Apol·lo 2009 ST19

Descobriment d'un asteroide extraordinari

Institut d'Estudis Catalans

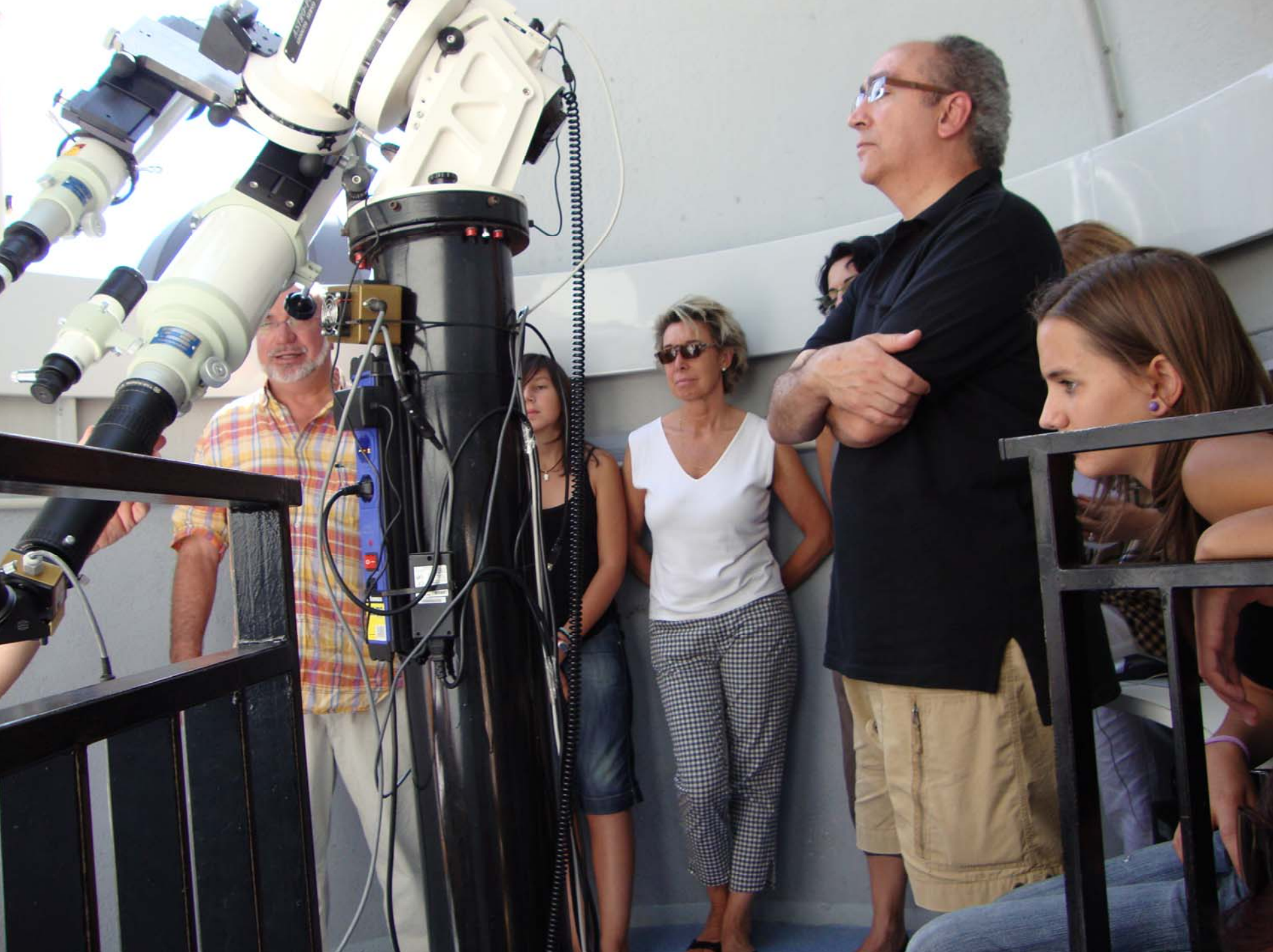
Barcelona, dia 4 de novembre de 2009

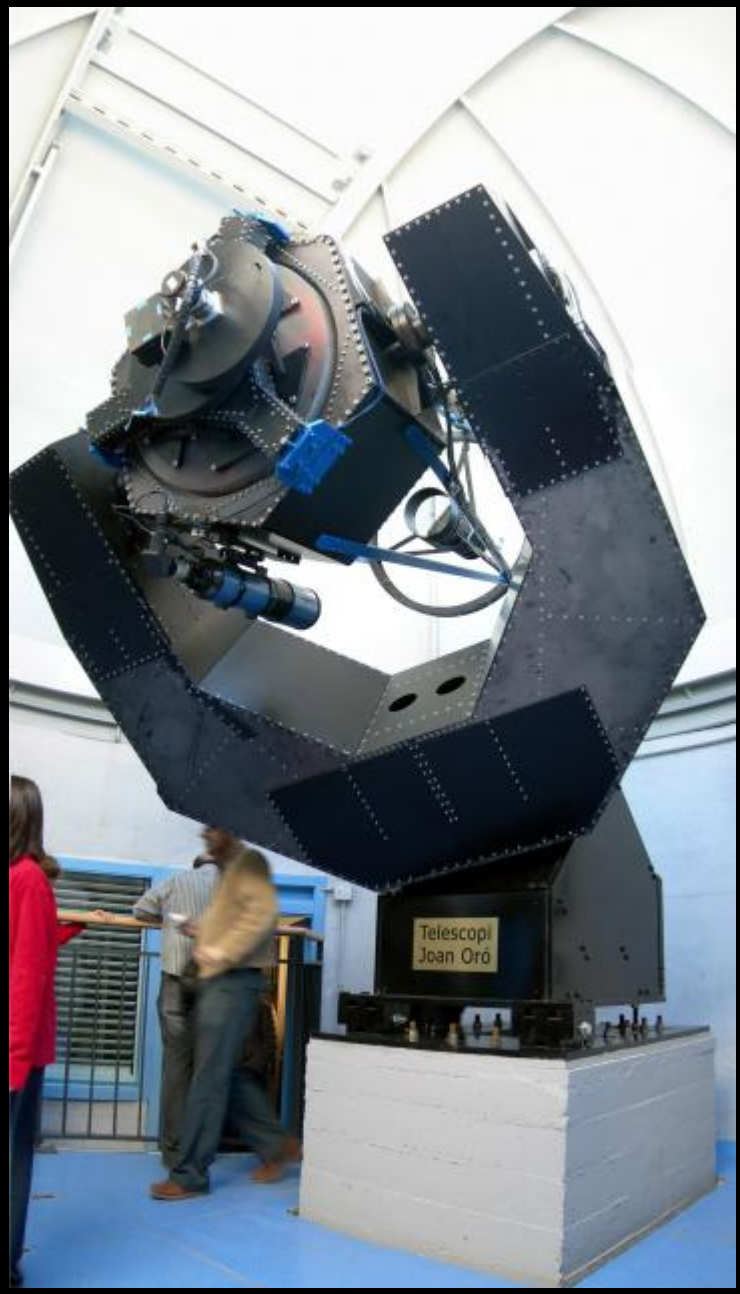
Josep M. Bosch

Professor del Camp d'Aprenentatge del Montsec

Observatori del Montsec

jbosch1@xtec.cat




Telescopi
Joan Oró


SANTA MARIA DE MONTMAGASTRELL

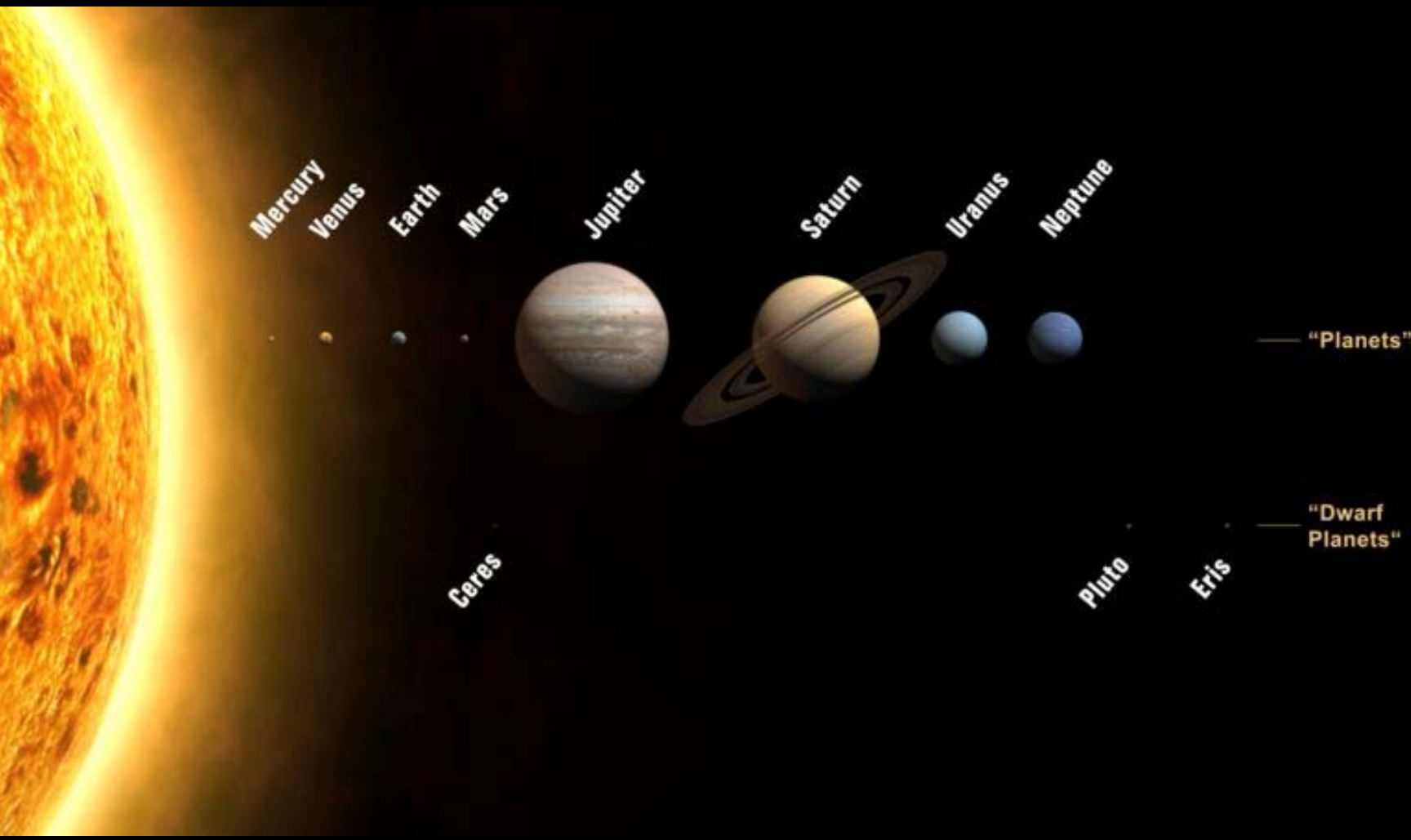
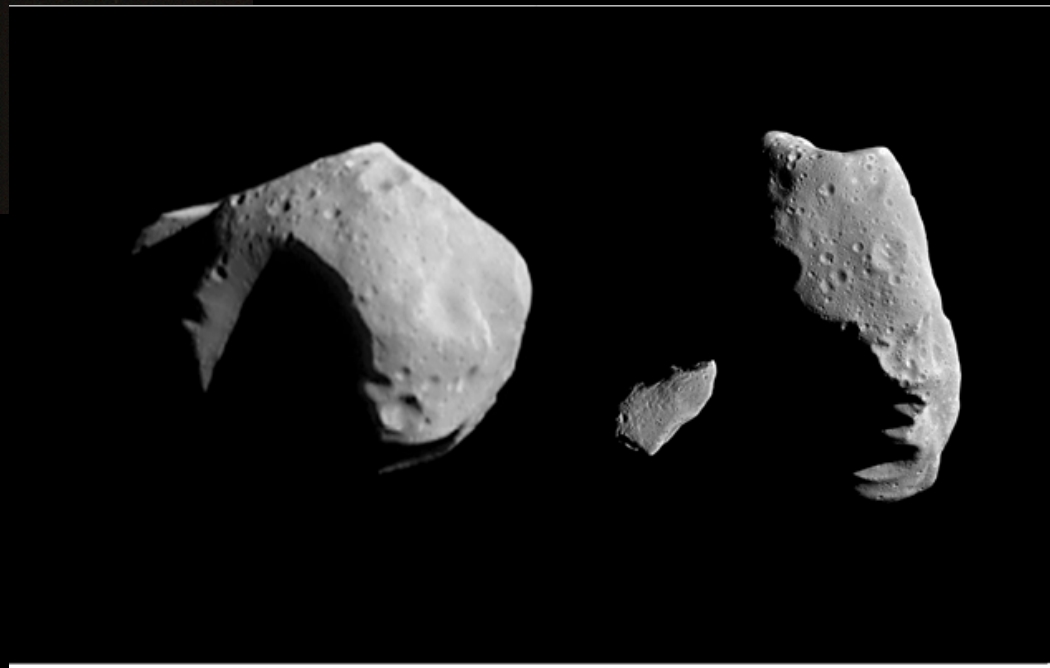

Mercury
Venus
Earth
Mars
Jupiter
Saturn
Uranus
Neptune
"Planets"
Ceres
Pluto
Eris
"Dwarf Planets"

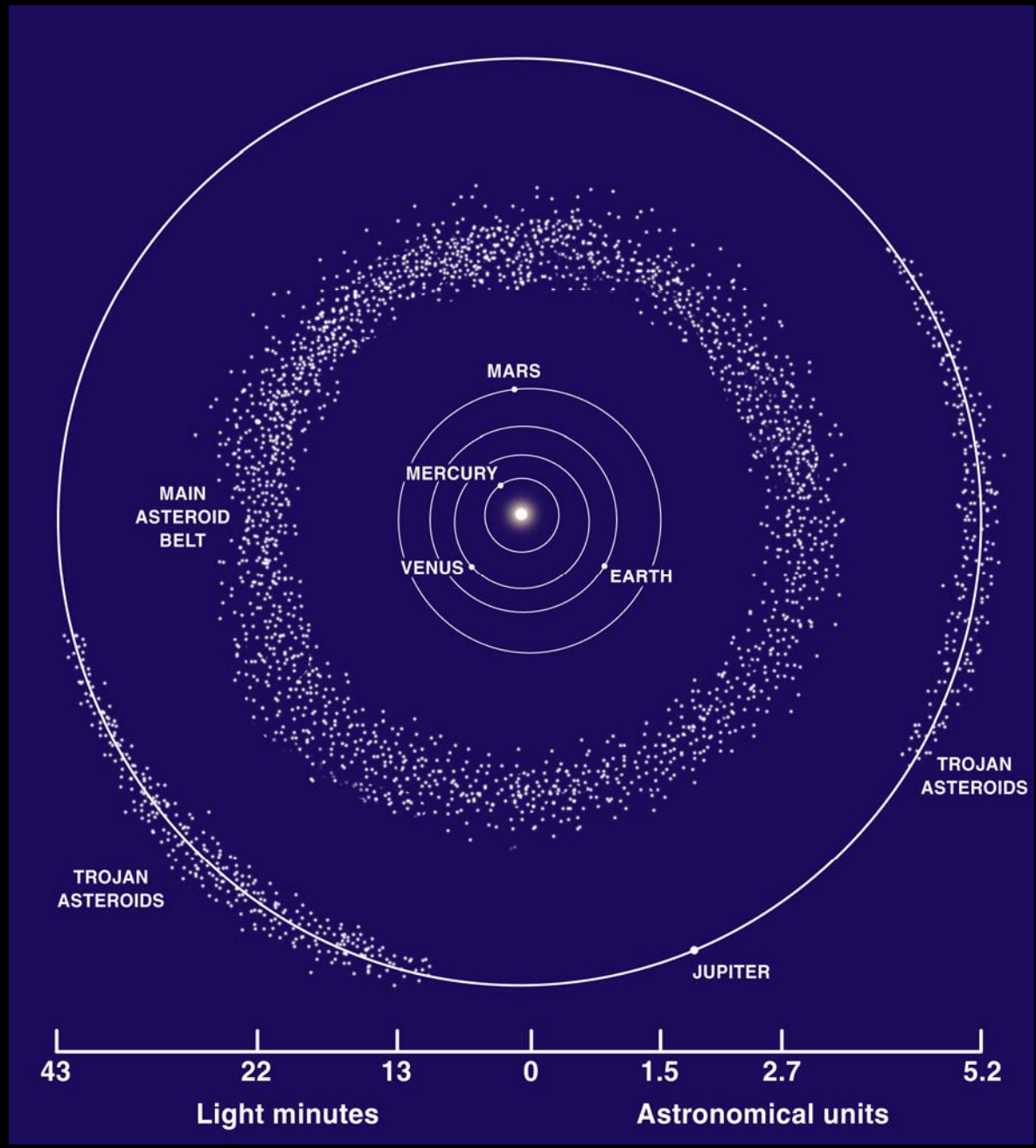

Image NASA
Image © 2007 TerraMetrics
©2007 Google™

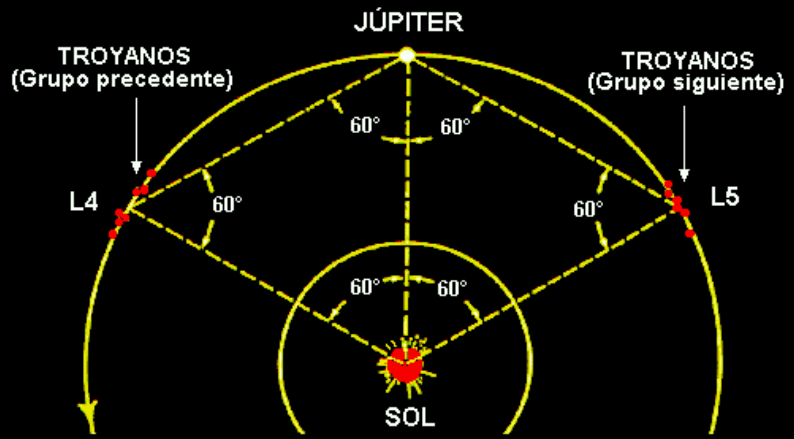


Mathilde Gaspra Ida


NEAR – 433 Eros
Sept 19 2000 00:30:00 –11° 142°

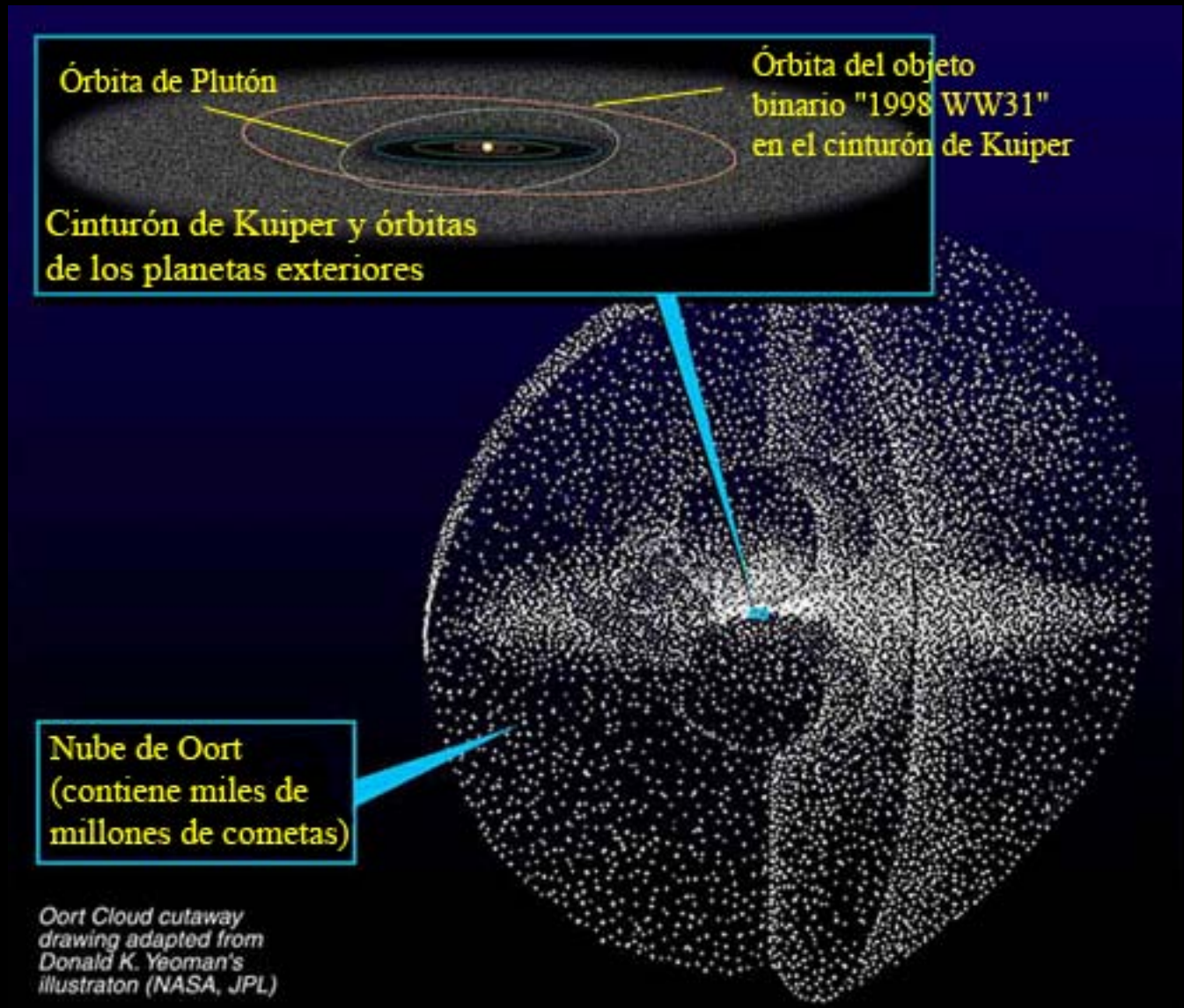
Sonda *Near* baixant sobre l'asteroide Eros

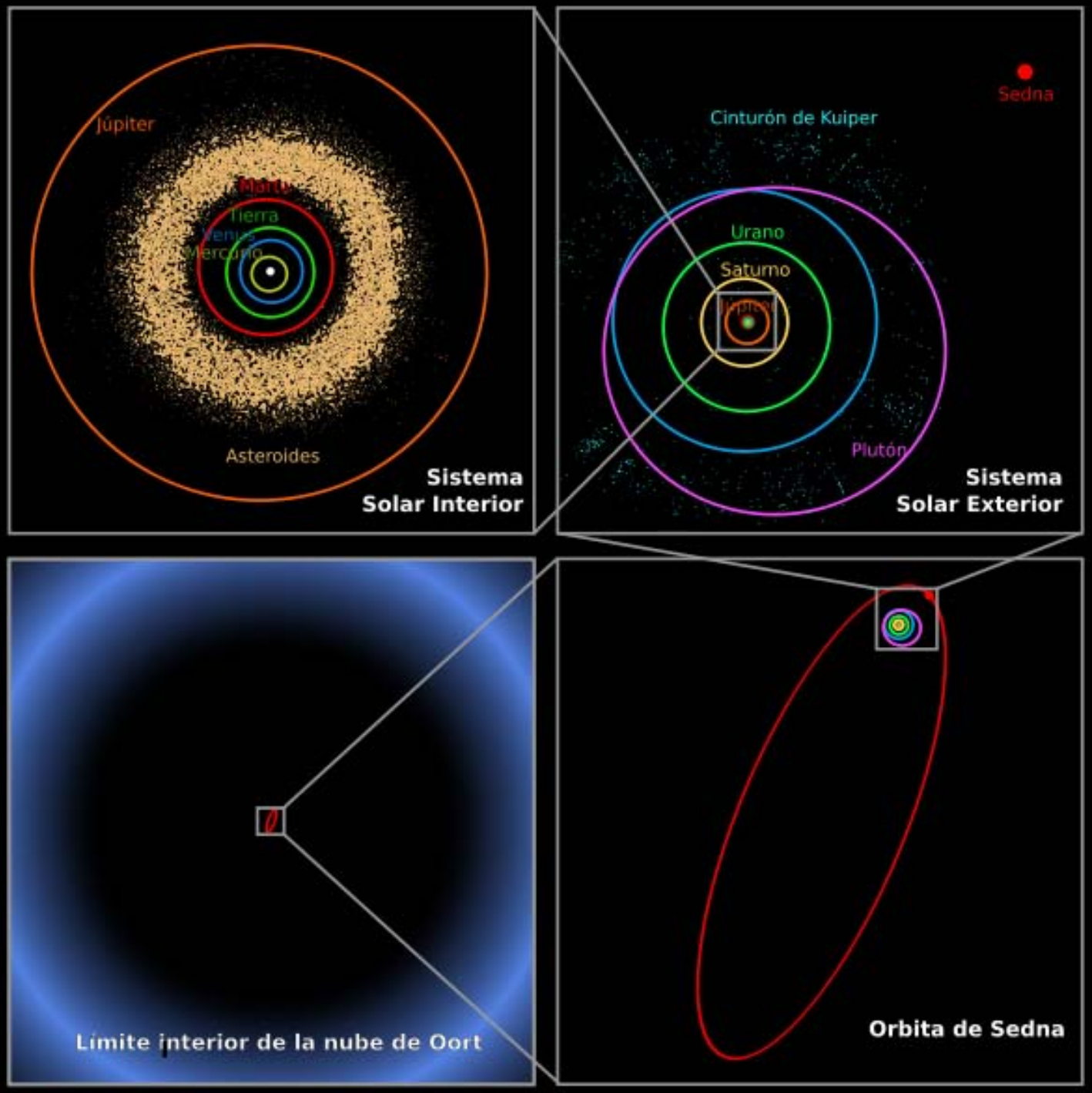

MARS
MERCURY
VENUS
EARTH
MAIN
ASTEROID
BELT
TROJAN
ASTEROIDS
TROJAN
ASTEROIDS
JUPITER
43
22
13
0
1.5
2.7
5.2
Light minutes
Astronomical units

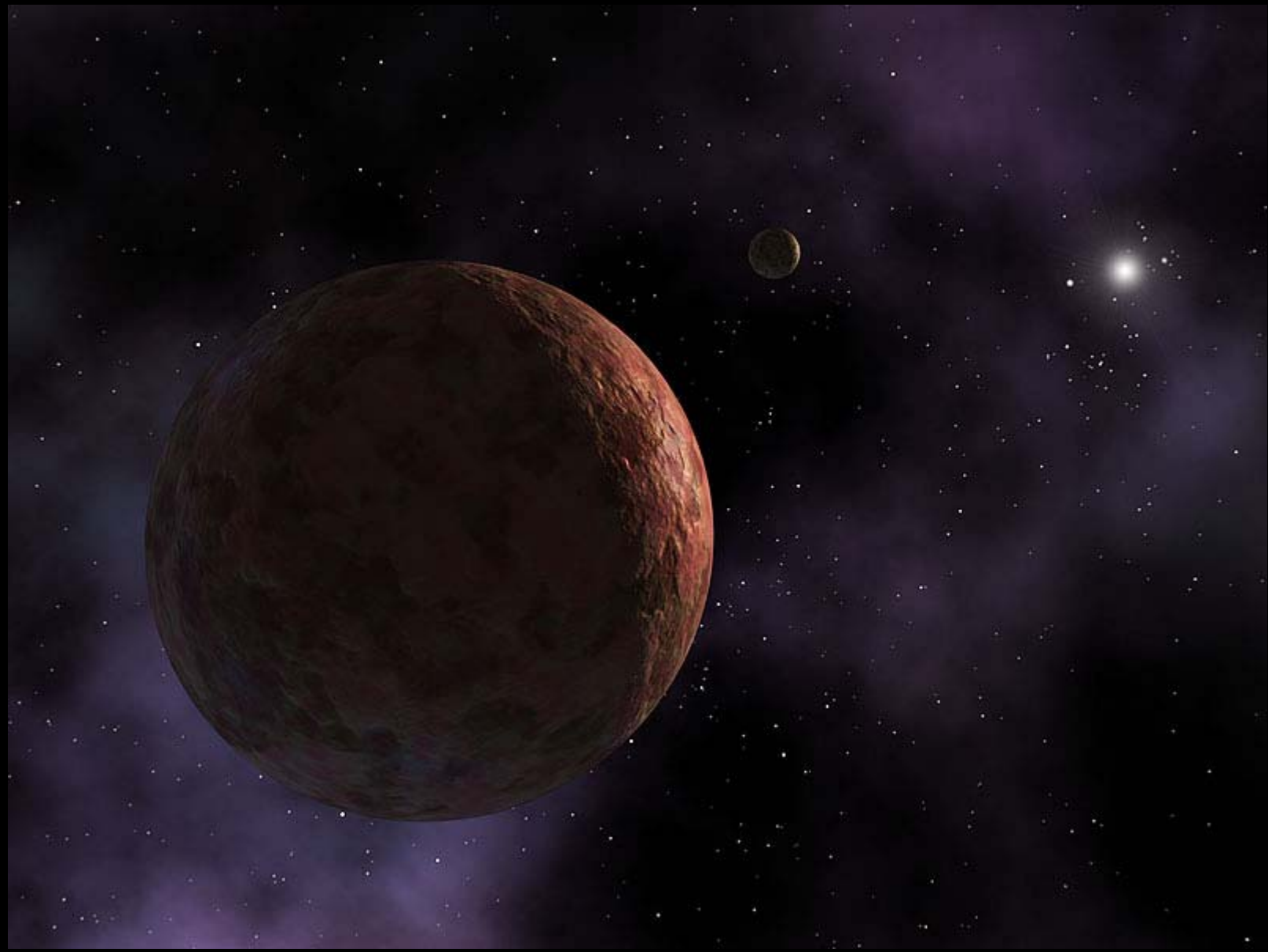

JÚPITER
TROYANOS
(Grupo precedente)
TROYANOS
(Grupo siguiente)
L4
L5
60°
60°
60°
60°
60°
60°
SOL

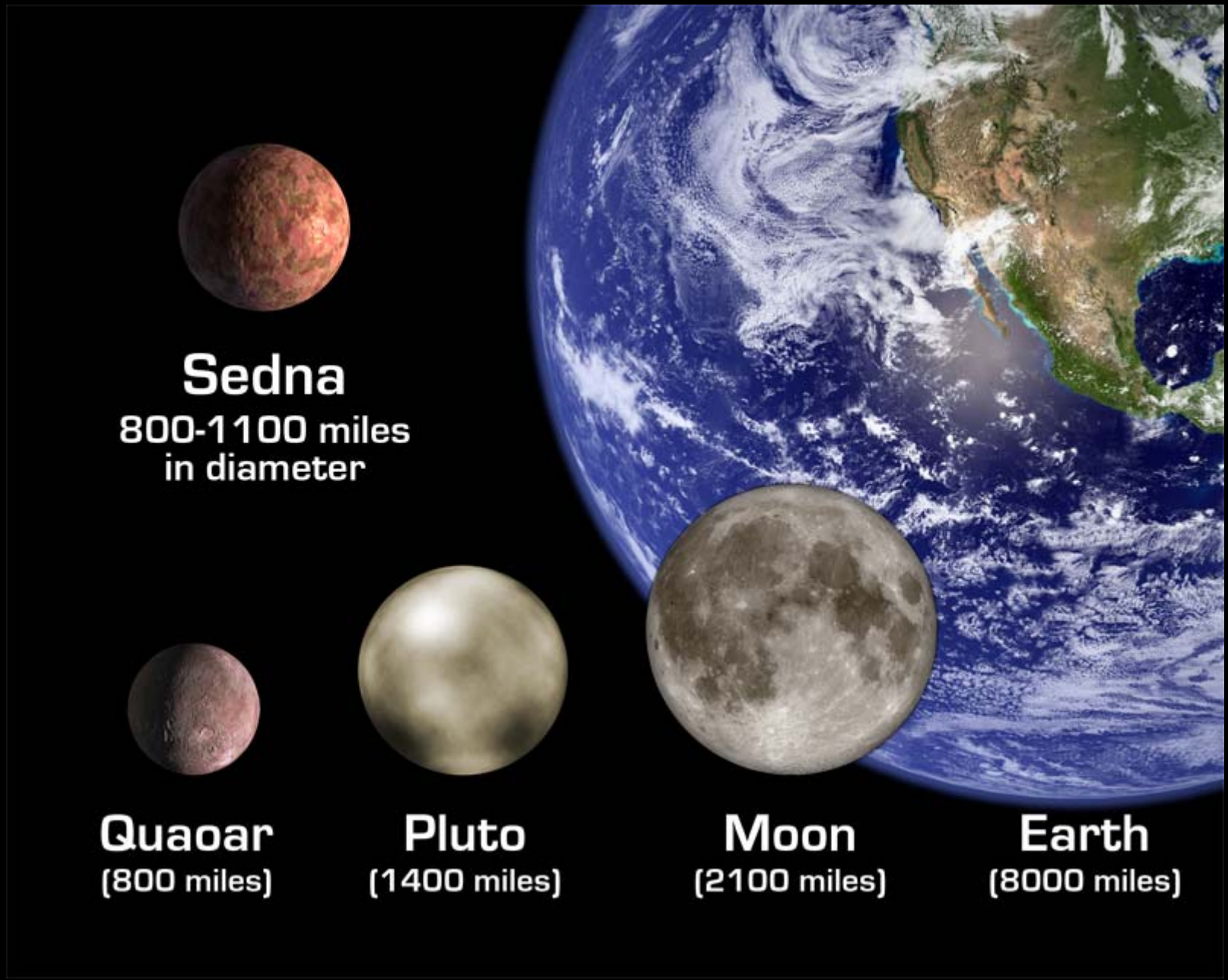

Amor
Apollo
Tierra
Aten
Sol

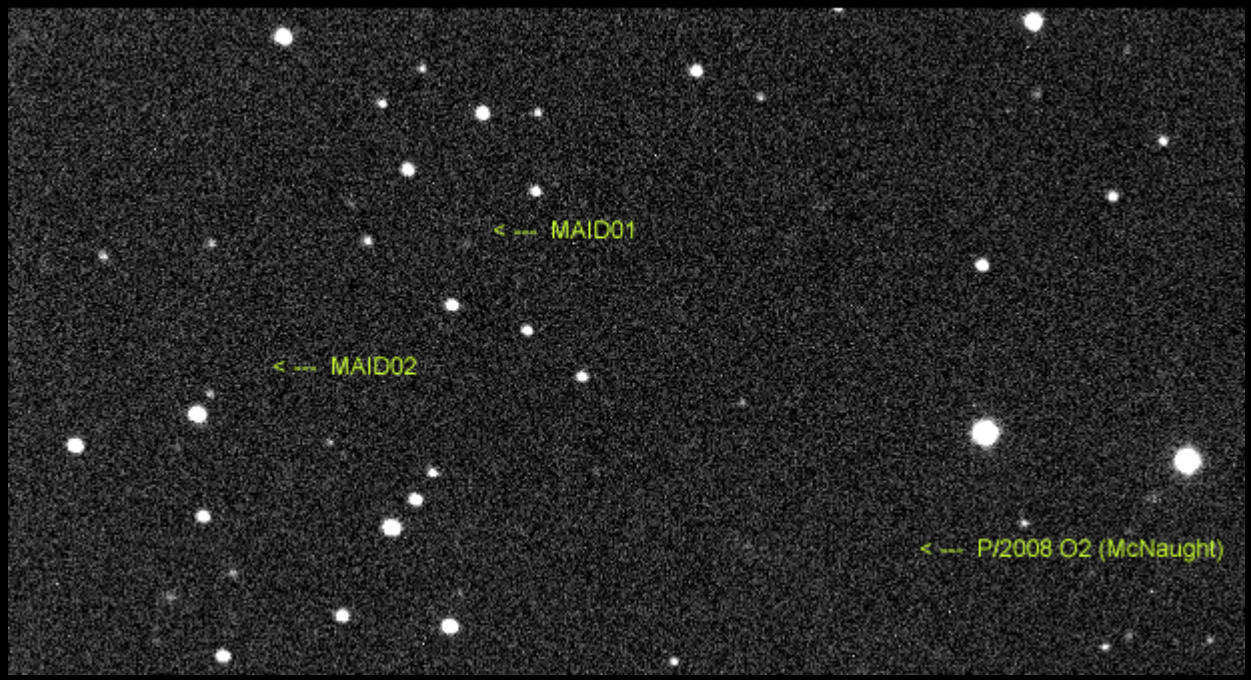

© 2000 Don Dixon / cosmographica.com


Órbita de Plutón
Órbita del objeto binario "1998 WW31" en el cinturón de Kuiper
Cinturón de Kuiper y órbitas de los planetas exteriores
Nube de Oort (contiene miles de millones de cometas)
Oort Cloud cutaway drawing adapted from Donald K. Yeoman's illustraton (NASA, JPL)


Júpiter
Marte
Tierra
Venus
Mercurio
Asteroides
Sistema
Solar Interior
Sedna
Cinturón de Kuiper
Urano
Saturno
Plutón
Sistema
Solar Exterior
Limite interior de la nube de Oort
Orbita de Sedna




Sedna
800-1100 miles
in diameter
Quaoar
(800 miles)
Pluto
(1400 miles)
Moon
(2100 miles)
Earth
(8000 miles)

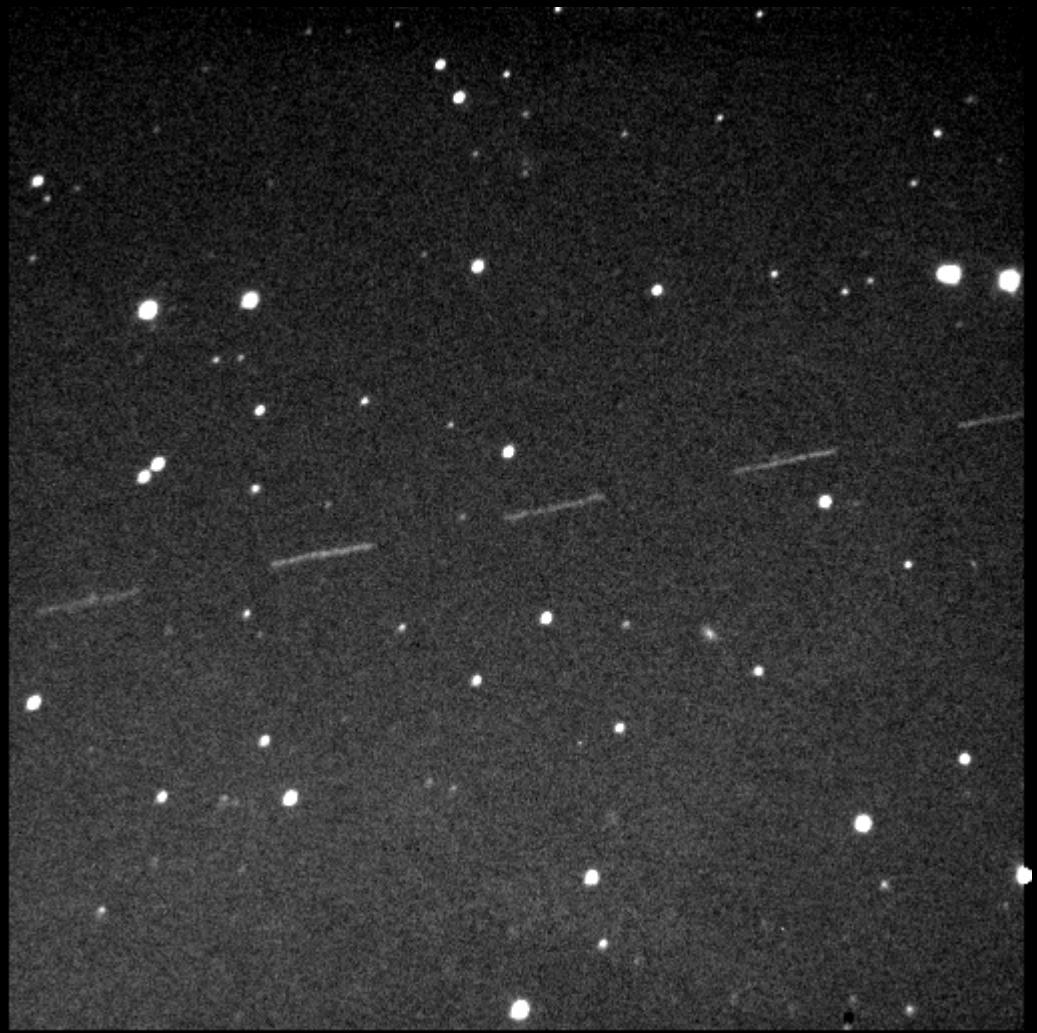

<--- MAID01
<--- MAID02
<--- P/2008 O2 (McNaught)

2008 TC3

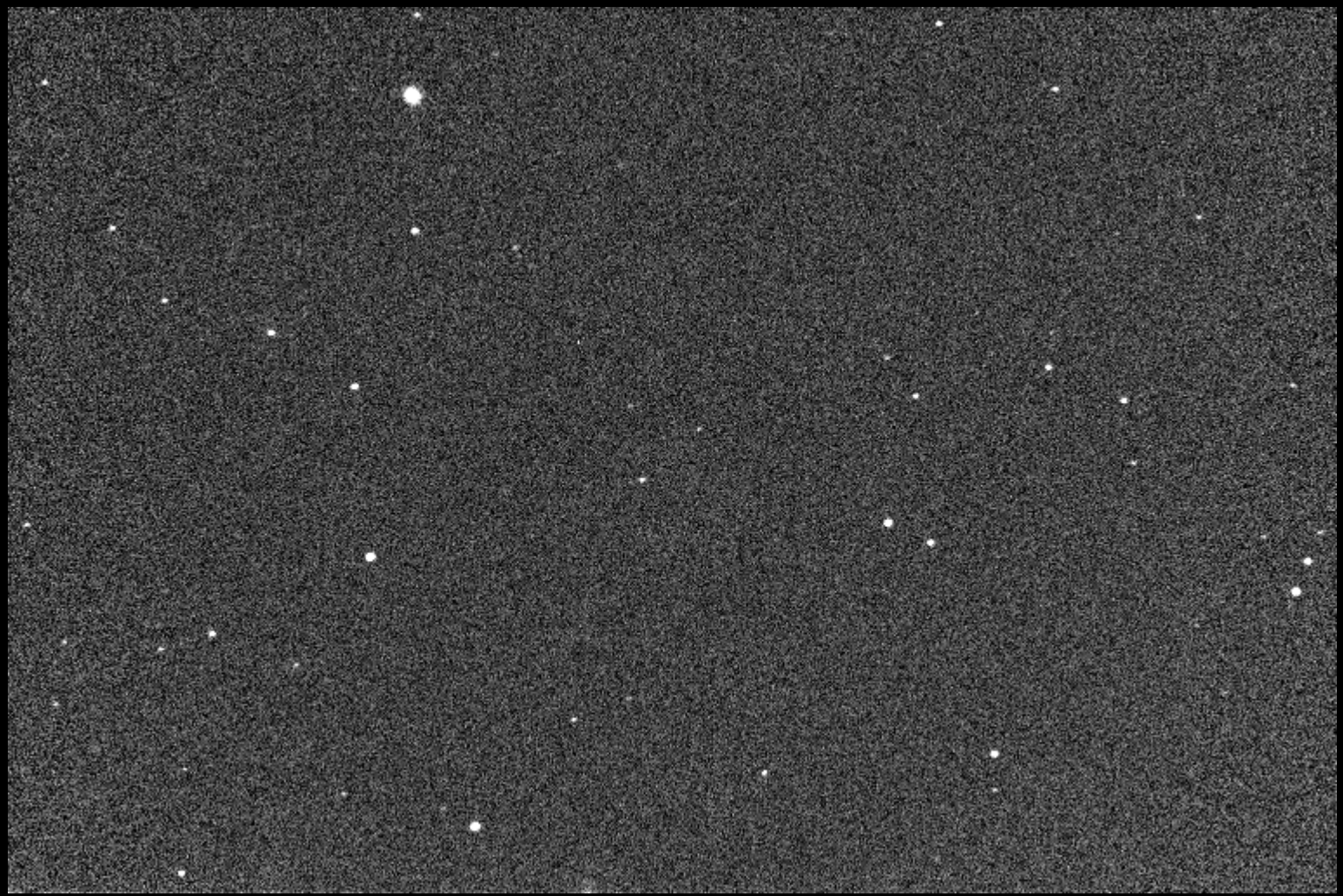
Dia 7 d'octubre de 2008 Hora 4,46 AM

2008 TC3

Dia 7 d'octubre de 2008



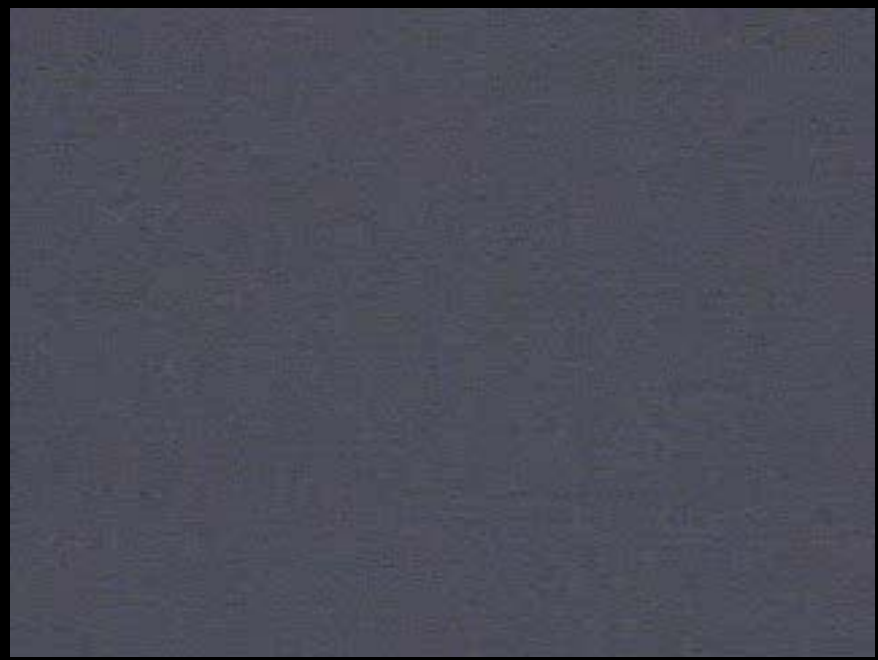
Asteroide 2008 TC3

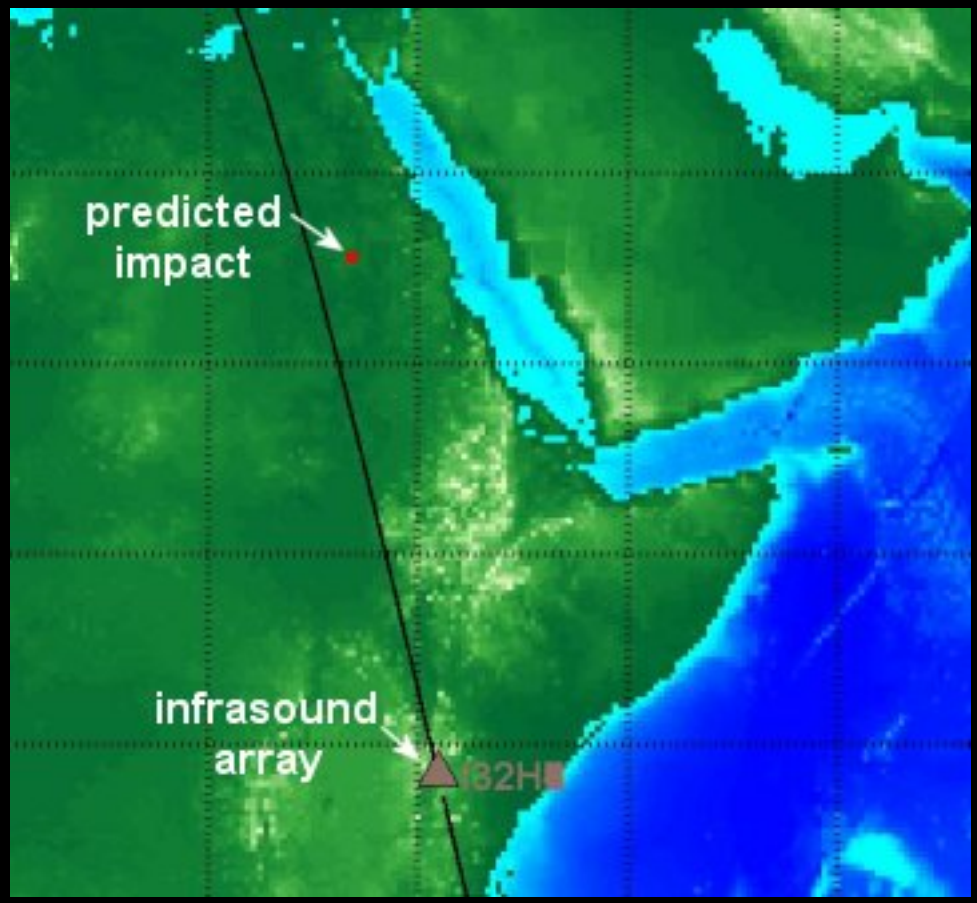


2008 TC3

Entrada a l'ombra de la Terra des de La Sagra (Granada)

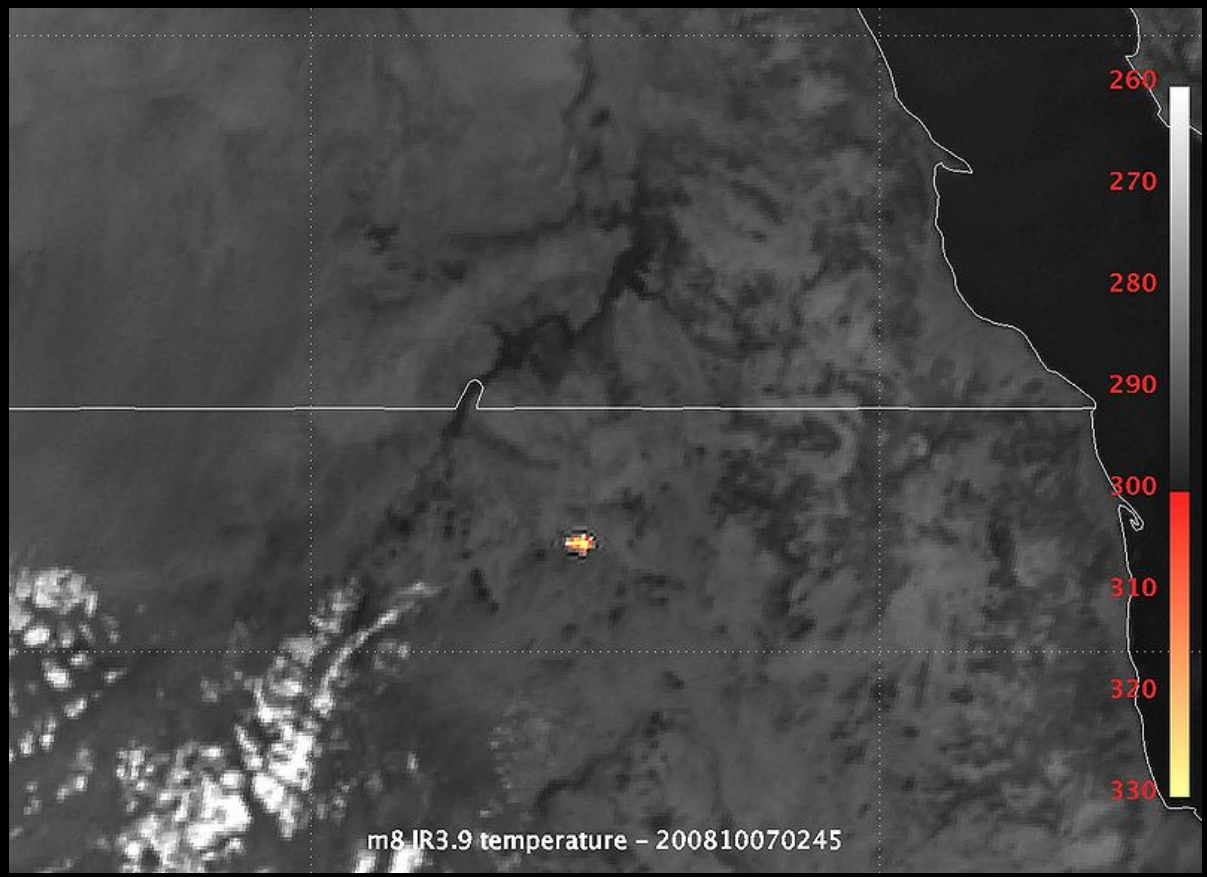
Entrada a l’atmosfera del 2008 TC3




predicted
impact
infrasound
array
I82H

Peter Jeniskens recuperant fragments del 2008 TC3

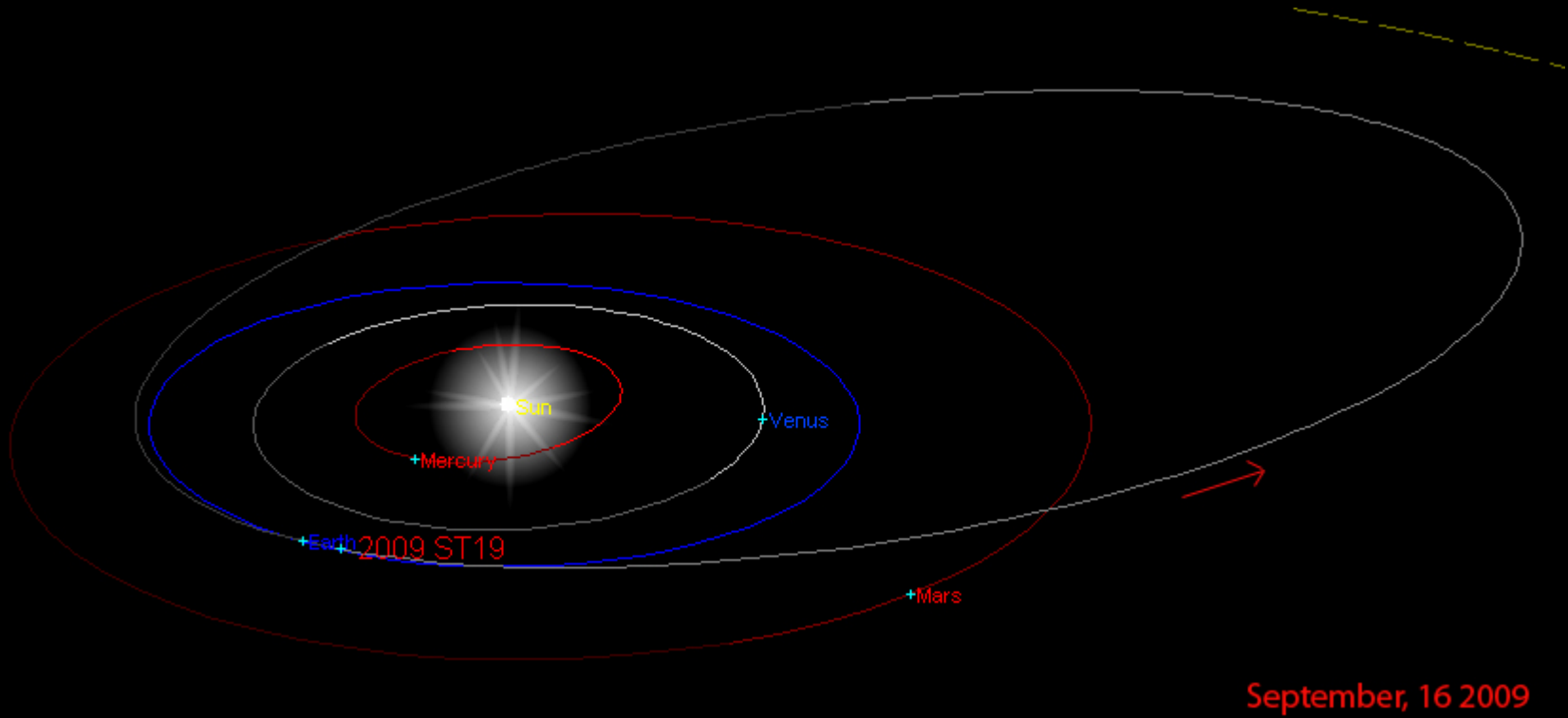
Vista de l’entrada del 2008 TC3 des el satèl·lit Eumesat



Asteroid 2008 TC3 approaching Earth
Entering atmosphere on 2008 Oct 7

[the Earth viewed from the asteroid]

by P. Tricarico
Planetary Science Institue
tricaric@psi.edu


Sun
Venus
Mercury
Earth
2009 ST19
Mars
September, 16 2009

Imatges descobriment 2009 ST19

From: RICHARD MILES

Yes, Special congratulations José María. This is a very special object. It breaks the record in terms of the closest pass by an object of this size, about 1 km across!

We currently know of no object larger than this to have come closer than this object has recently. The next largest such object was the famous (69230) Hermes (H=17.5), which approached to 0.0050 AU of the Earth in 1937! Your PHA, 2009 ST19 will be visible during the next few weeks and so will be a good target for photometryI

(Gustavo - Please translate if necessary...!)

Richard Miles

Asteroids and Remote Planets Section

British Astronomical Association.

Your object got recovered by LINEAR. Nice job!

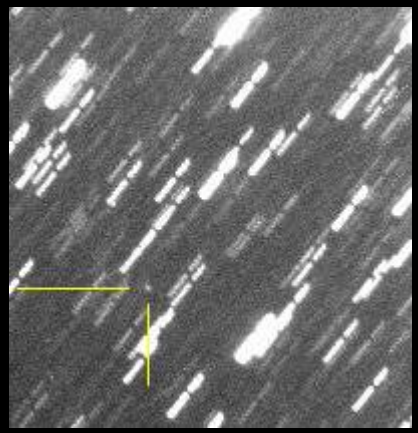
I just issued an MPEC for it:

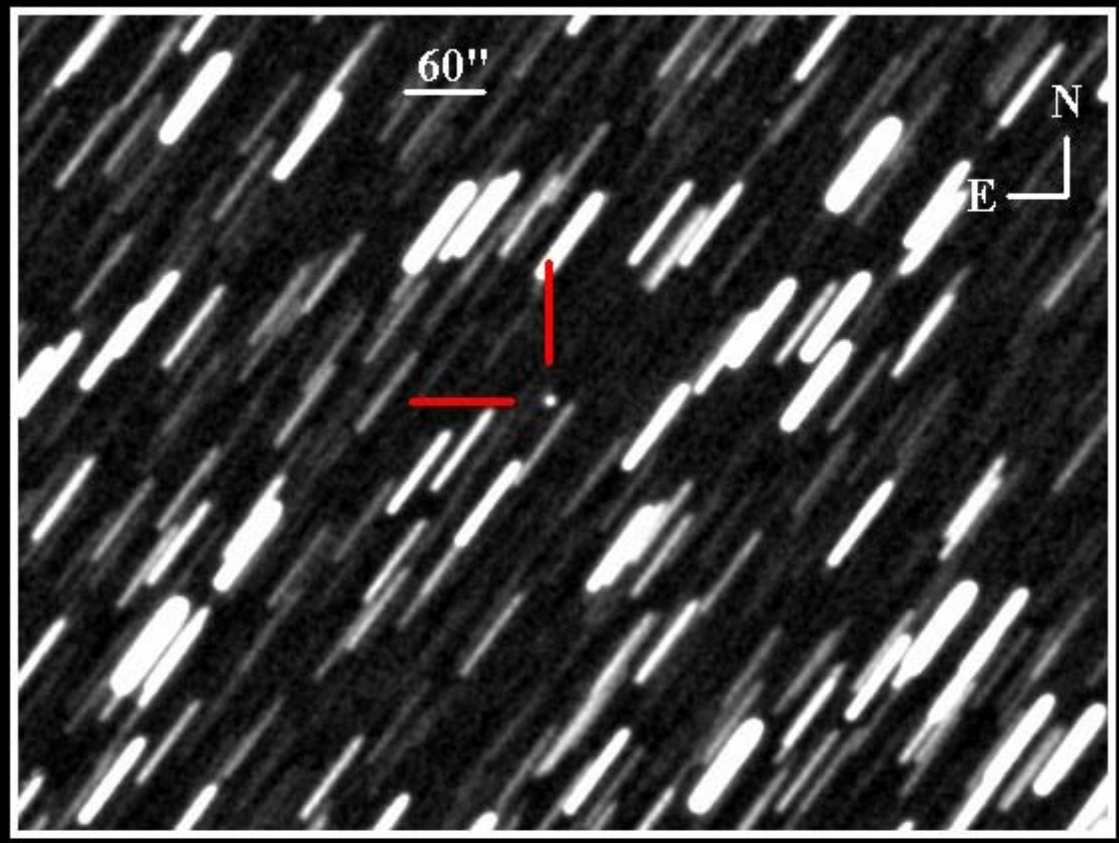
http://www.cfa.harvard.edu/mpec/K09/K09S72.html

It is rare to find an NEO like this!

I am off to make sure the discovery file has your name listed. Well done!

Tim Spahr Minor Planet Center, Harvard





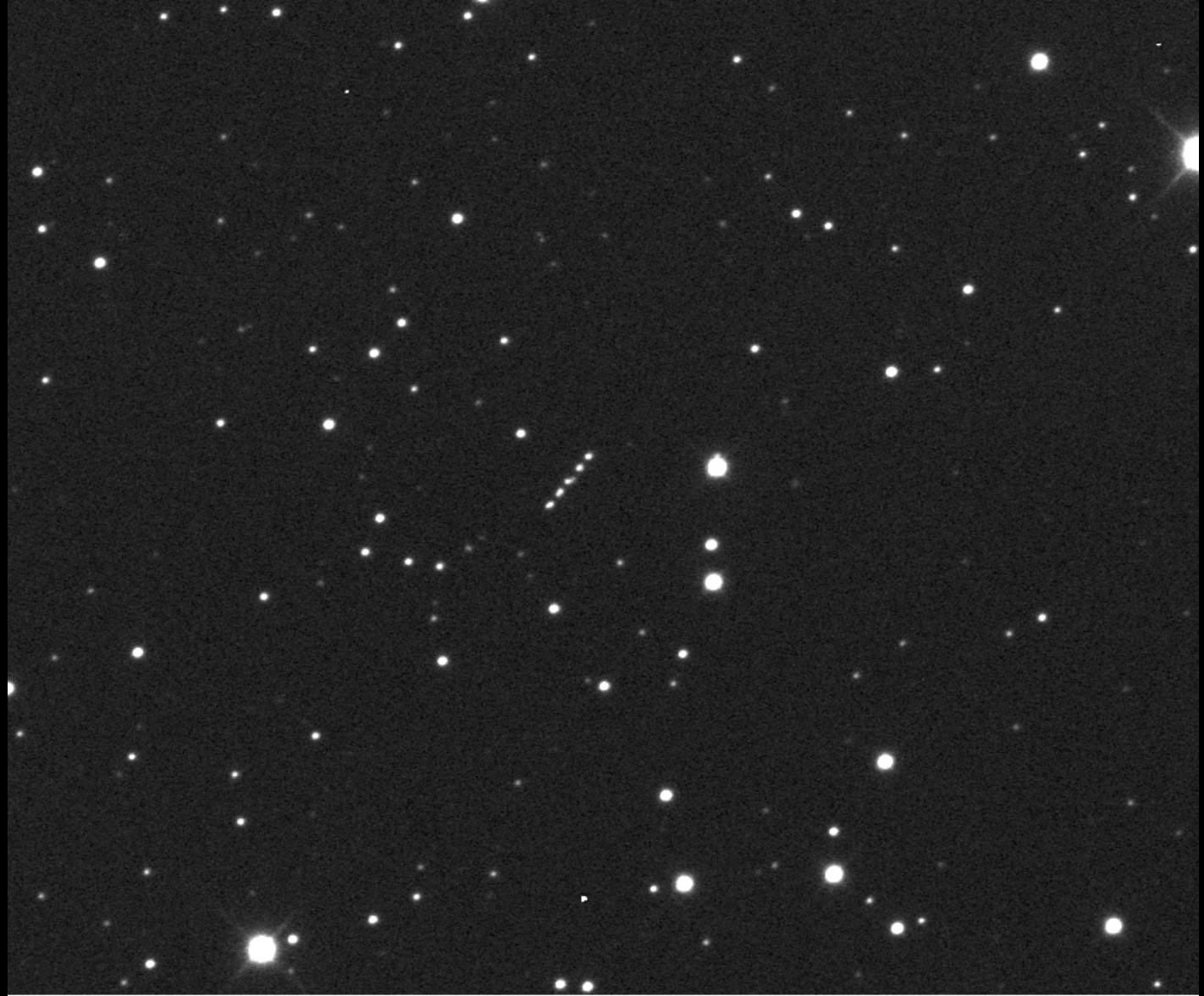
delta~ 0.14AU, r~ 1.02 AU, phase~ 79 deg

PHA 2009 ST19 2009, Sept. 23.31
Stacking of 16 unfiltered exposures, 60-sec. each
Remotely through the GRAS (near Mayhill, NM)
0.25-m, f/3.4 reflector + CCD

http://remanzacco.blogspot.com/
http://www.afamweb.com
http://cara.uai.it

A.F.A.M.

CARA



Asteroid 2009 ST19 imaged using 2.0-m Faulkes Telescope North

(R mag = 16.50 +/-0.03, potentially hazardous asteroid with MOID = 0.004 AU)

2009 Sep 23 12:21-12:26 UT (5 x 20 sec with R filter) FOV = 3.9' x 3.3' North up (R. Miles)

Asteroide 2009 ST19 corrent entre les estrelles

Observatori de Santa Maria de Montmagastrell (B74)

Josep M. Bosch Dia 27-09-2009

Orbital Elements at Epoch 2455000.5 (2009-Jun-18.0) TDB
Reference: JPL 3 (heliocentric ecliptic J2000)

Element	Value	Uncertainty (1-sigma)	Units
e	.5920391345544367	0.0018828	
a	2.366157112476957	0.01064	AU
q	.9652995033862745	0.00011452	AU
i	6.683528972978194	0.014964	deg
node	.5404248861826243	0.017328	deg
peri	336.3884484267431	0.017655	deg
M	340.326862878792	0.133	deg
t_p	2455073.149881891549 (2009-Aug-29.64988190)	0.0019853	JED
period	1329.42485582348 3.64	8.967 0.02455	d yr
n	.2707937935890379	0.0018265	deg/d
Q	3.76701472156764	0.016939	AU

Orbit Determination Parameters

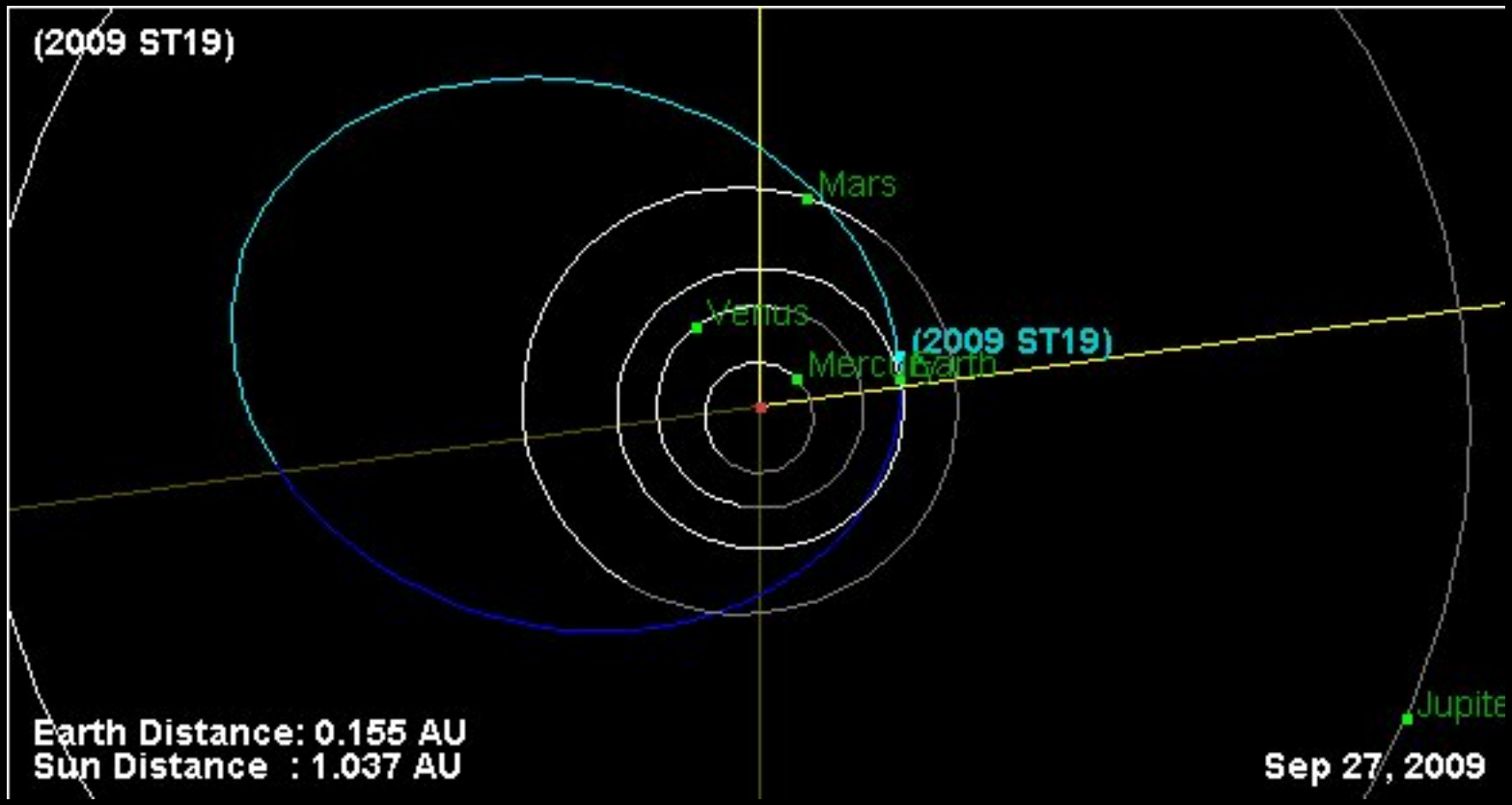
# obs. used (total)	76
data-arc span	11 days
first obs. used	2009-09-16
last obs. used	2009-09-27
planetary ephem.	DE405
SB-pert. ephem.	SB405-CPV-2
quality code	7
fit RMS	.42208
data source	ORB
producer	Otto Matic
solution date	2009-Sep-27 00:50:17

Additional Information

Earth MOID = .0043296 AU
T_jup = 3.279

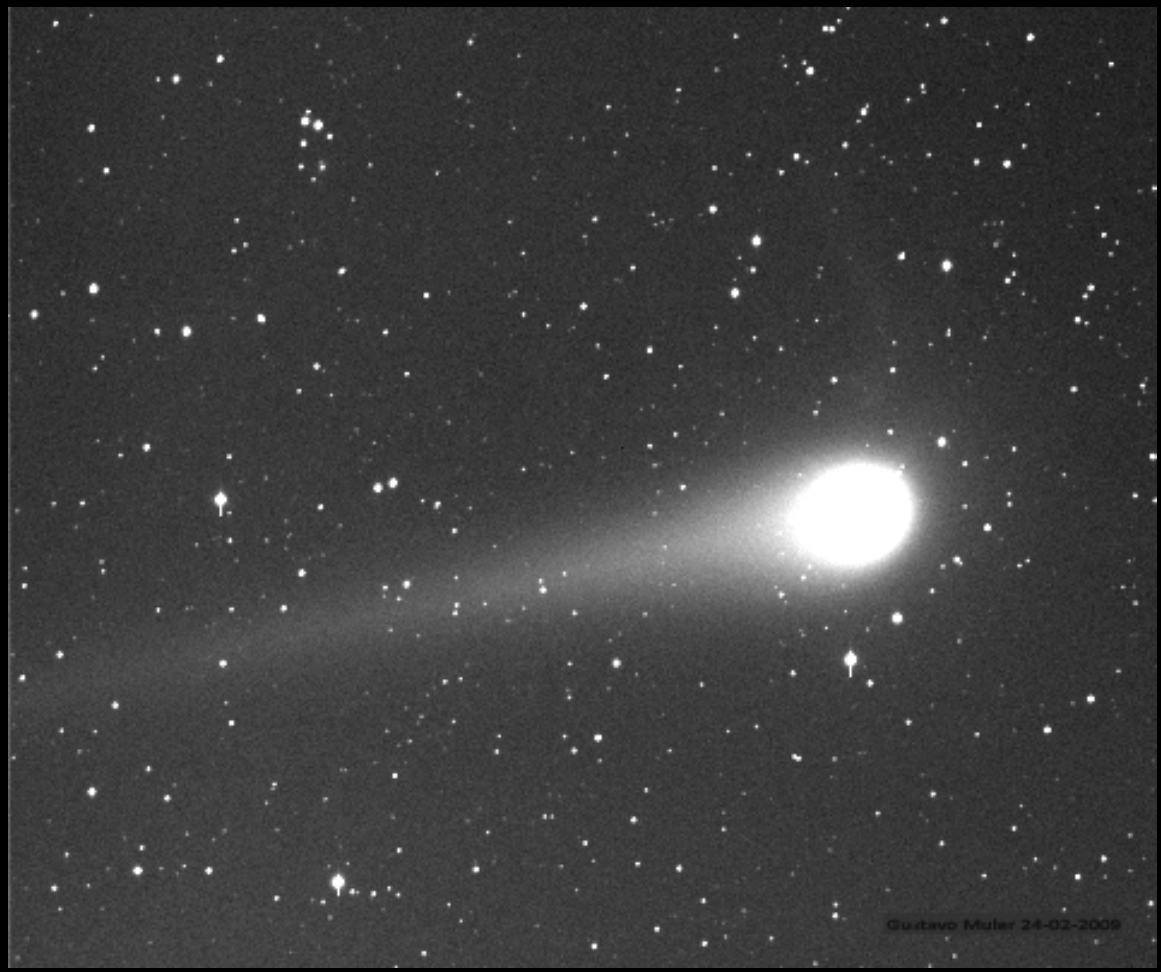
Physical Parameter Table

Parameter	Symbol	Value	Units	Sigma	Reference	Notes
absolute magnitude	H	18.518	mag	.32904	3	autocmod 2.4a

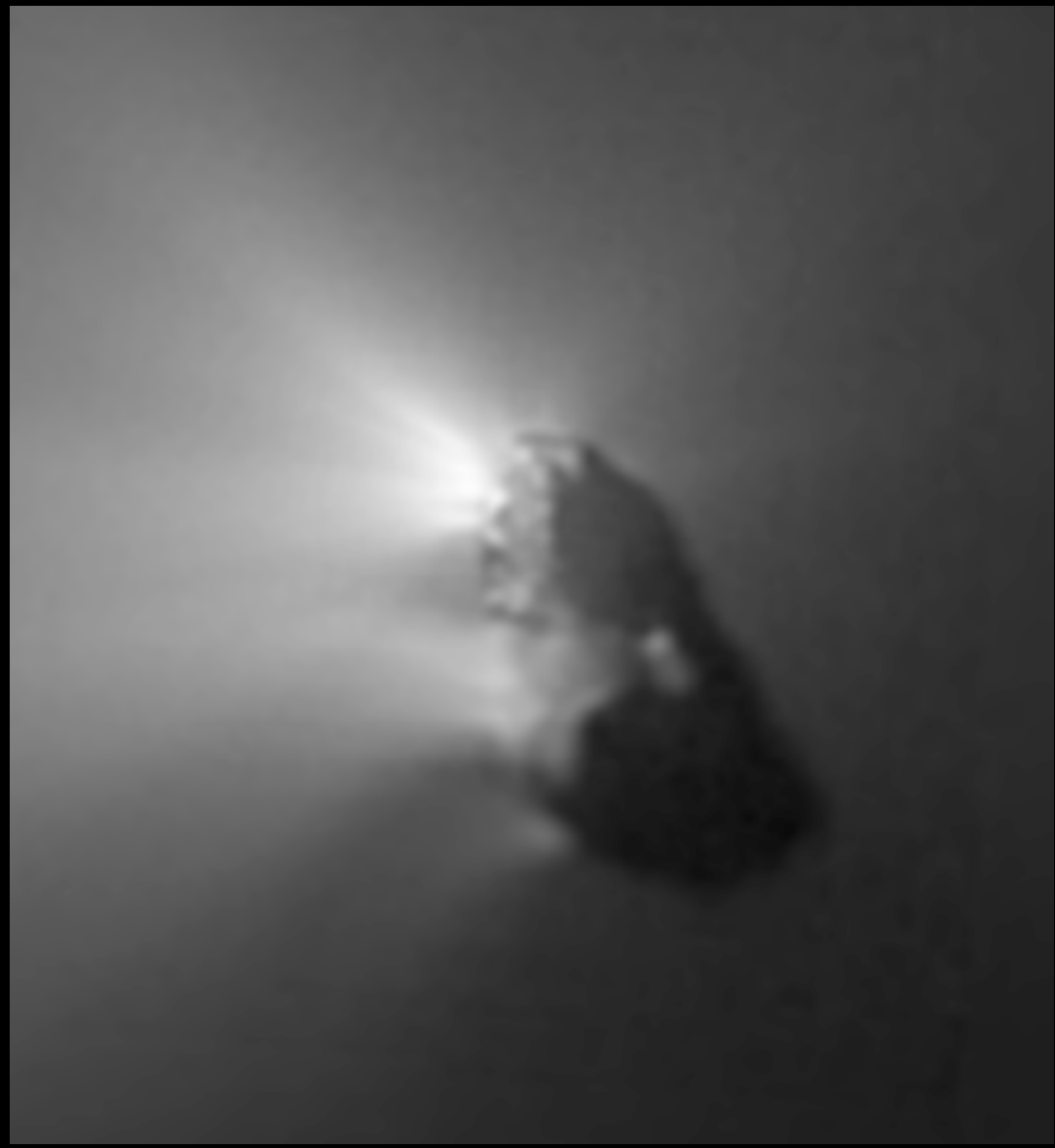

(2009 ST19)
Mars
Venus
(2009 ST19)
Earth
Jupite
Earth Distance: 0.155 AU
Sun Distance : 1.037 AU
Sep 27, 2009

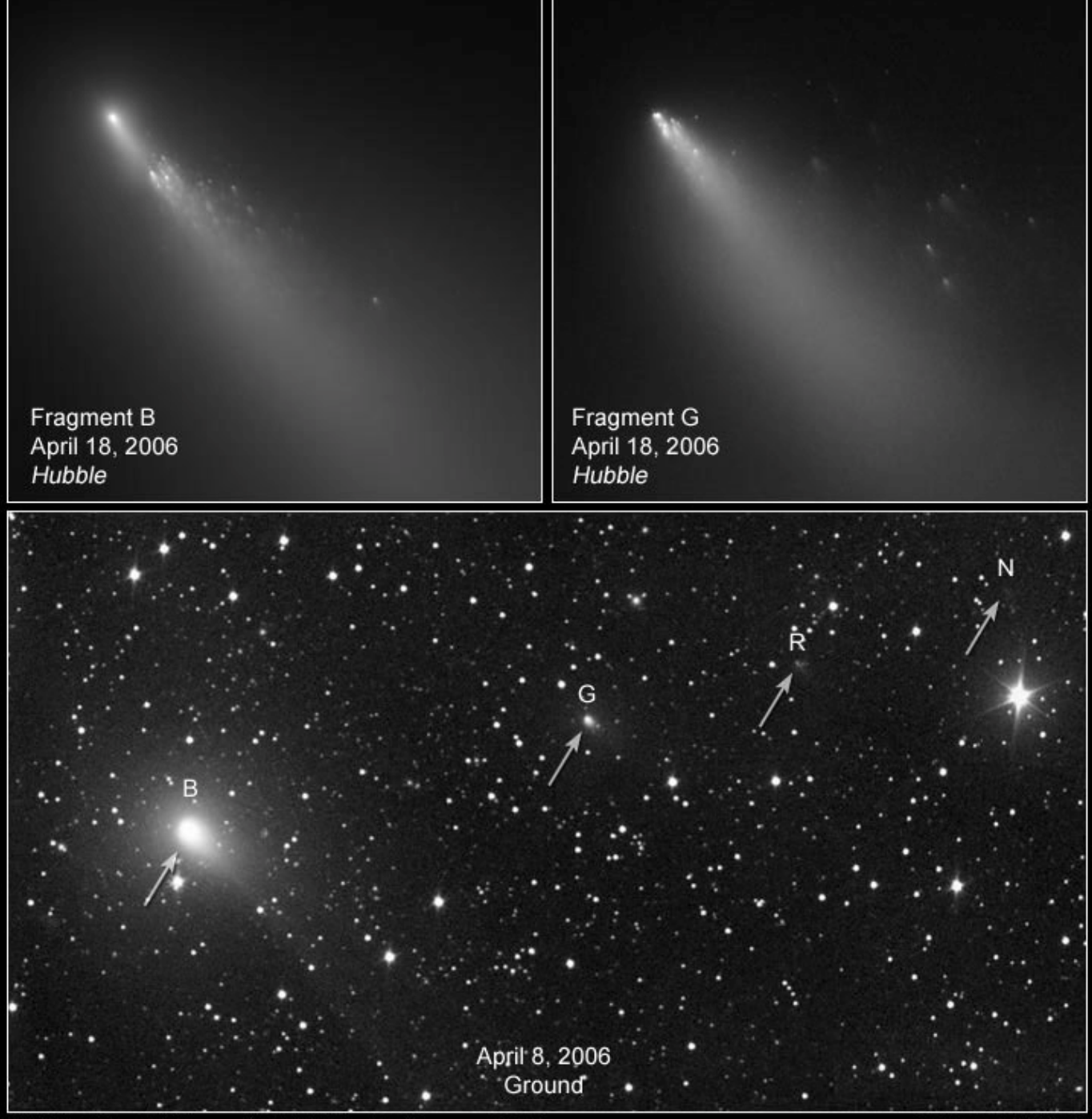
Aproximacions del 2009 ST19

From 1950 to 2100							
Planet	Date	MJD	Nominal distance (AU)	Min possible distance (AU)	Stretching (AU)	Width (AU)	Close app probability
EARTH	1980/07/14.12358	44434.1	0.1449630	0.0099079	4.841e-1	4.383e-6	1.19e-1
EARTH	2009/08/31.09301	55074.1	0.0648355	0.0647365	7.967e-5	5.343e-7	1.00e+0
EARTH	2038/09/20.43997	65686.4	0.0311676	0.0104071	3.550e-1	6.400e-7	1.87e-1
EARTH	2067/09/18.66447	76276.7	0.0385719	0.0125352	2.153e+0	6.035e-7	3.06e-2


Gustavo Muller 24-02-2009


19P 300sec
22P 4x120sec
29P 300sec
65P 300sec
77P 300sec
116P 300sec
210P 180 sec
C/2005 L3 300sec
C/2006 Q1 3x120sec





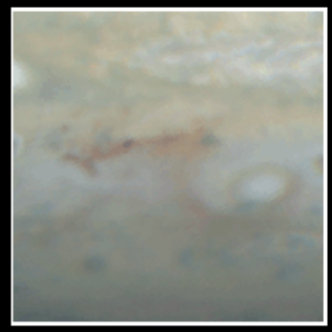
NASA, ESA, H. Weaver (JHU/APL), M. Jäger and G. Rhemann

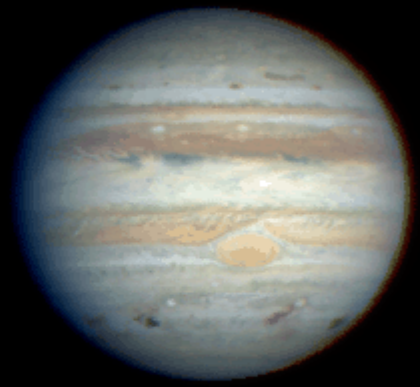
STScI-PRC06-18

Comet P/Shoemaker-Levy 9 (1993e) • May 1994

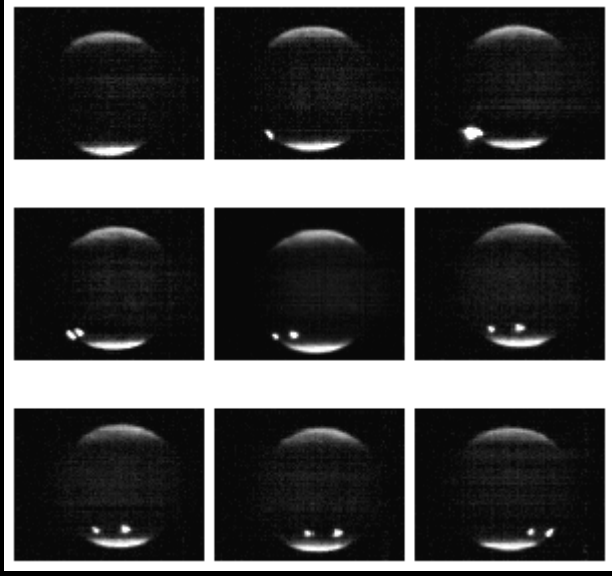
Jupiter 22 July 1994

"A" impact site
after 5.5 days



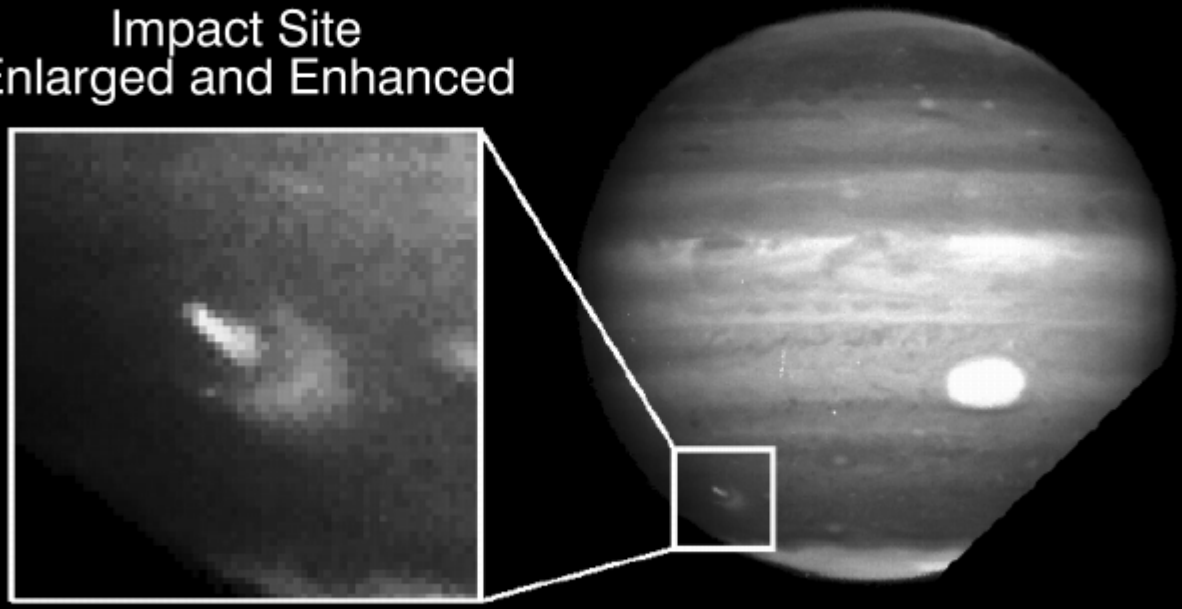


Hubble Space Telescope
Wide Field Planetary Camera 2

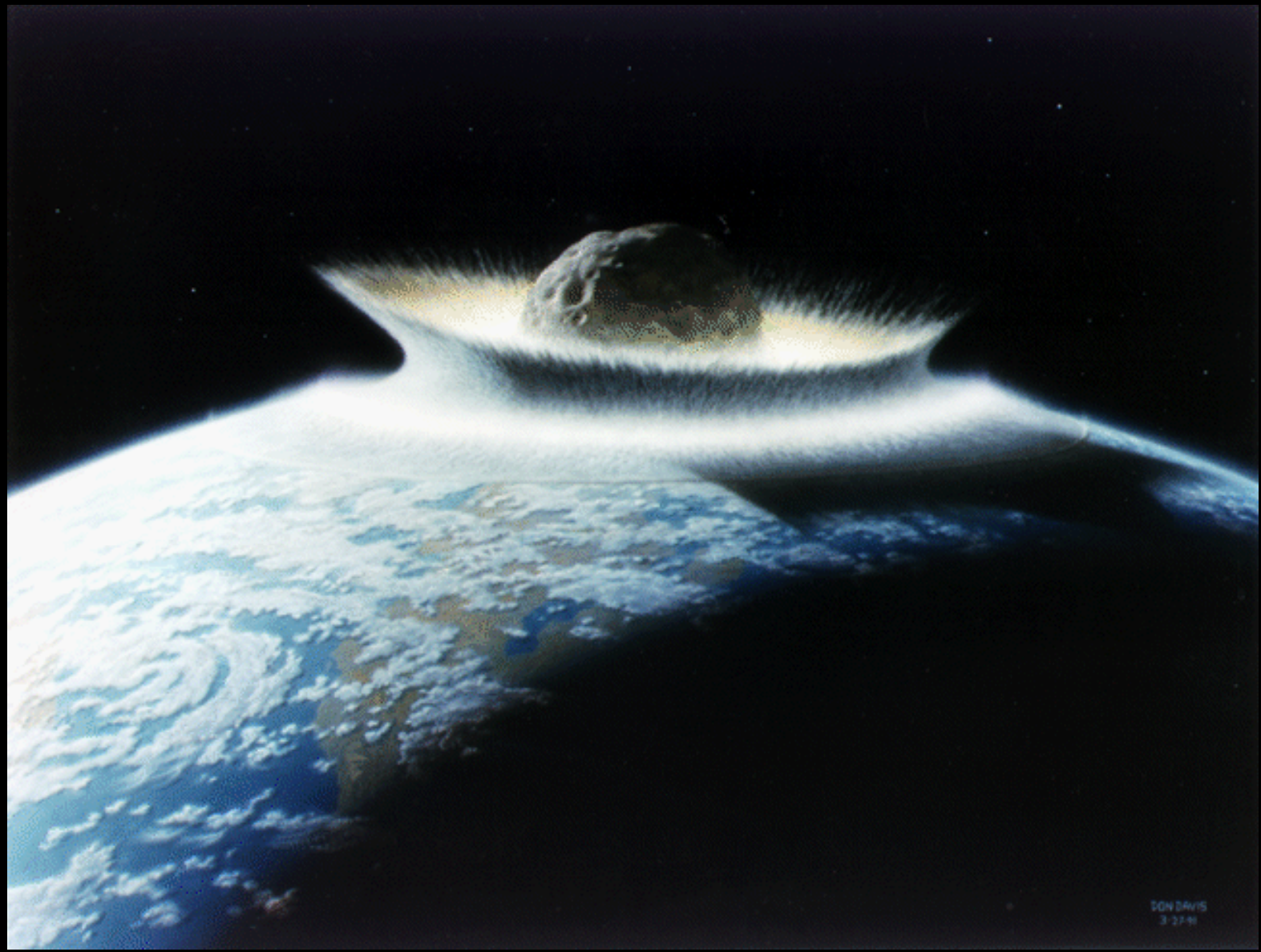


Jupiter July 16, 1994

After
Impact Site
Enlarged and Enhanced



Hubble Space Telescope


DON DAVIS

The Great Daylight Fireball of 1972

Bòlid de Peekshill, 9 d’octubre de 1992

Dedicat al meu mestre

Jaume Nomen

Impulsor i organitzador de

La Sagra Sky Survey