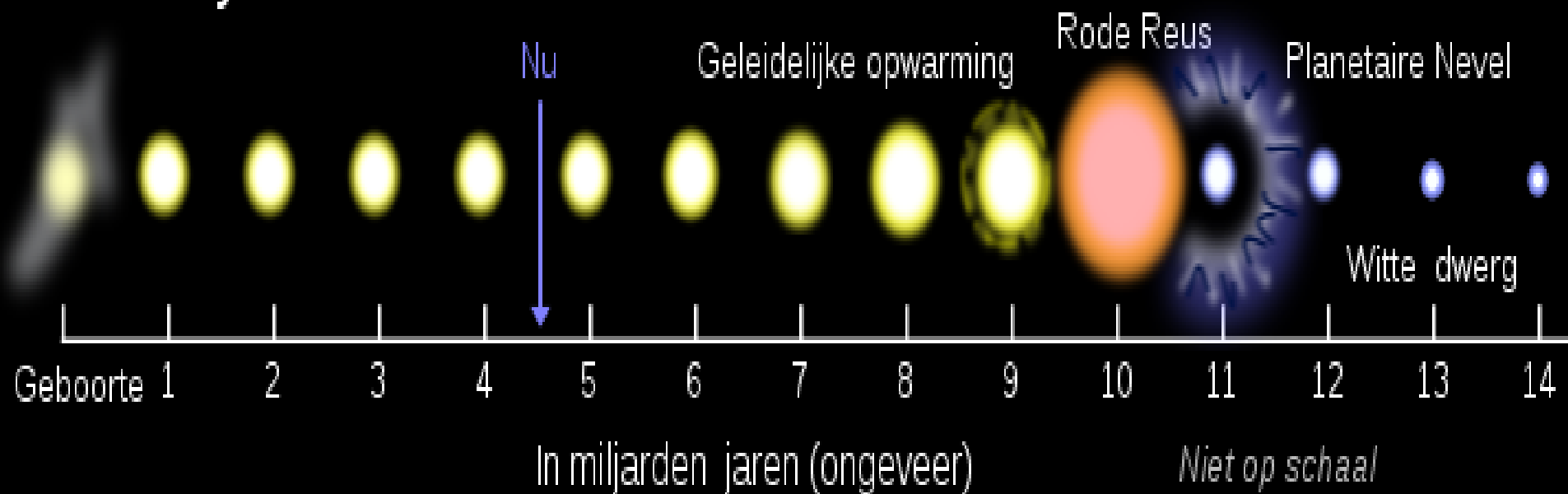


KRABNEVEL PULSAR



Levensloop van een ster

Levenscyclus van de Zon



Periodiek Systeem der Elementen

1 IA New Original																	18 VIIIA
1 H Waterstof 1.00794	2 He Helium 4.002602											13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
3 Li Lithium 6.941	4 Be Beryllium 9.012182											5 B Boor 10.811	6 C Koolstof 12.0107	7 N Stikstof 14.00674	8 O Zuurstof 15.9994	9 F Fluor 18.9984032	10 Ne Neon 20.1797
11 Na Natrium 22.989770	12 Mg Magnesium 24.3050	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8 VIII	9 VIII	10 VIII	11 IB	12 IIB	13 Al Aluminium 26.981538	14 Si Silicium 28.0855	15 P Fosfor 30.973761	16 S Zwavel 32.066	17 Cl Chloor 35.453	18 Ar Argon 39.948
19 K Kalium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955910	22 Ti Titanium 47.867	23 V Vanadium 50.9415	24 Cr Chroom 51.9961	25 Mn Mangaan 54.938049	26 Fe Ijzer 55.8457	27 Co Kobalt 58.933200	28 Ni Nikkel 58.6934	29 Cu Koper 63.546	30 Zn Zink 65.409	31 Ga Gallium 69.723	32 Ge Germanium 72.64	33 As Arsenium 74.92160	34 Se Seleen 78.96	35 Br Broom 79.904	36 Kr Krypton 83.798
37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirkonium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdeen 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Zilver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimonium 121.760	52 Te Telluur 127.60	53 I Jodium 126.90447	54 Xe Xenon 131.293
55 Cs Cesium 132.90545	56 Ba Barium 137.327	57 to 71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.9479	74 W Wolfram 183.84	75 Re Renium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platina 195.078	79 Au Goud 196.96655	80 Hg Kwik 200.59	81 Tl Thallium 204.3833	82 Pb Lood 207.2	83 Bi Bismut 208.98038	84 Po Polonium (209)	85 At Astatium (210)	86 Rn Radon (222)
87 Fr	88 Ra	89 to 103	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Uub	113 Uut	114 Uuq	115 Uup	116 Uuh	117 Uus	118 Uuo

- Alkalimetalen
- Aardalkalimetalen
- Overgangsmetalen
- Lanthaniden
- Actiniden
- Hoofdgroepmetalen
- Niet-metalen
- Edelgassen
- C Solid
- Br Liquid
- H Gas
- Tc Synthetic

Het einde

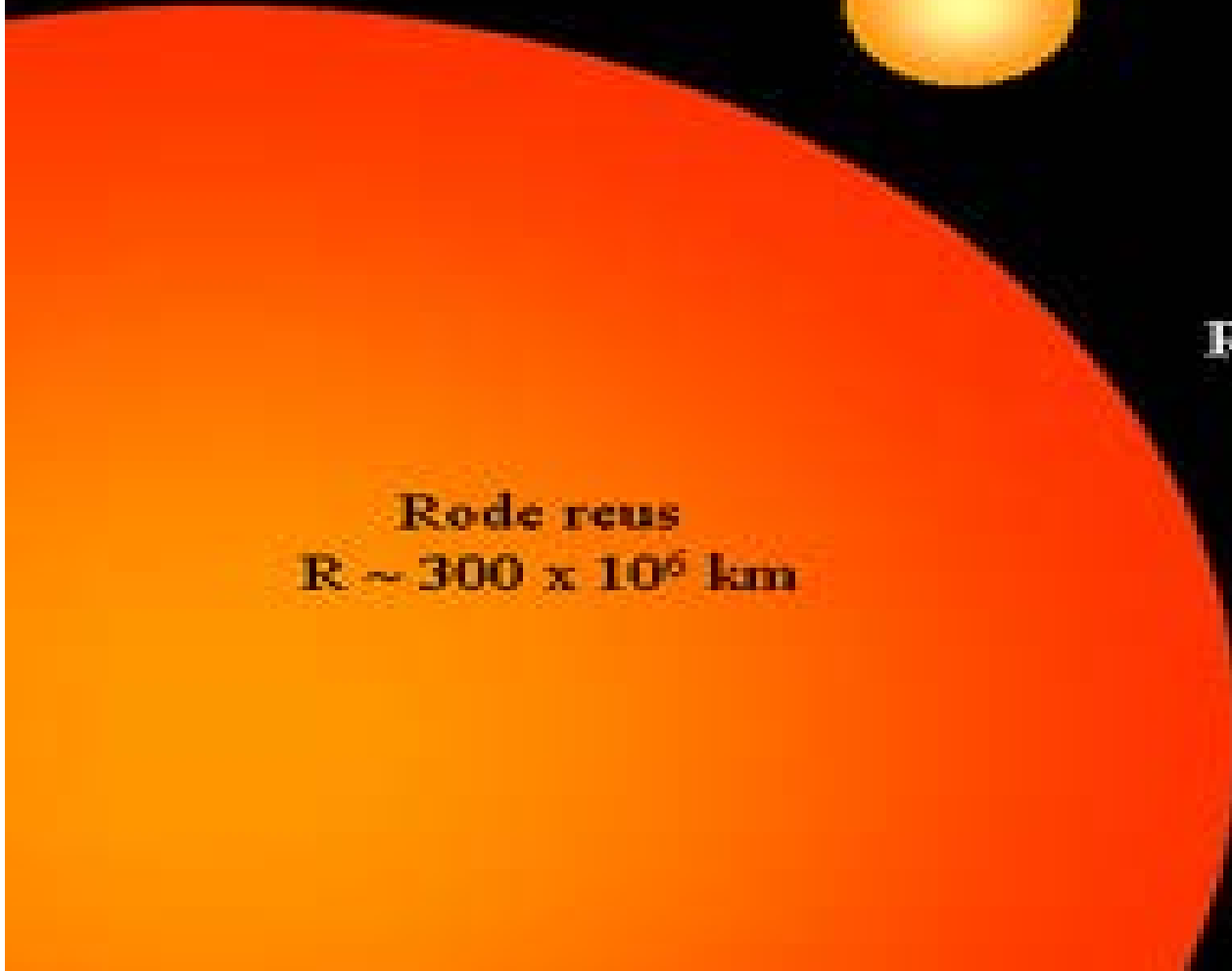
Baan van Mars
 $R \sim 227 \times 10^6 \text{ km}$

Oranje ster
 $R \sim 20 \times 10^6 \text{ km}$

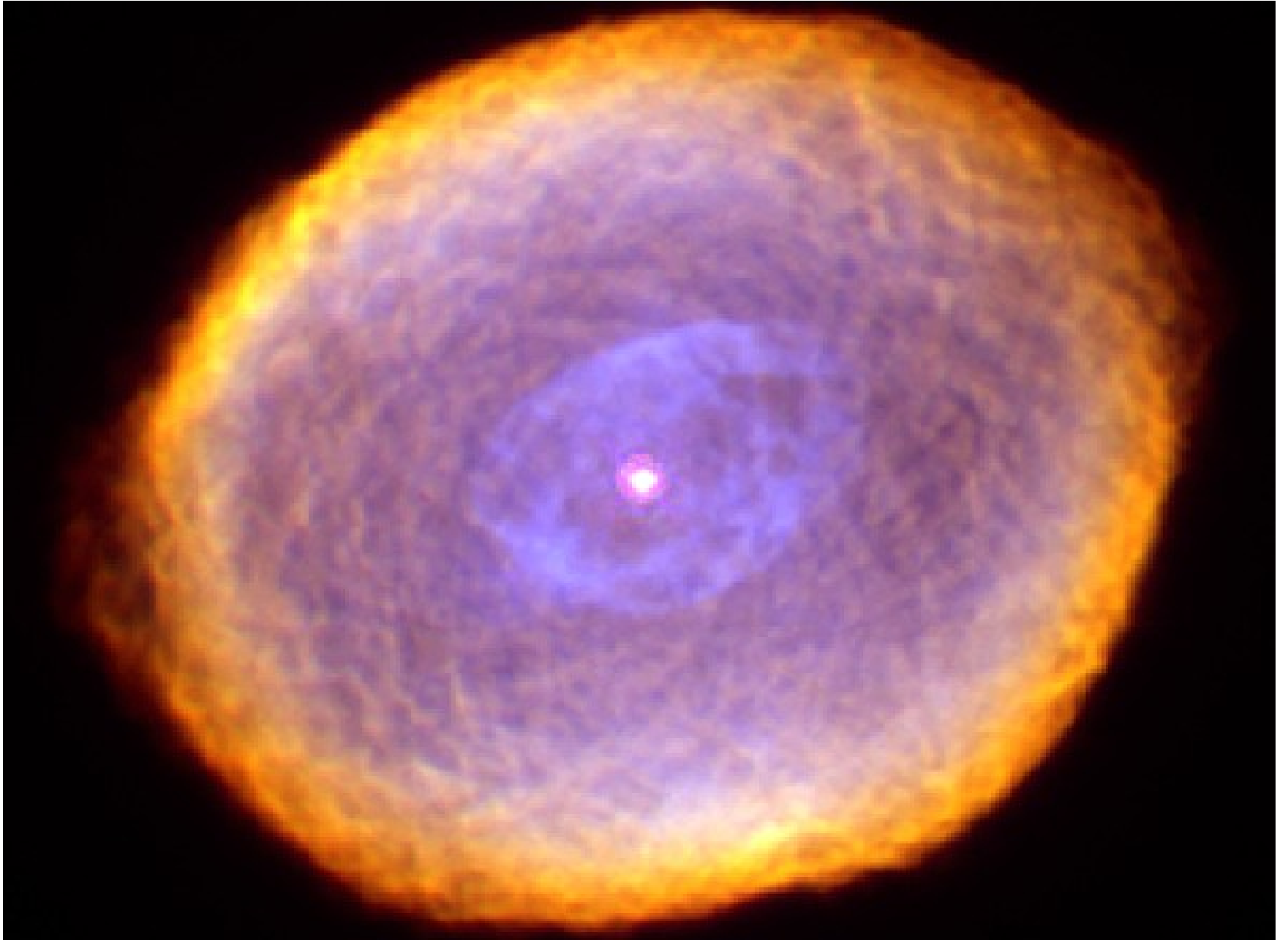


Zon
 $R \sim 0,7 \times 10^6 \text{ km}$

Rode reus
 $R \sim 300 \times 10^6 \text{ km}$



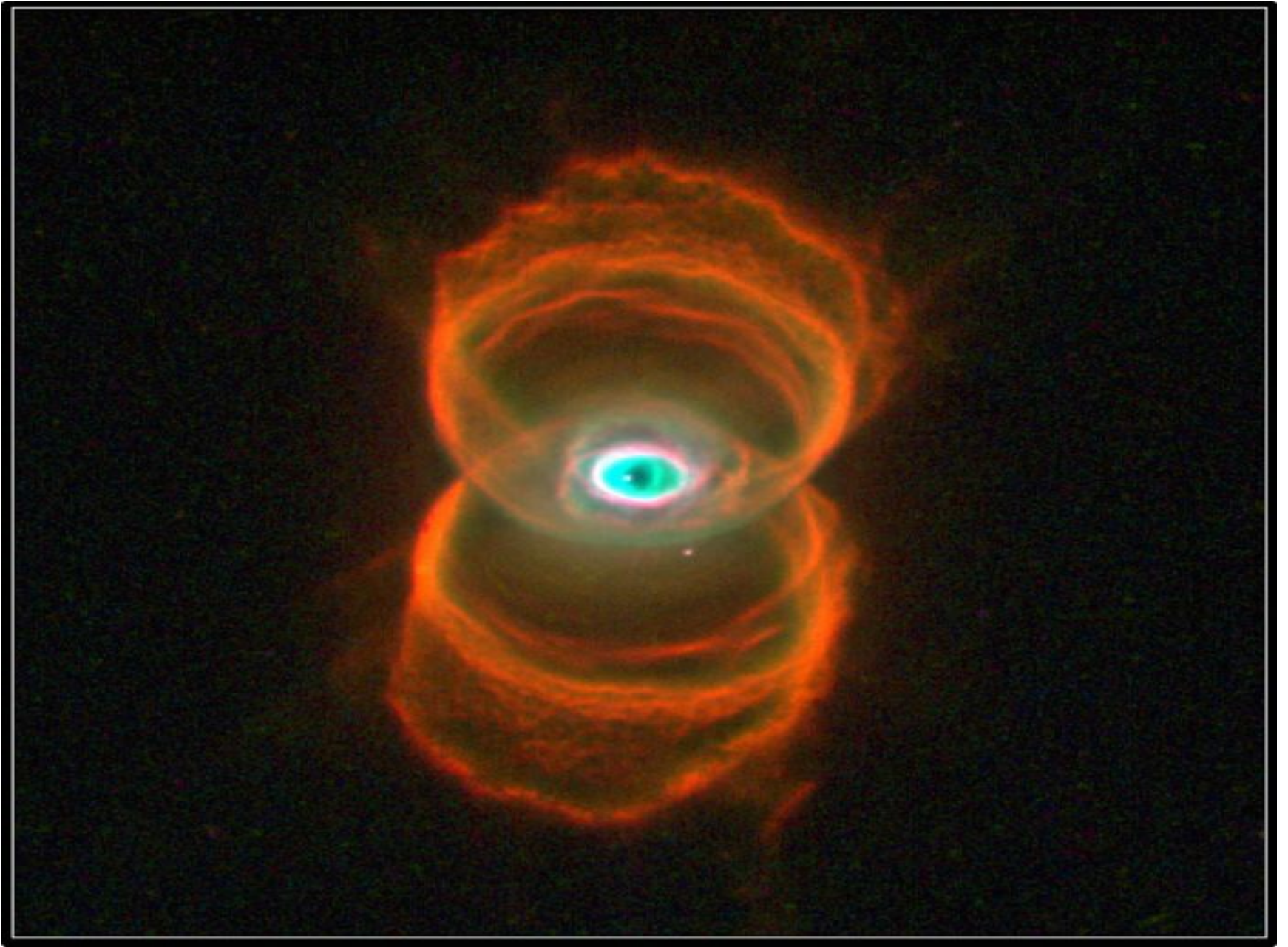
Spirograph nevel



Eskimo nevel



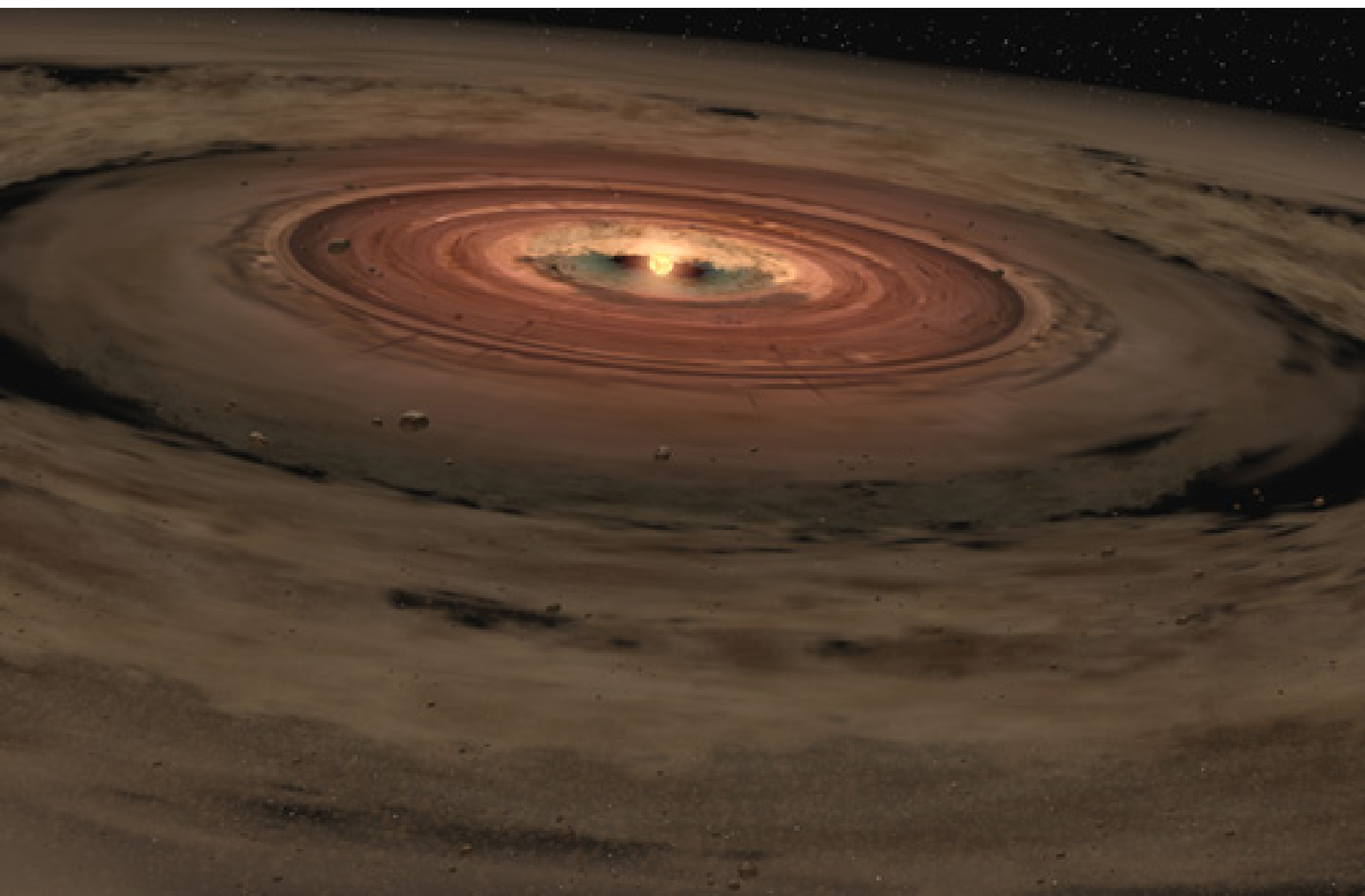
Hourglass nevel



Adelaars nevel

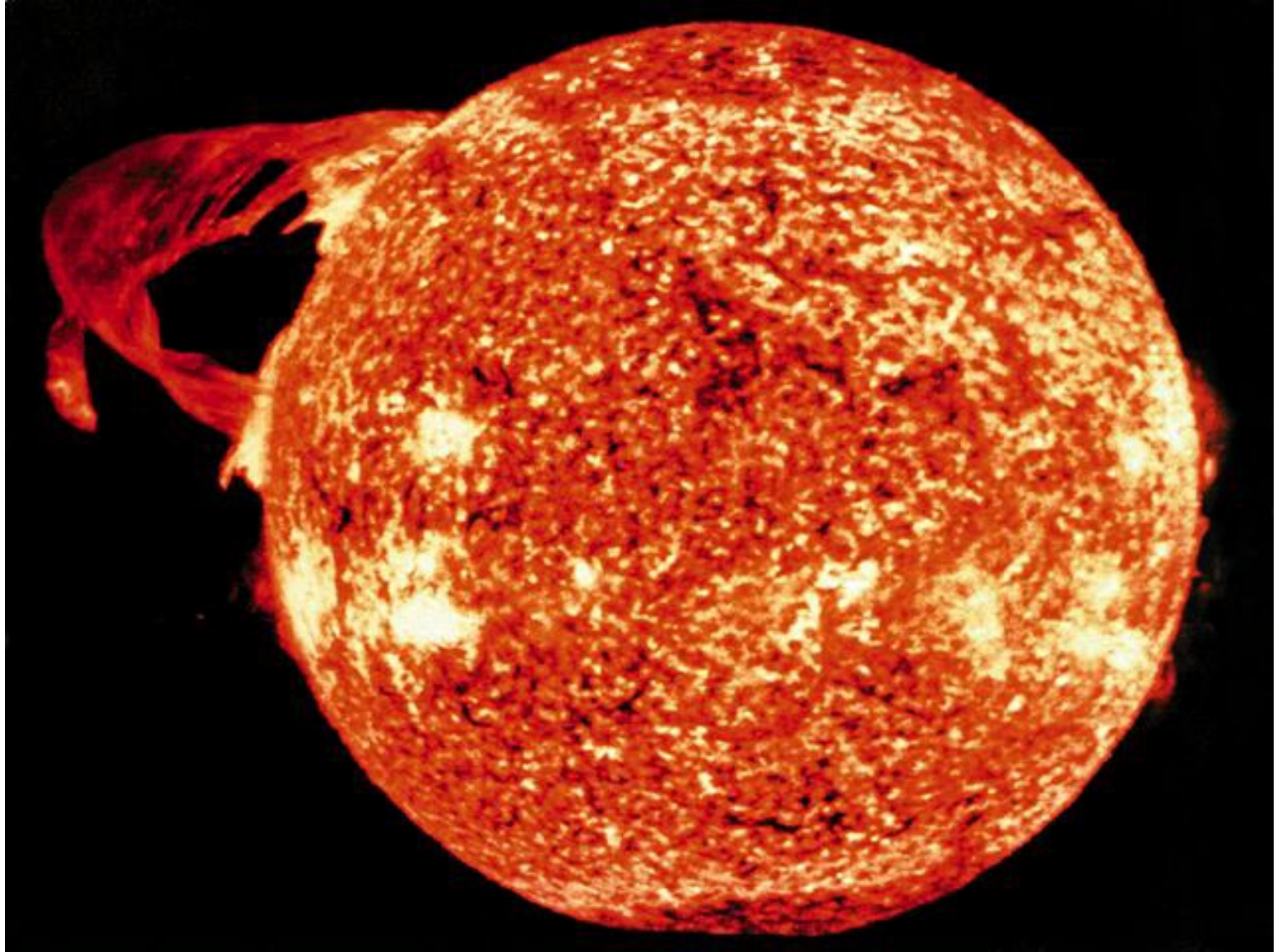


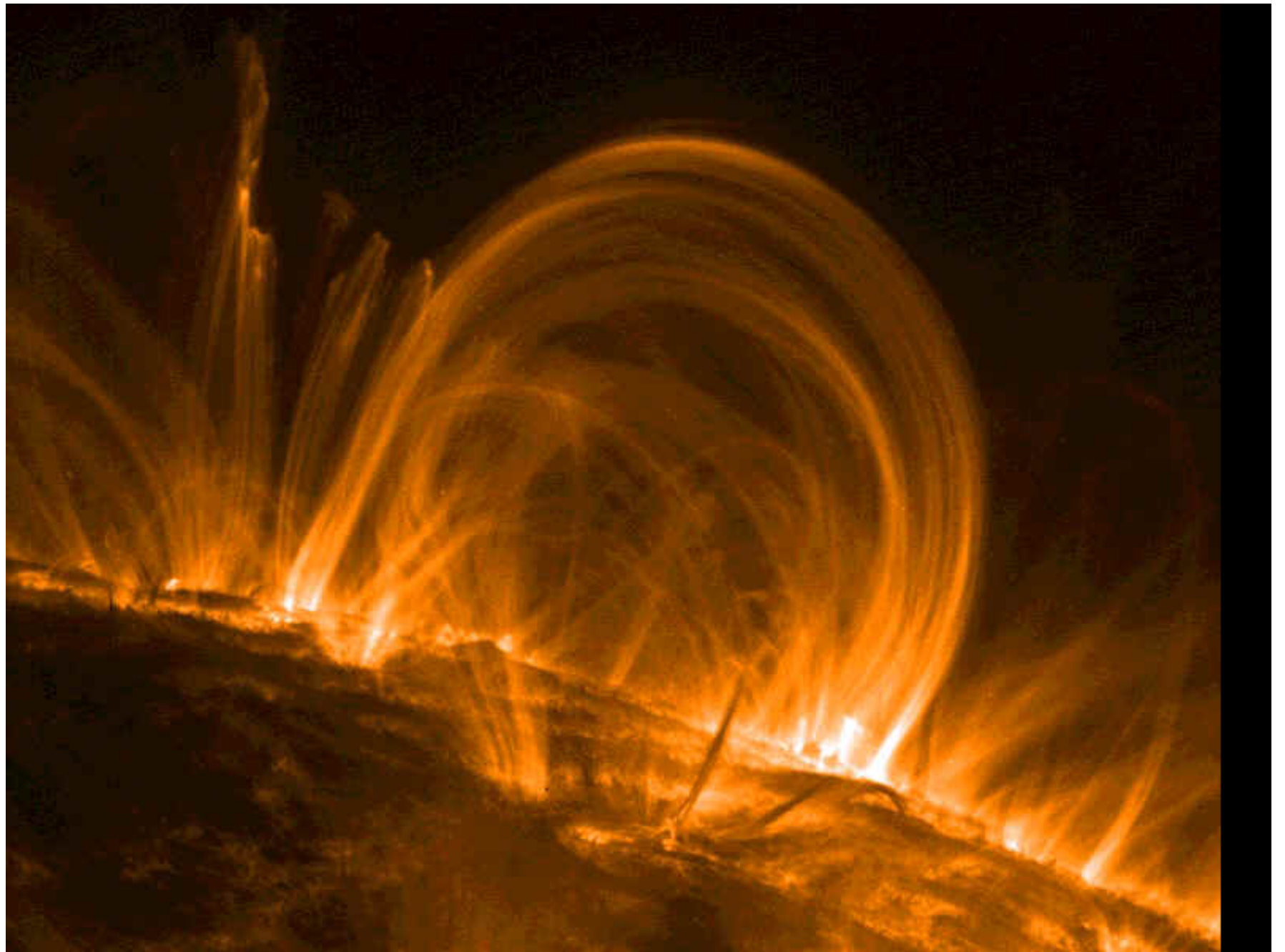
Ontstaan van ons zonnestelsel

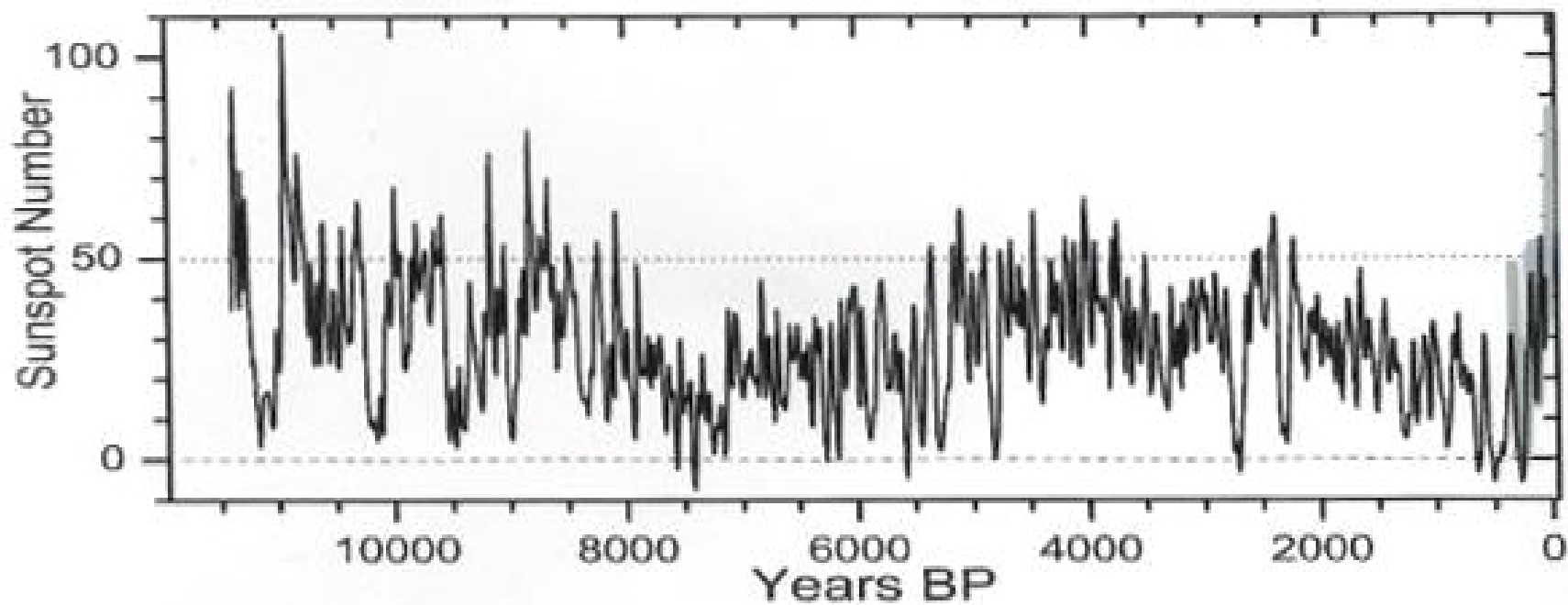
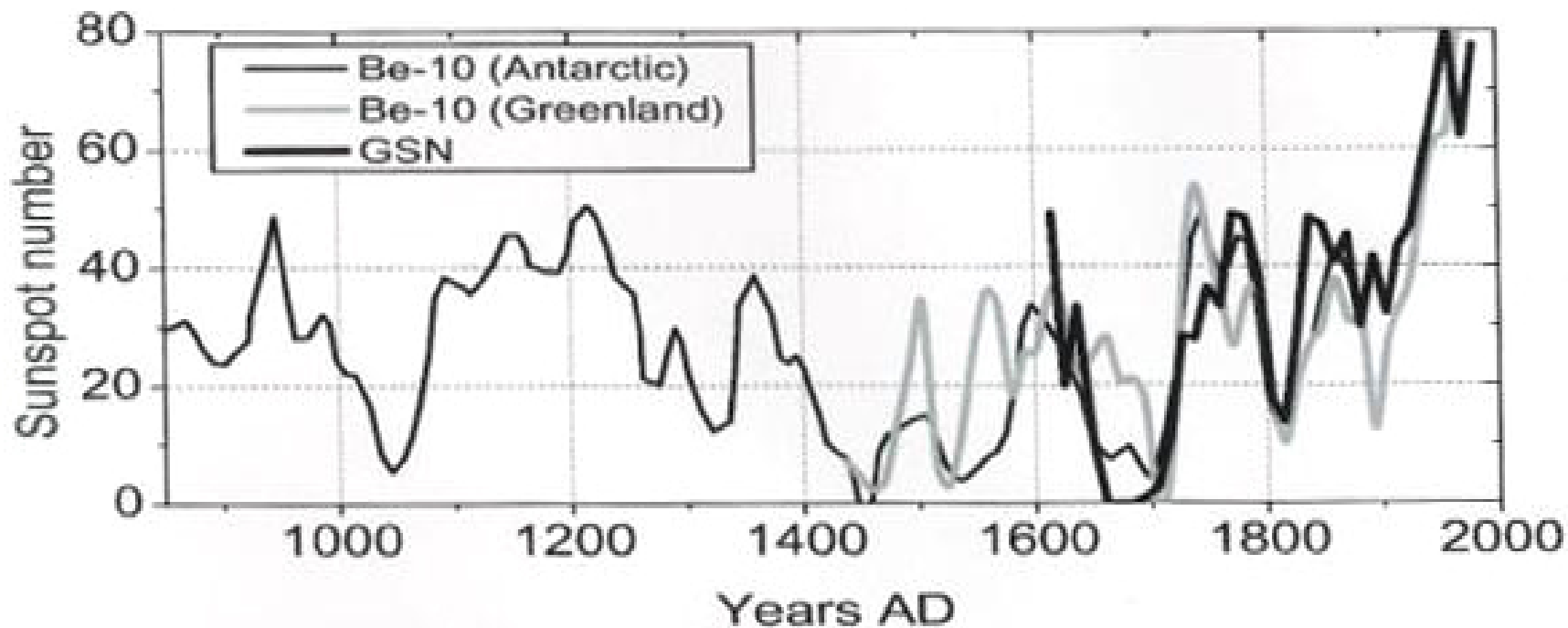


5 MILJARD JAAR OUD

109x diameter vd aarde
rotatie tijd 25 dagen







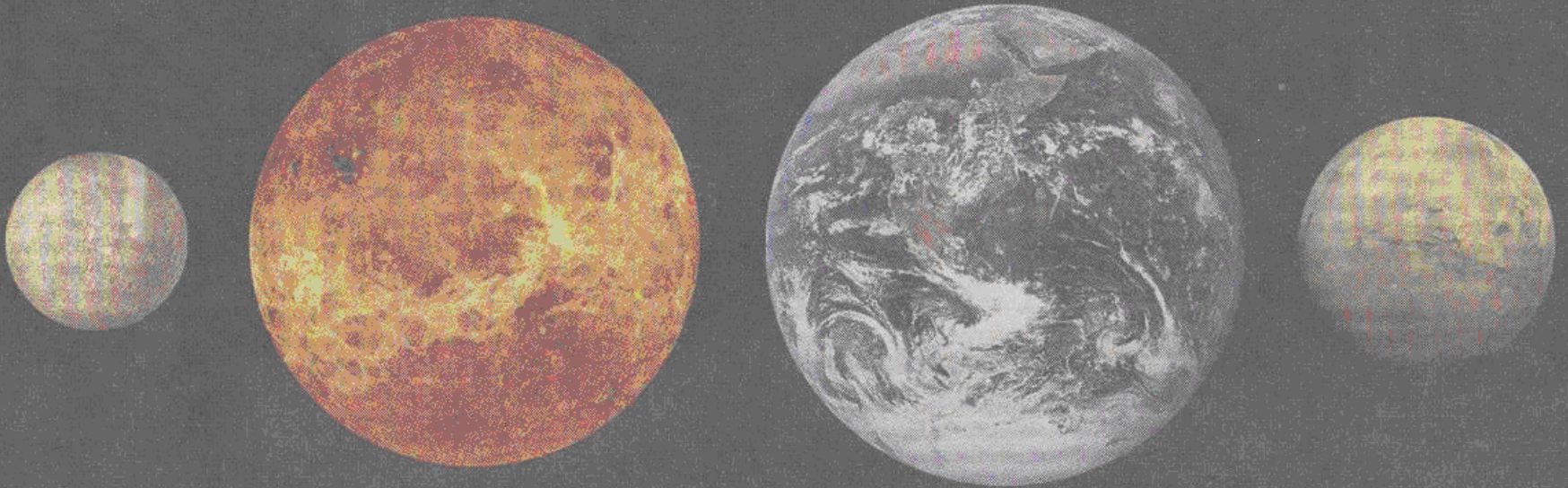




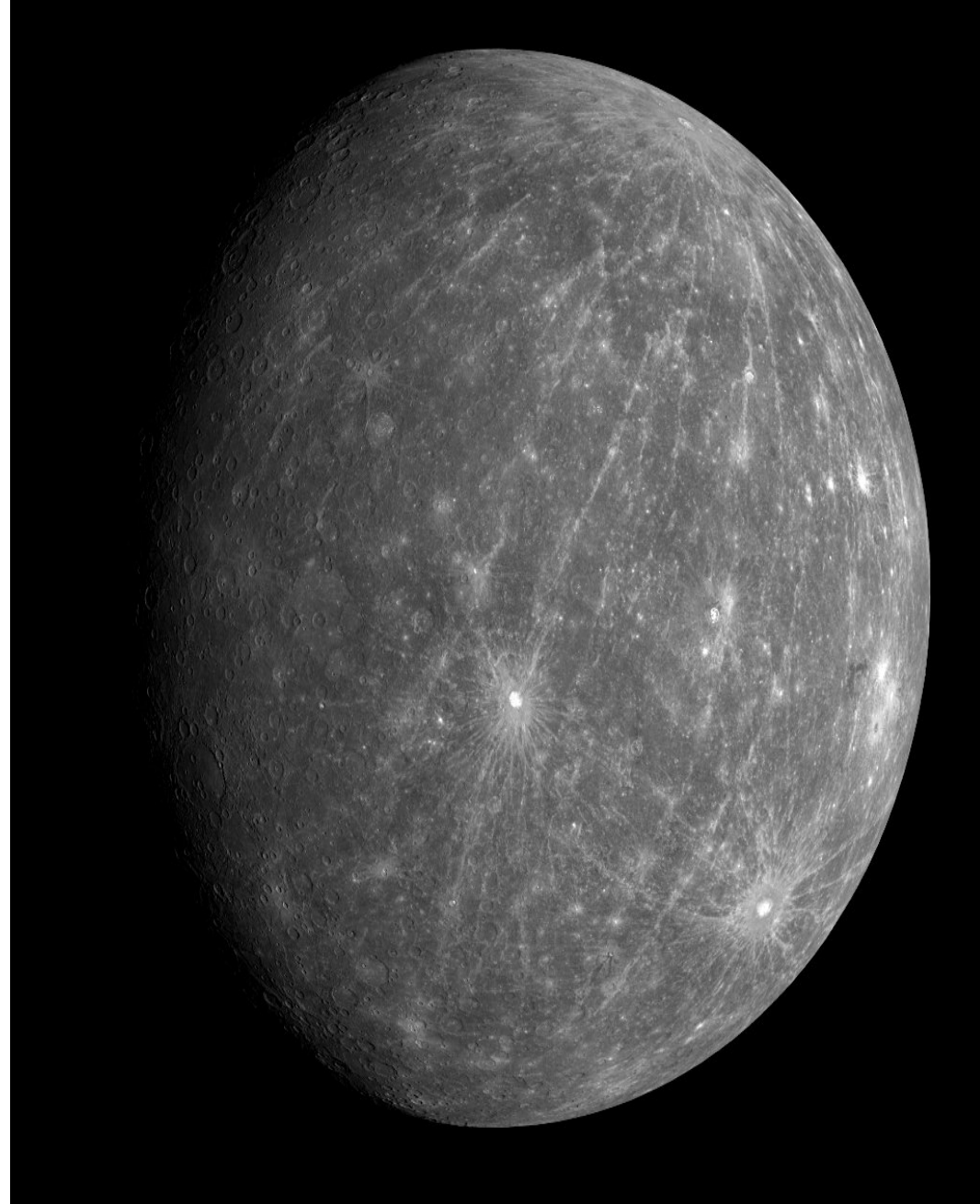
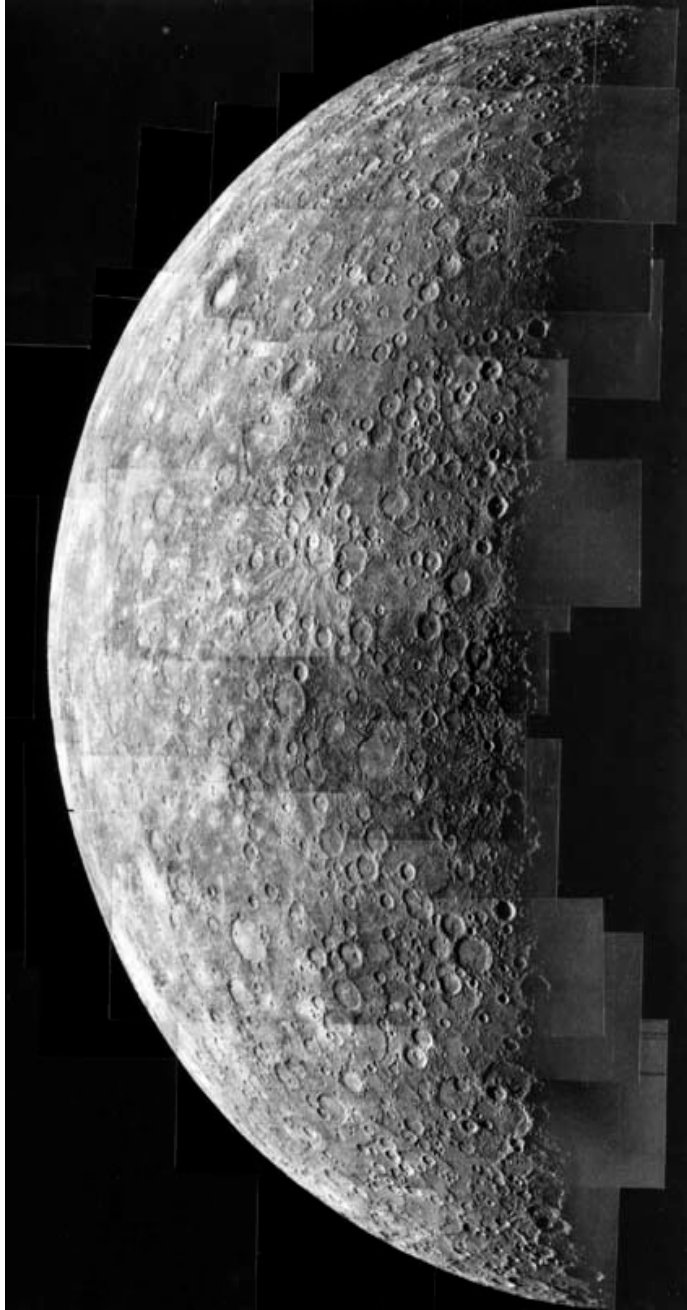
ENKELE GETALLEN

		Zonsafstand	Diameter	Omlooptijd	Rotatietijd
		(Aarde=1)	(Aarde=1)	(In jaren)	(In dagen)
1	ZON	--	109		25
2	MERCURIUS	0.4	0.4	73 dgn	58
3	VENUS	0.7	0.9	224 dgn	234
4	AARDE	1.0	1.0	1.0	1
5	MARS	1.5	0.5	1.9	1
6	PLANETOIDEN	3	--	5	--
7	JUPITER	5.2	11	12	0.4
8	SATURNUS	9.5	9	29	0.5
9	URANUS	19	4	84	0.7
10	NEPTUNUS	30	4	165	0.7
11	PLUTO (kuipergordel)	39	0.2	248	6
12	KOMETEN (oortwolk)	--	--	--	--

Mercurius-Venus-Aarde-Mars



MERCURIUS



VENUS

VENUS

Afst.zon:0,7

Diam.:0,9

Rotatie:243d

Omloop:224d

Temp.:450.c

Druk: 90 atm.





MARS

Afst.zon :1,5

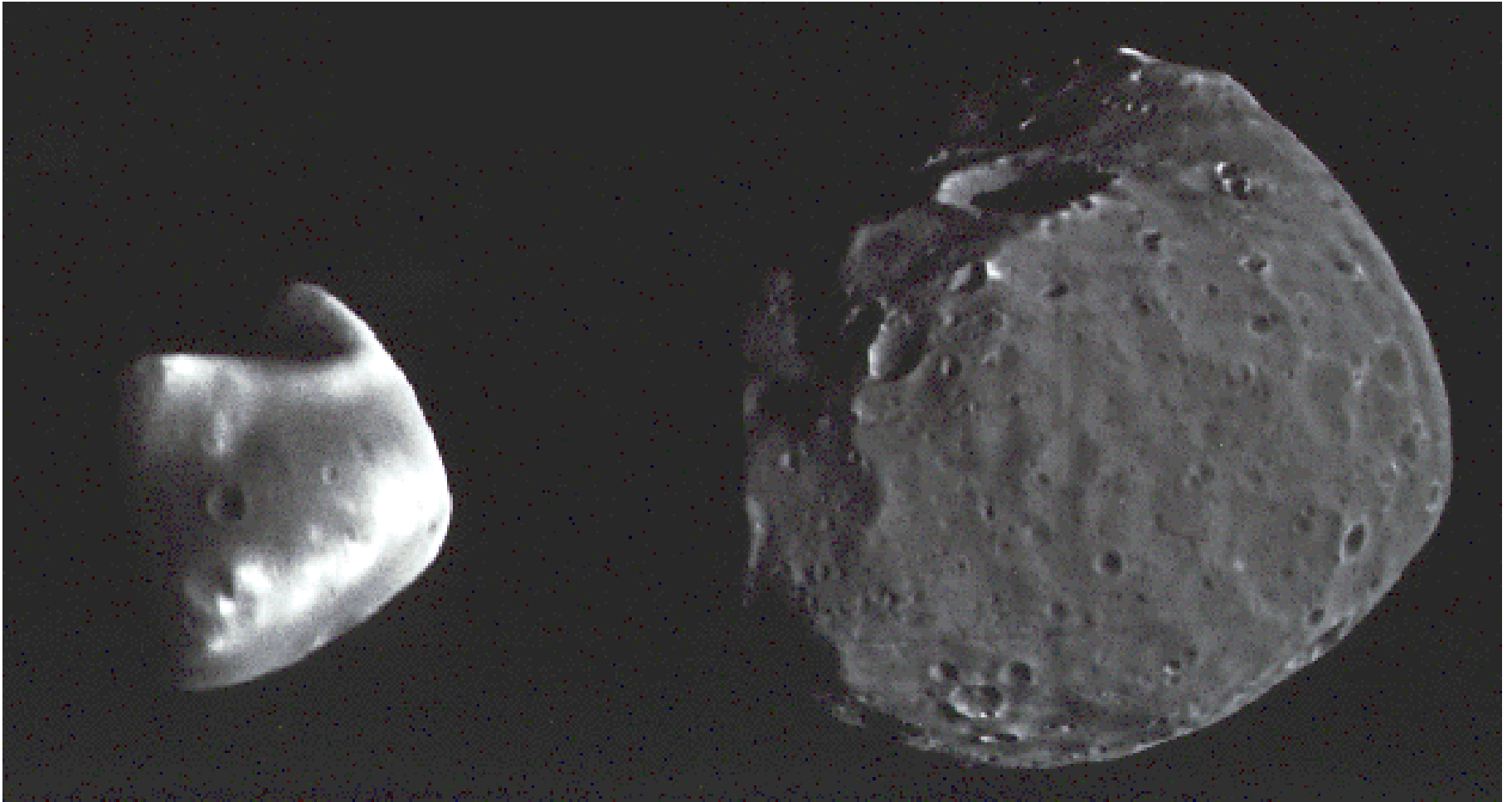
Diam.0,5 aarde

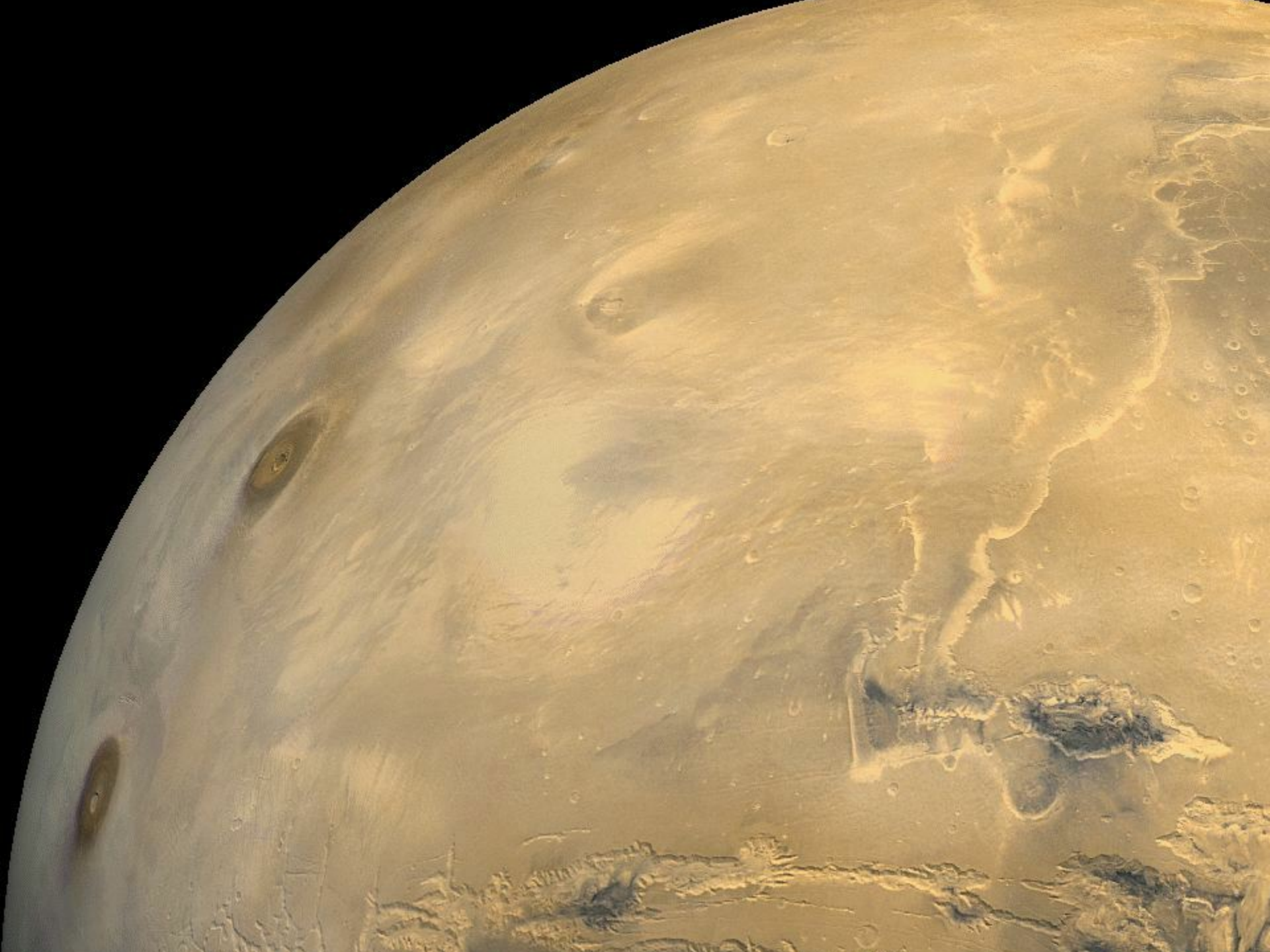
Oml.1,9 jr.

Rotat. 1

Temp.-140/+20

PHOBOS EN DEIMOS

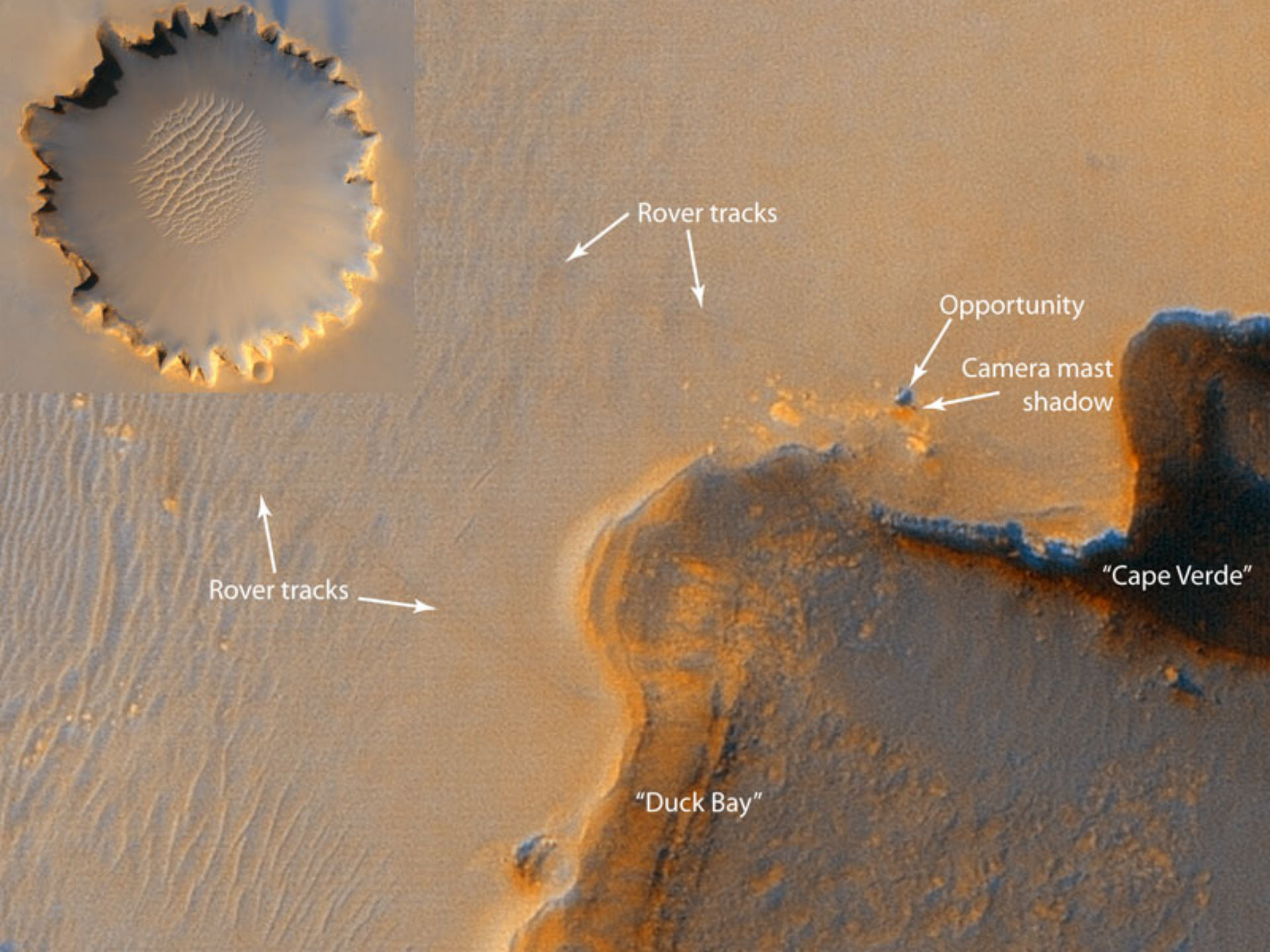






opportunity





Rover tracks

Opportunity

Camera mast shadow

Rover tracks

"Cape Verde"

"Duck Bay"

spirit



JUPITER

» 60X DE
AARDE

Za. 5,2

Diam. 11x aarde

Omloop 12 jr

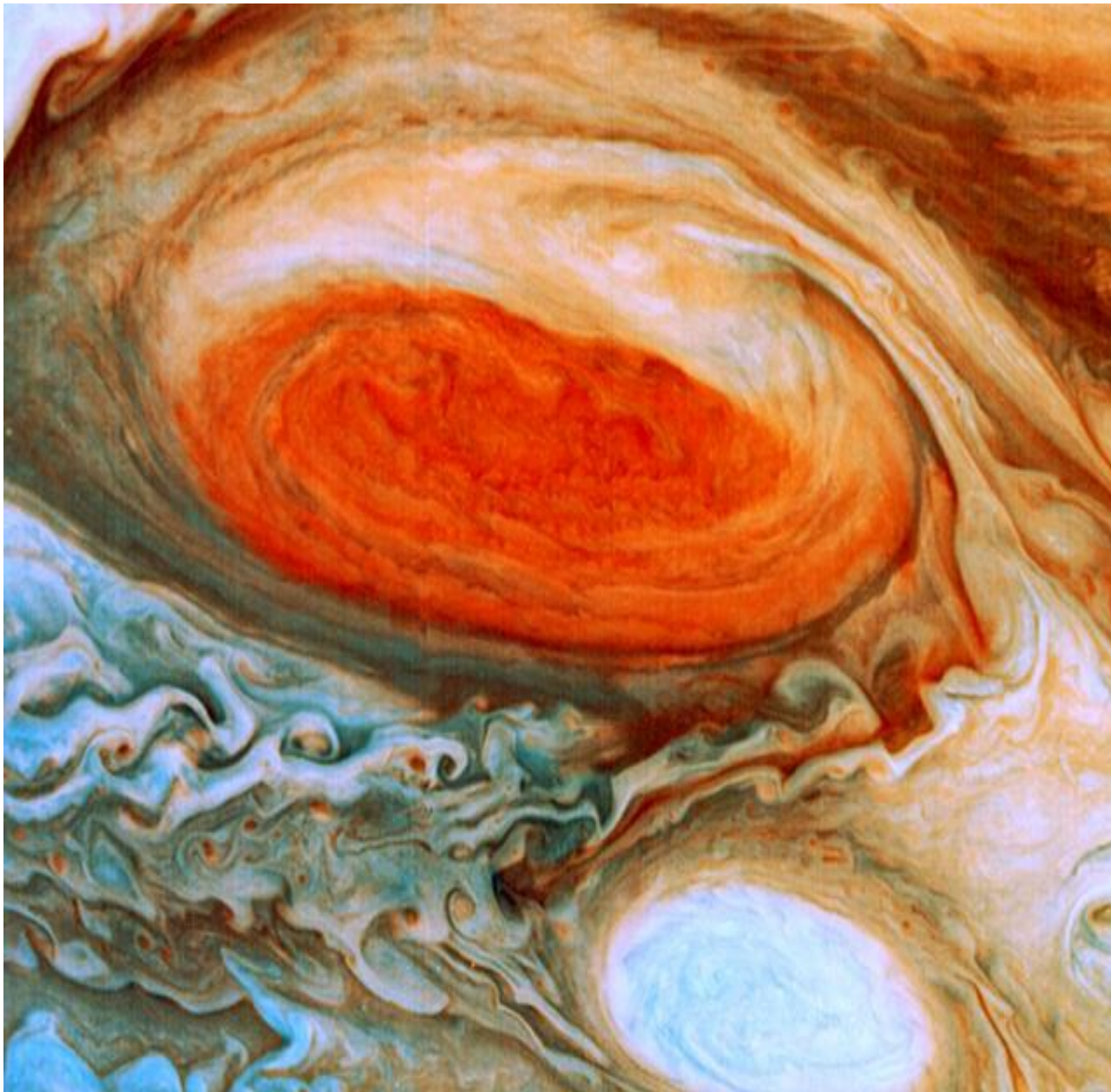
Rotatie 0,4

manen o.a.: Io (vulkanen)

Europa (ijs)

Calisto

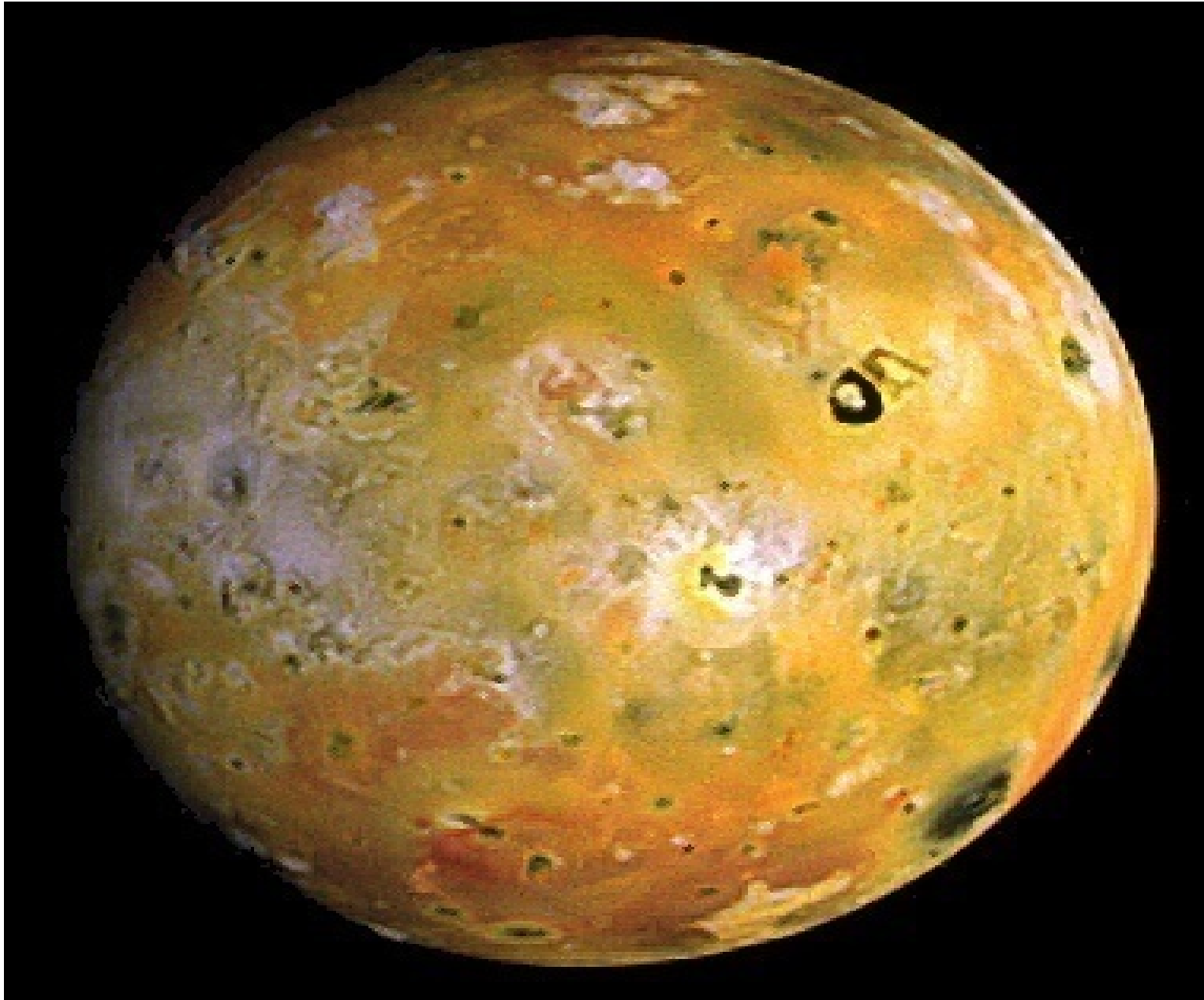
Ganymedes

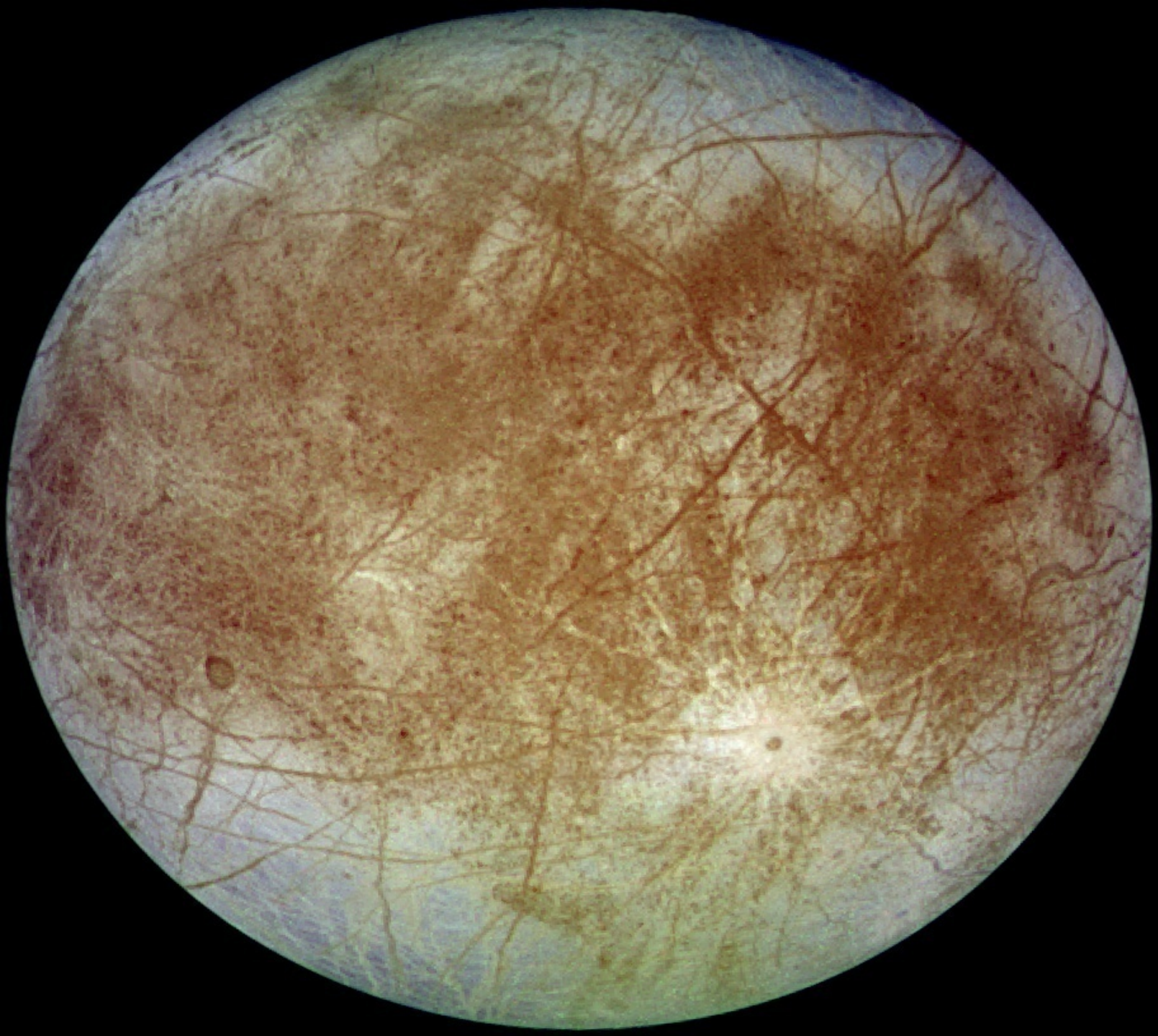


DE RODE
VLEK
3X ONZE
AARDE
300JAAR
STORM

IO met vulkanen

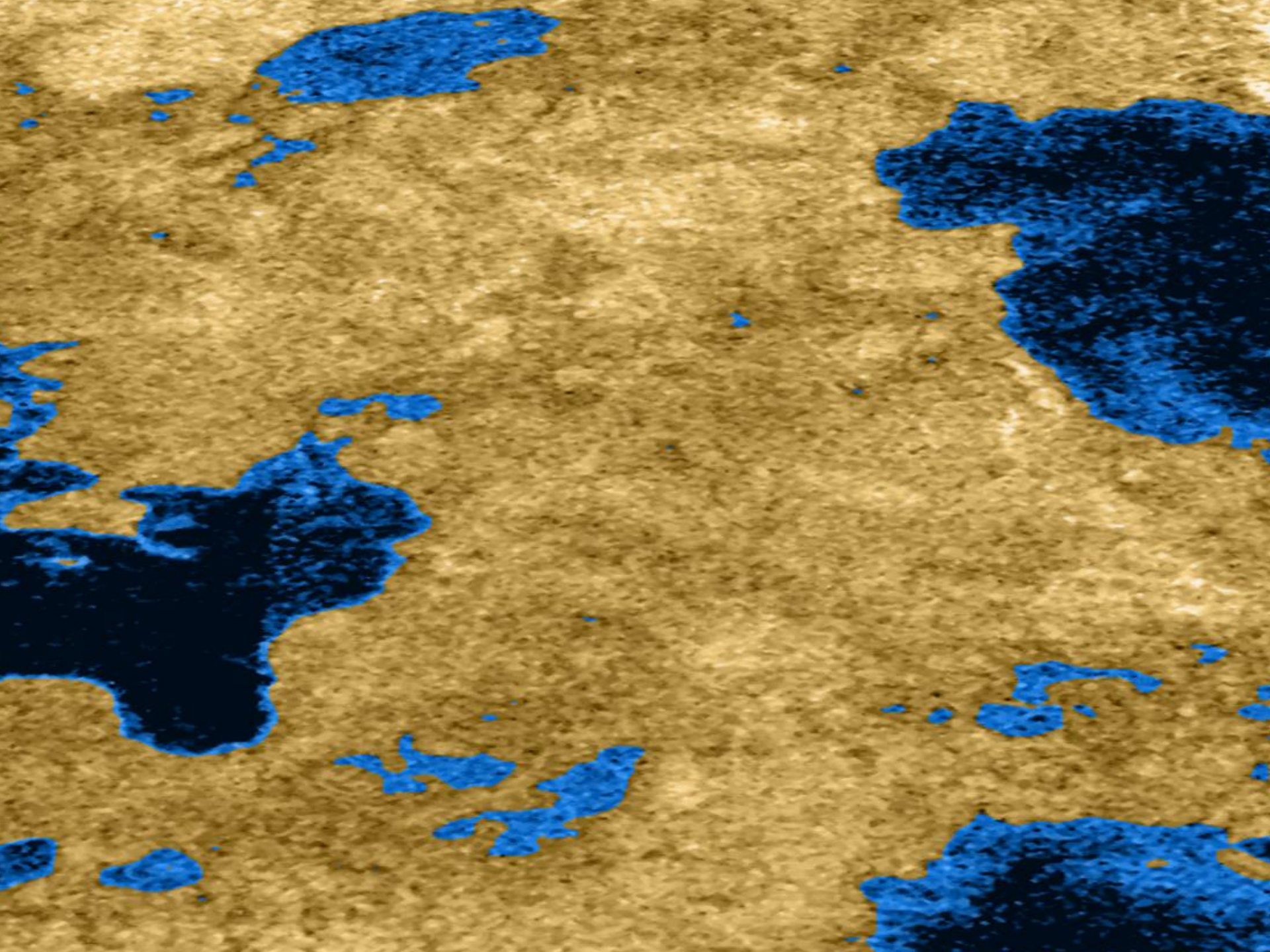
- Diameter 3600km





ijsmaan
europa
diam.
3100km

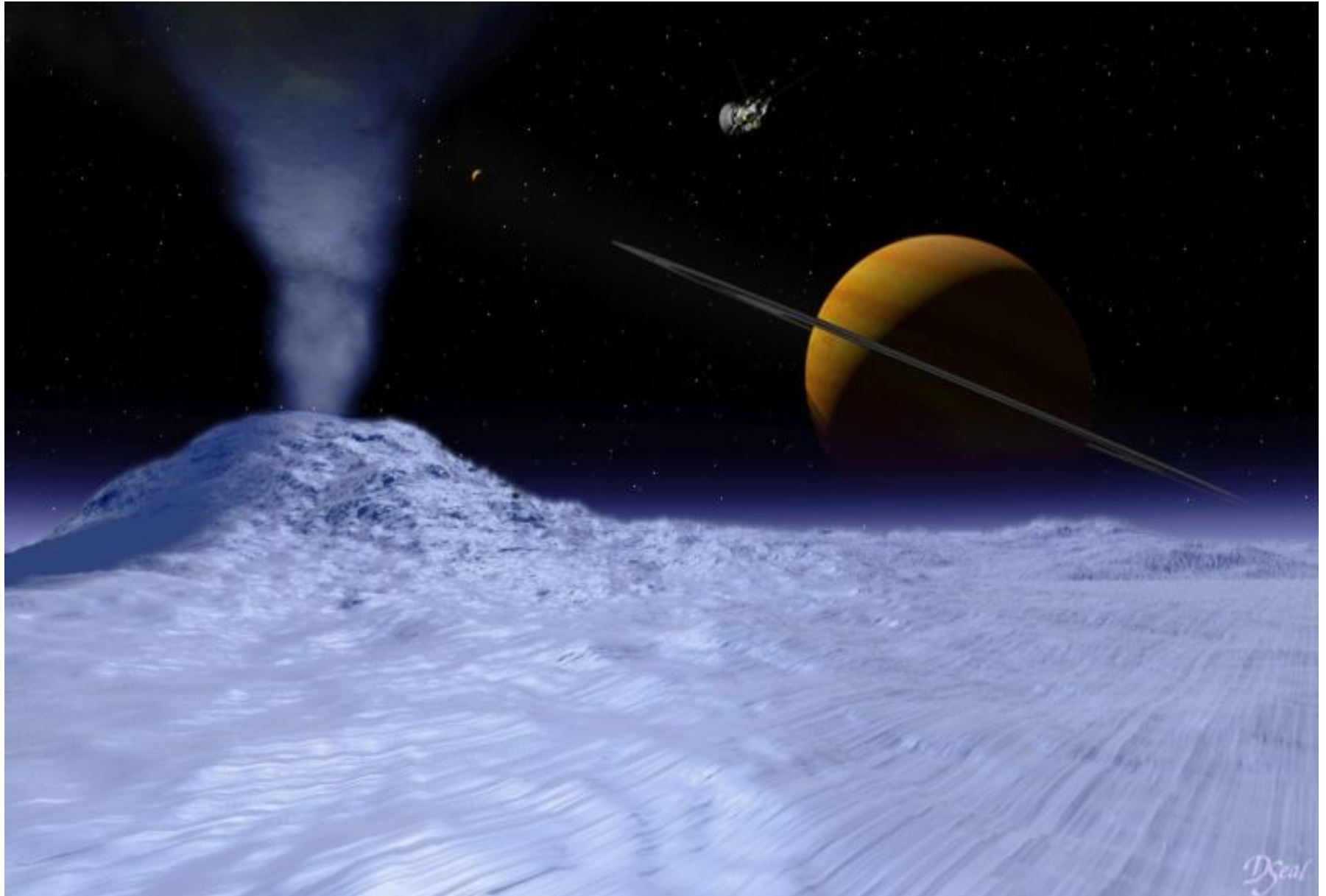
M



- Titan 1/7 g
- 1,5atm -190 C



Enceladus met waterfontijn



URANUS

NEPTUNUS

PLUTO EN CHARON

kuipergordel

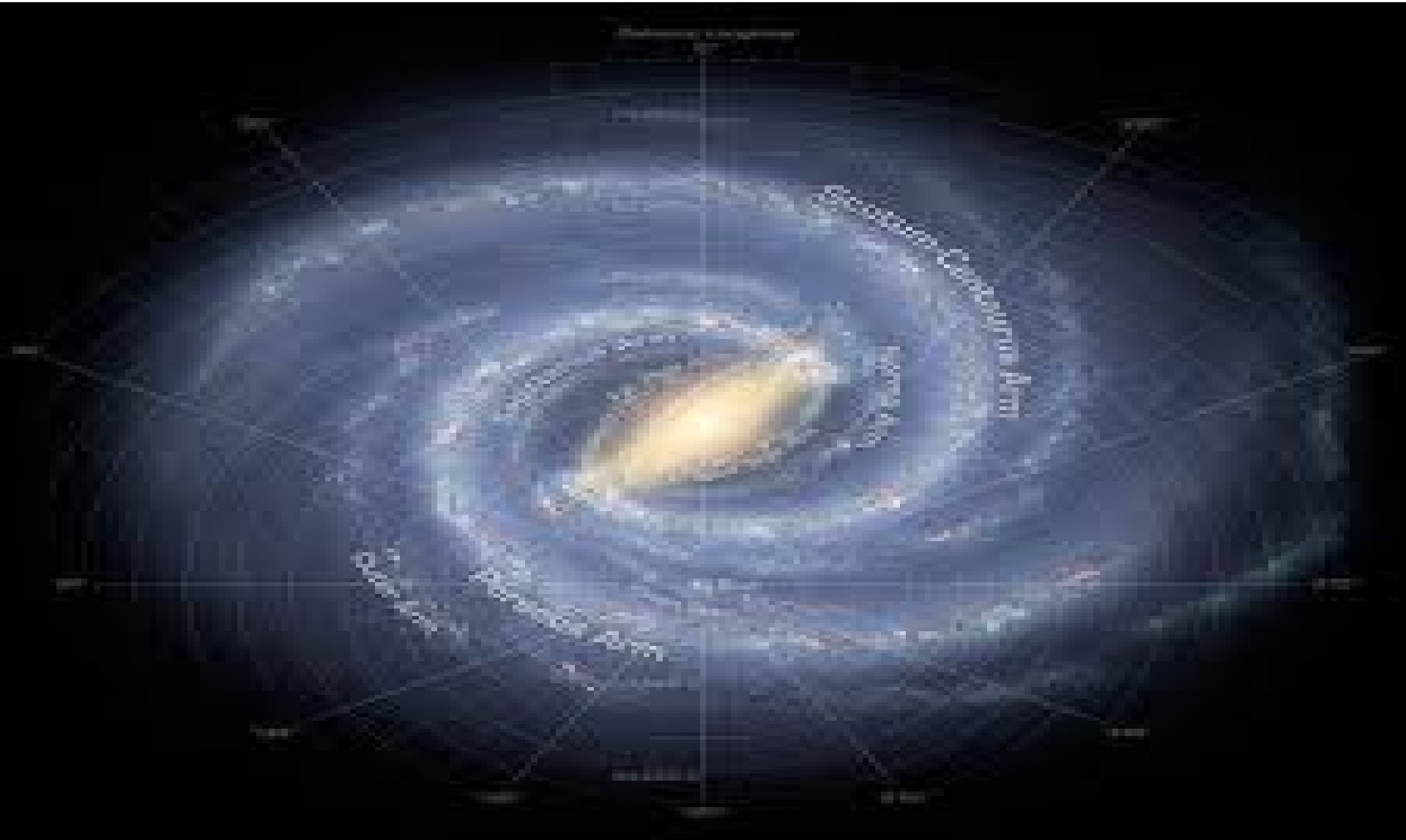


KOMEET KOHOUTEK

oortwolk



Onze melkweg



ANDROMEDA NEVEL



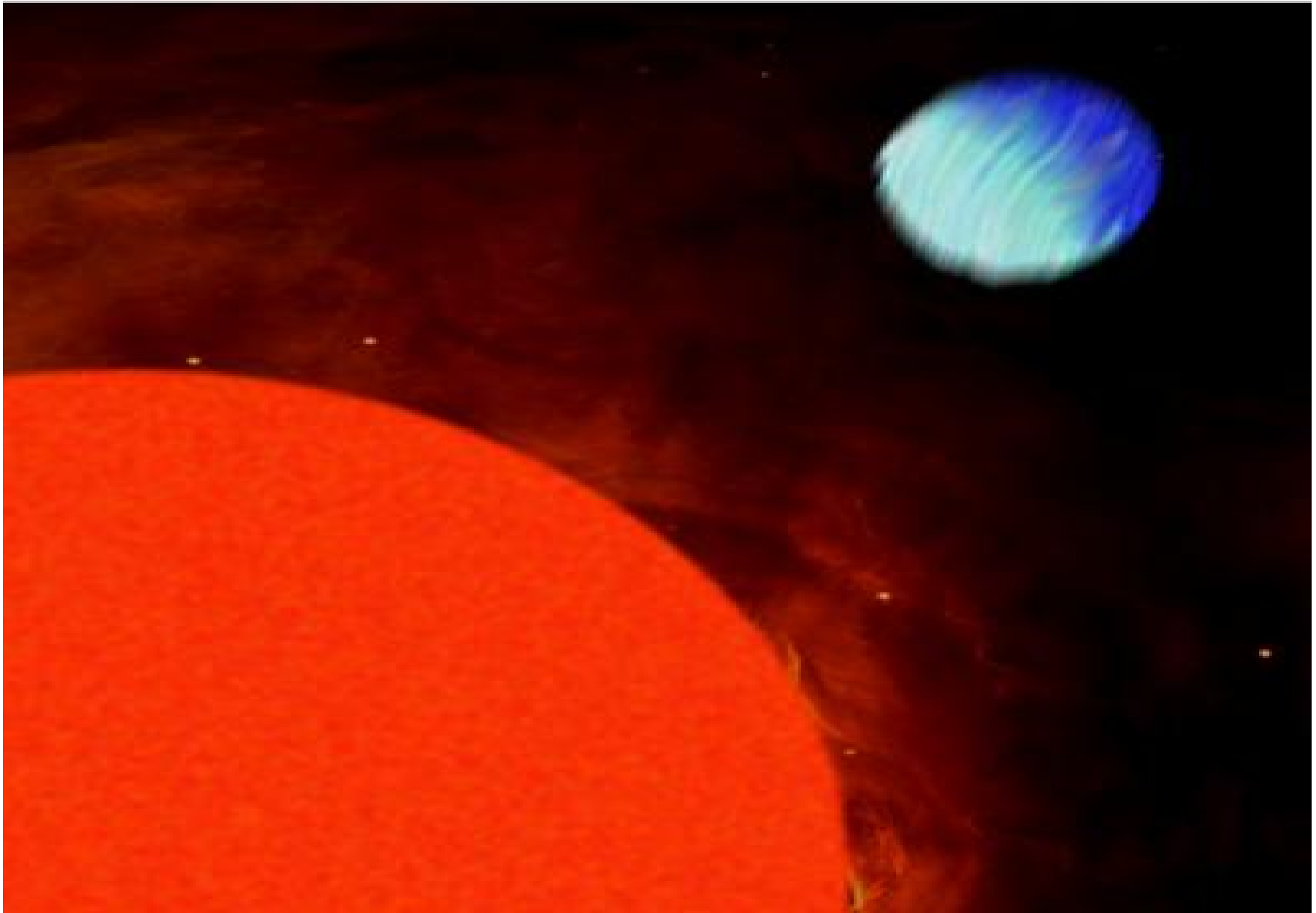
EEN BOTSING

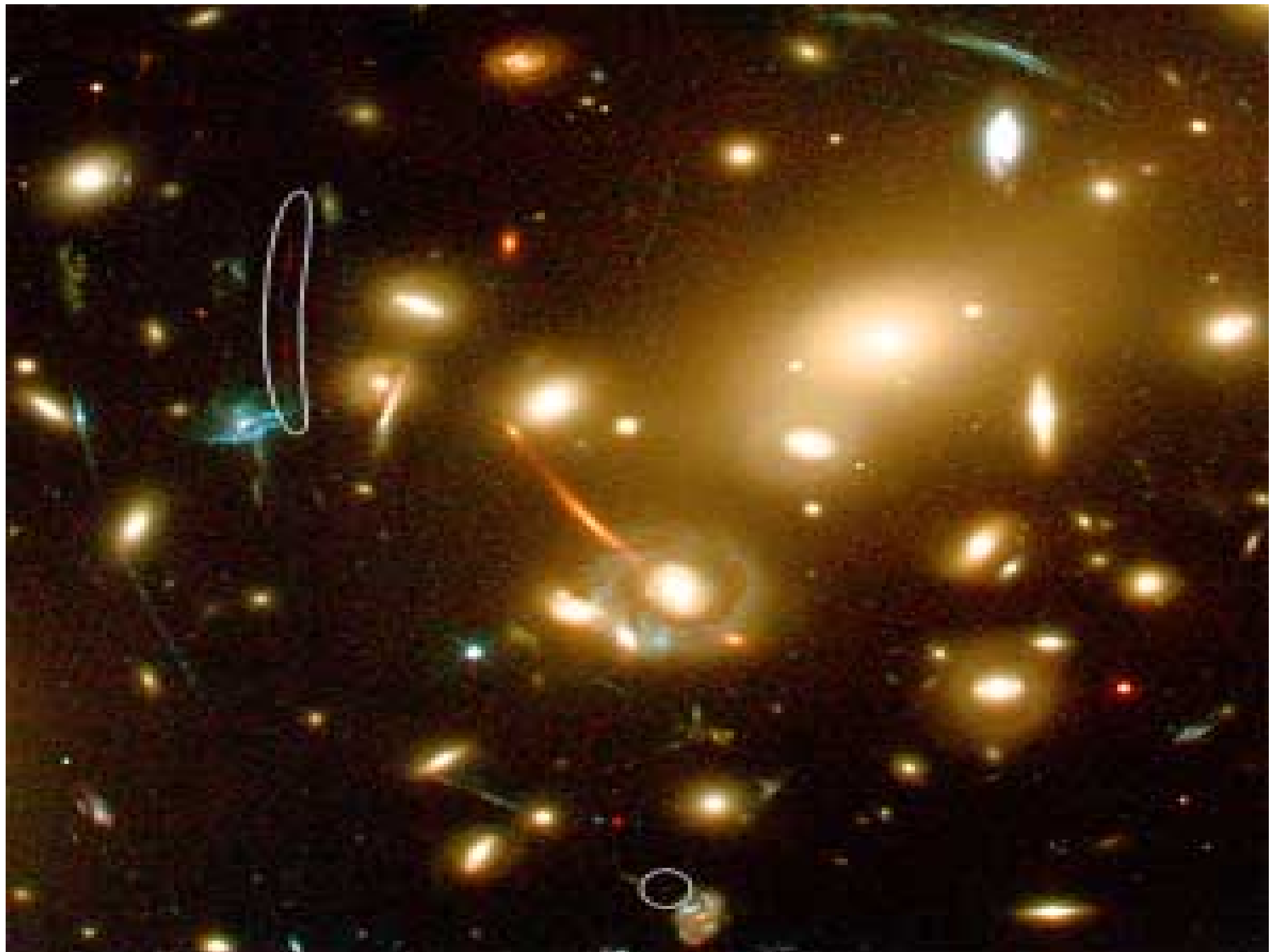




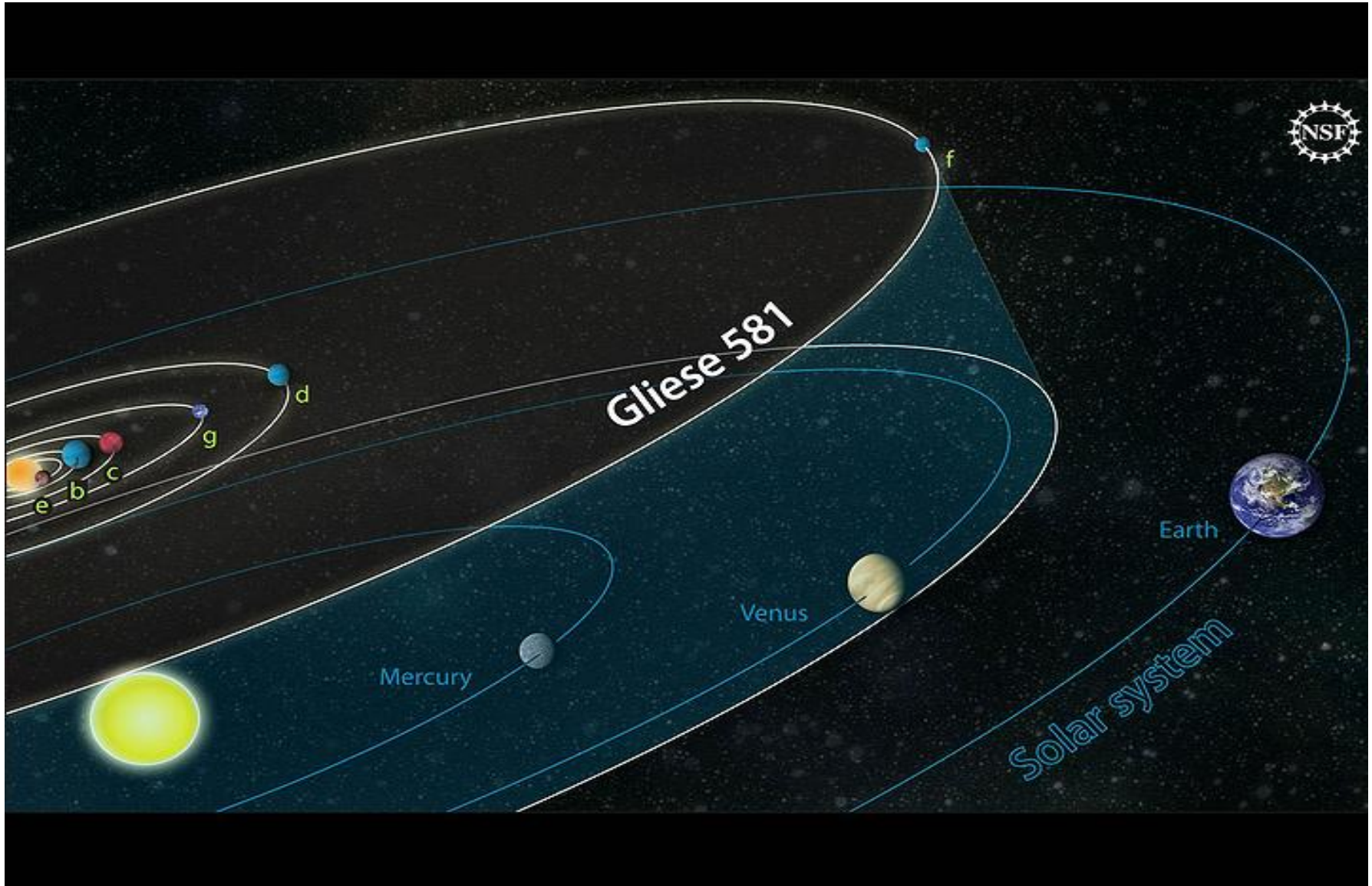
Fig. 10.10
June 8, 1994 - 8:30am EDT
Level 1000

exoplaneten





3-4x zwaarder dan de
aarde;jaar=37dgn;geen draaing



Ontdekte planeten door "Galilei"



"VIEW OF ALPHA CENTAURI"



Paardekopnevel (7000 lj)



DUBBELSTER



QUASAR



Een zwart gat

