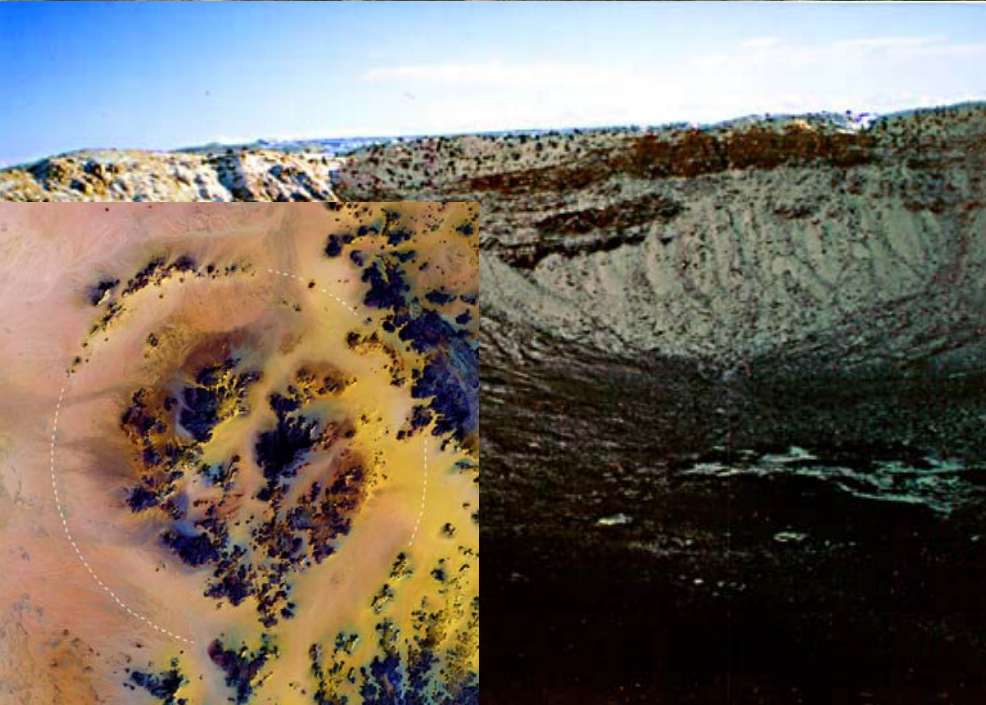


LA TERRA COME BERSAGLIO COSMICO

**Il pericolo potenziale dell'impatto di
asteroidi o comete con il nostro pianeta**

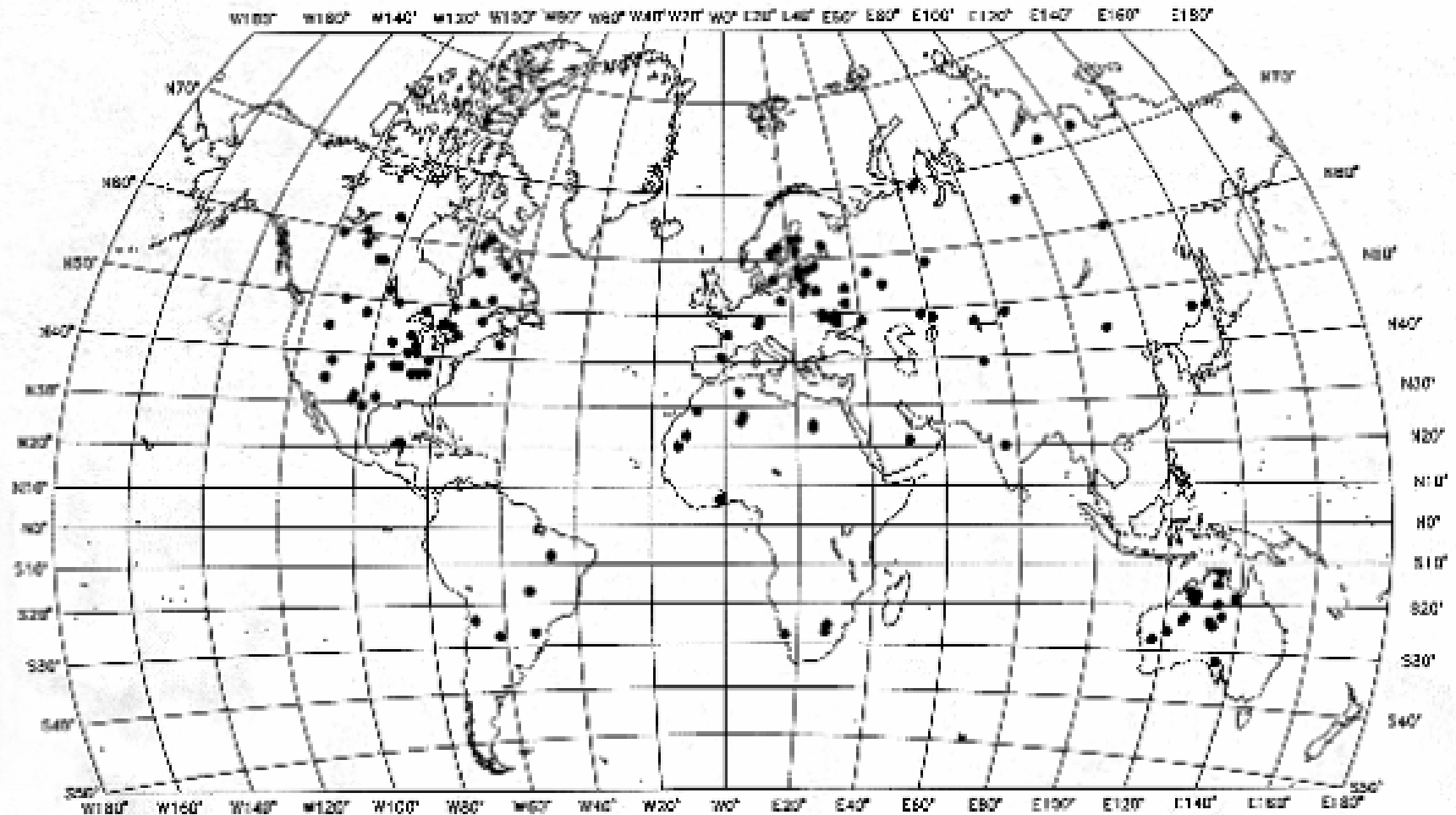
Luciano Anselmo
Laboratorio di Dinamica del Volo Spaziale
ISTI/CNR – Area della Ricerca di Pisa

*“Universus 2006” – XXV Edizione – “Pianeta Terra, i grandi rischi per l'umanità”
Aula Magna – Liceo Scientifico di Montecorvino Rovella – 25-26-27 Maggio 2006*



IMPACT CRATERS

COMPILED BY THE GEOPHYSICS DIVISION
GEOLOGICAL SURVEY OF CANADA, ENERGY, MINES AND RESOURCES
90-DEC-91



EQUATORIAL SCALE 1:150 000 000 ECHELLE EQUATORIAL

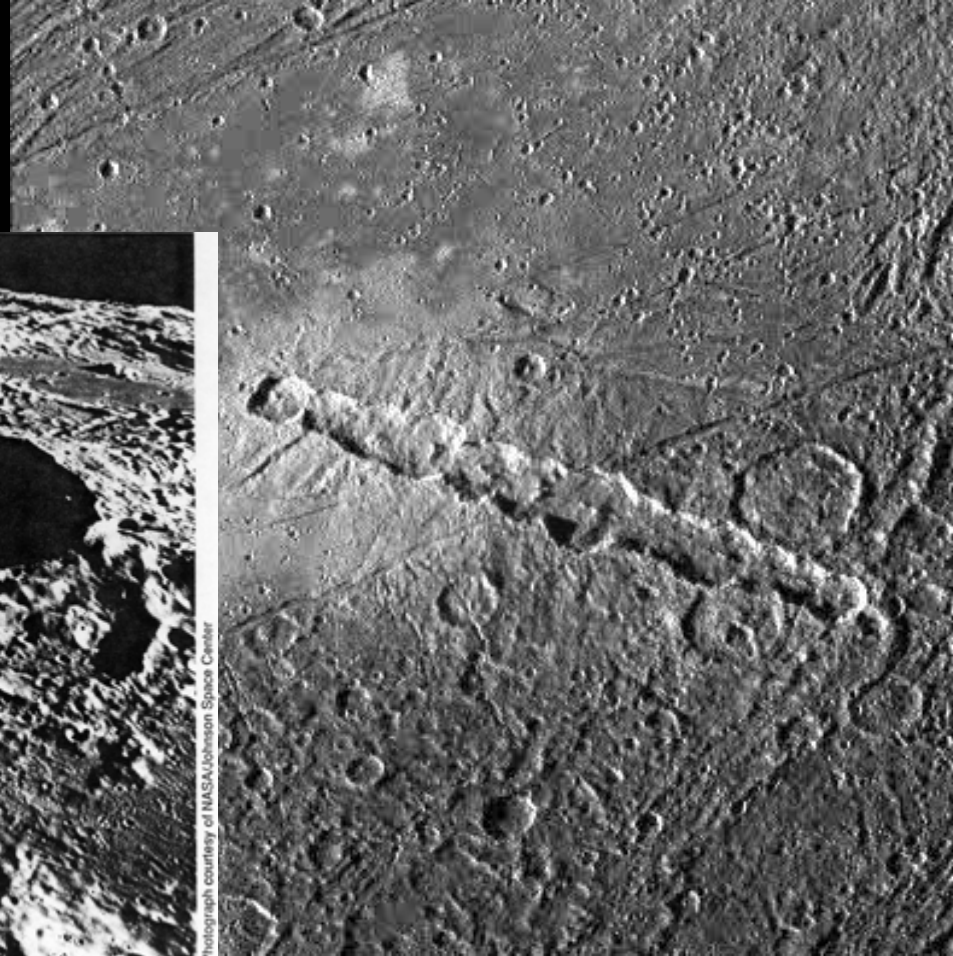
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KILOMETRES

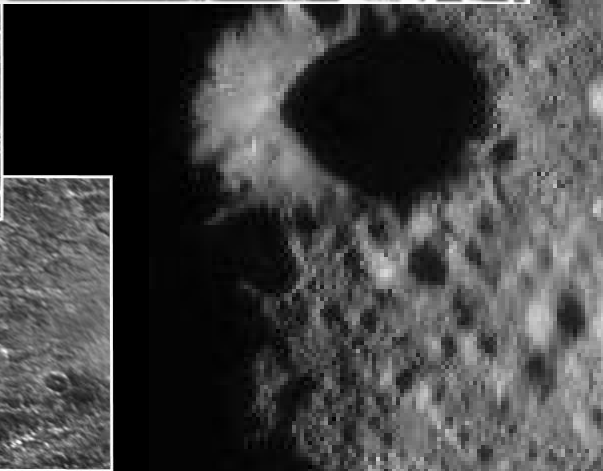
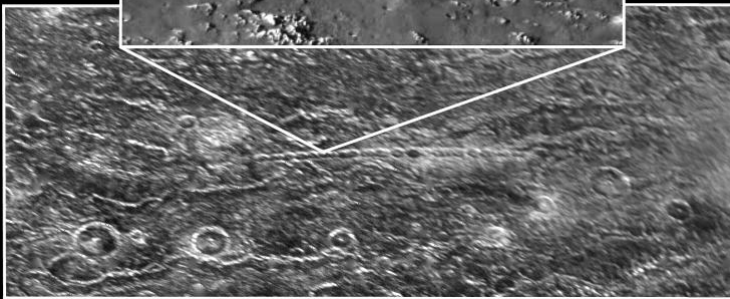
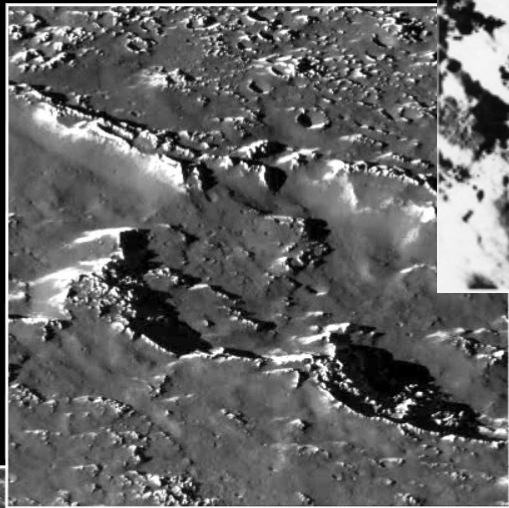
VAN DER Grinten PROJECTION

PROJECTION VAN DER GRINTEN

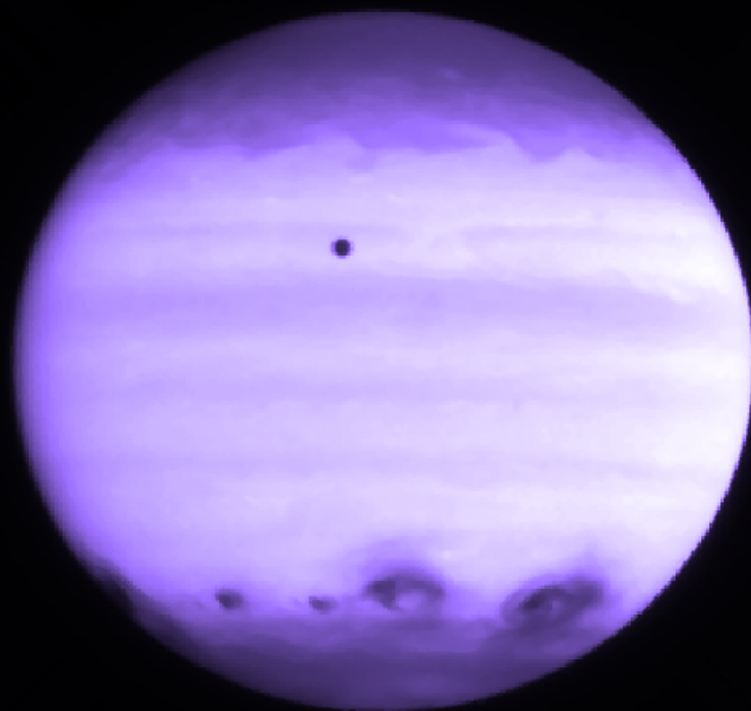
CENTRAL MERIDIAN 0° MERIDIEN CENTRAL 0°



Photograph courtesy of NASA/Johnson Space Center

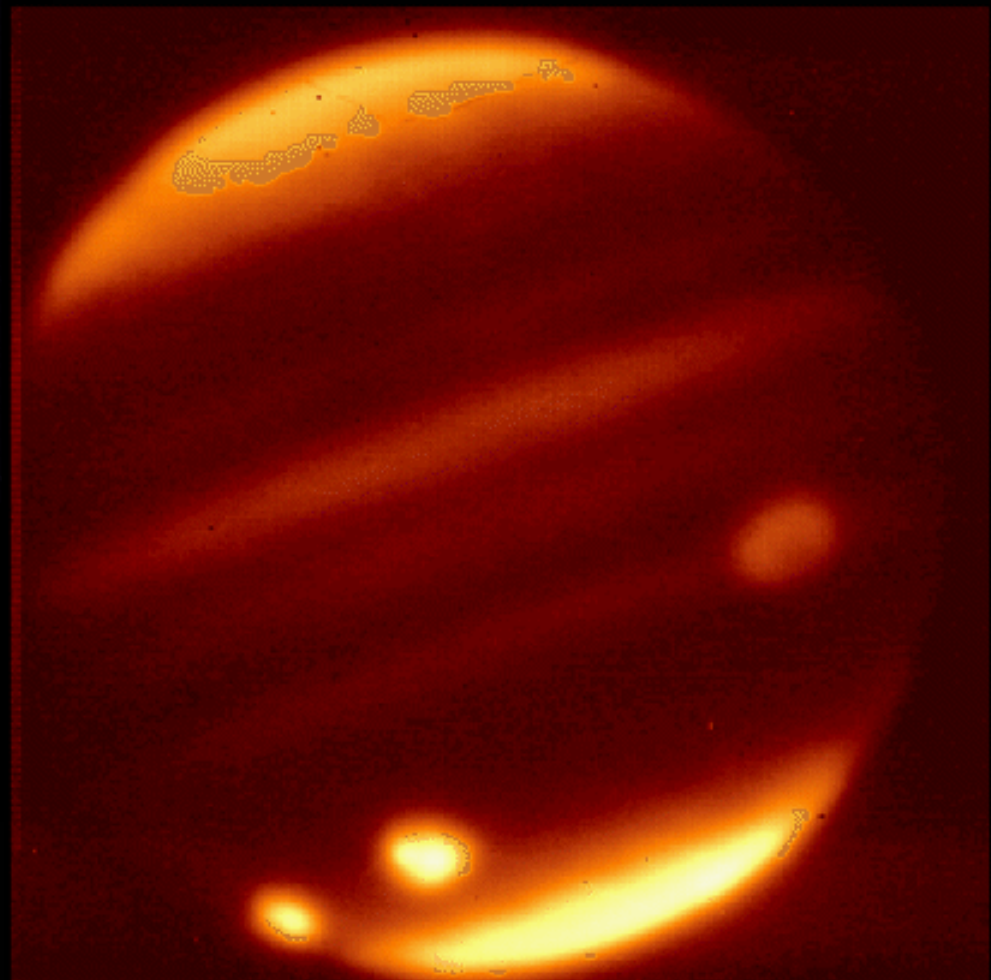


Jupiter in Ultraviolet



↑ H ↑ N ↑ Q₂ ↑ D/G ↑
 B Q₁ R L

Hubble Space Telescope
Wide Field Planetary Camera 2



ASTEROIDI, COMETE & TNO

- **ASTEROIDI REGISTRATI: ~ 340.000**
- **ASTEROIDI CON ORBITA NOTA: ~ 120.000**
- **NEA CATALOGATI: ~ 3800 (~ 850 $\geq$ 1 km)**
- **NUOVI ASTEROIDI SCOPERTI: ~ 5000 al mese**
- **ASTEROIDI DELLA FASCIA PRINCIPALE [$\emptyset \geq$ 1 km]:
1.200.000 $\pm$ 500.000**
- **NEA [$\emptyset \geq$ 1 km]: 900 - 1200**
- **TNO [$\emptyset \geq$ 100 km]: ~ 35.000**
- **COMETE NELLA NUBE DI OORT: ~ 1.000.000.000.000**
- **COMETE IN VIAGGIO VERSO IL SISTEMA SOLARE
“INTERNO” IN OGNI MOMENTO: ~ 400**

140 Siwa

9969 Braille

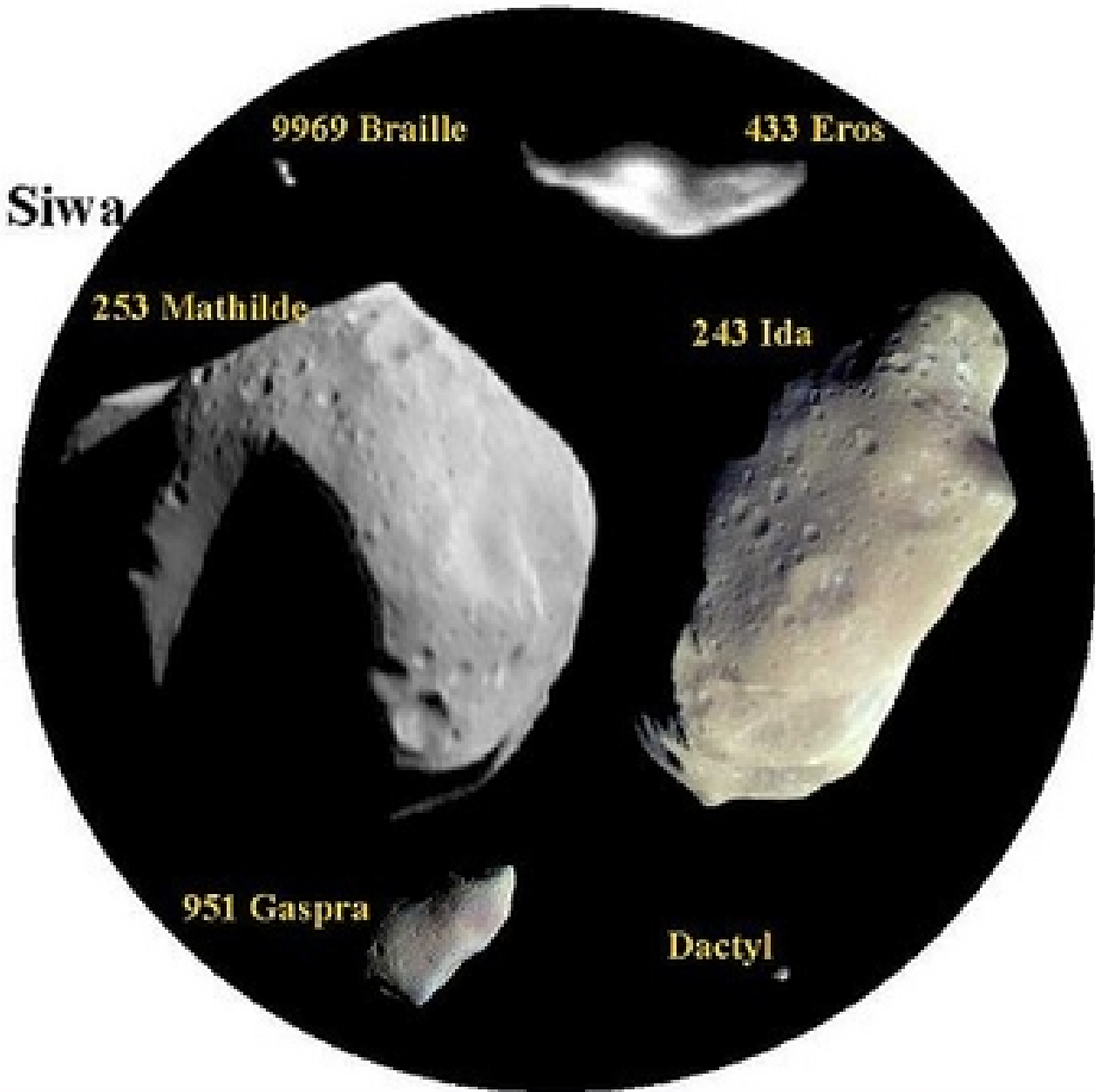
433 Eros

253 Mathilde

243 Ida

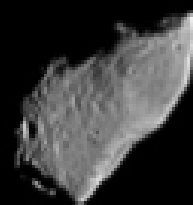
951 Gaspra

Dactyl





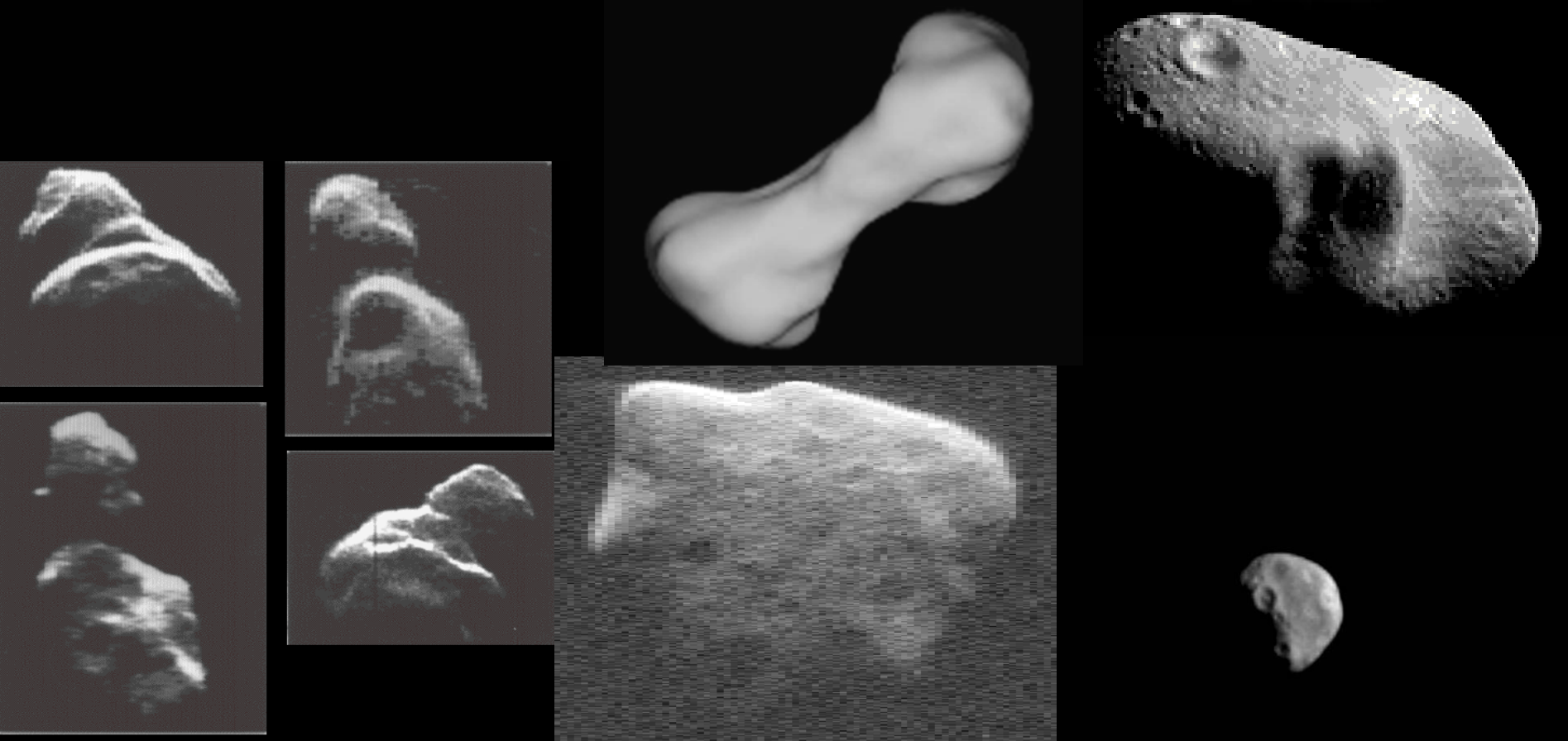
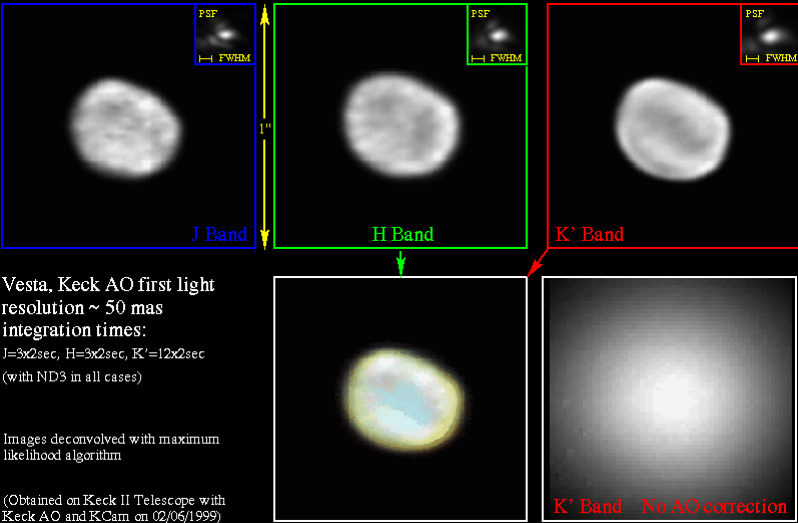
Mathilde



Gaspra



Ida





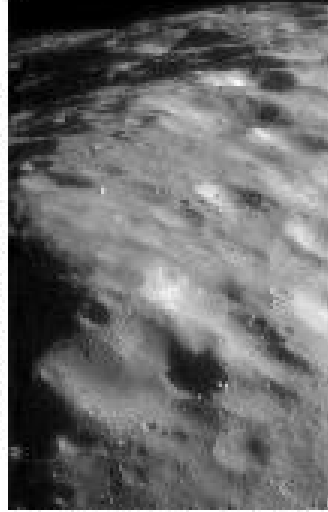
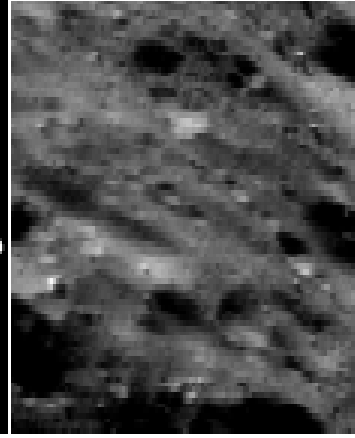
Discovery Is NEAR



Discovery Is NEAR



Discovery Is NEAR



NEAR is the first asteroid to be visited by a spacecraft. It was discovered by the NEAR Shoemaker mission in 1991.



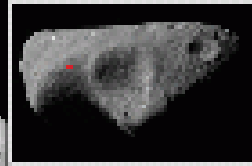
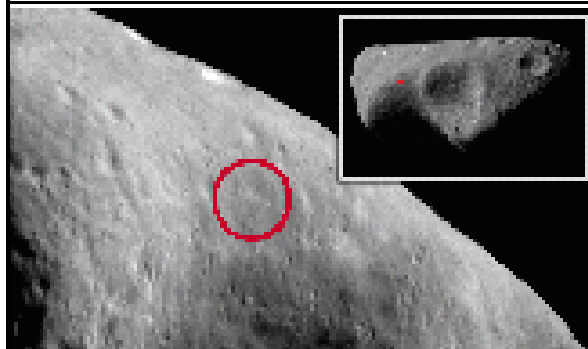
NEAR is the first asteroid to be visited by a spacecraft. It was discovered by the NEAR Shoemaker mission in 1991.



NEAR is the first asteroid to be visited by a spacecraft. It was discovered by the NEAR Shoemaker mission in 1991.



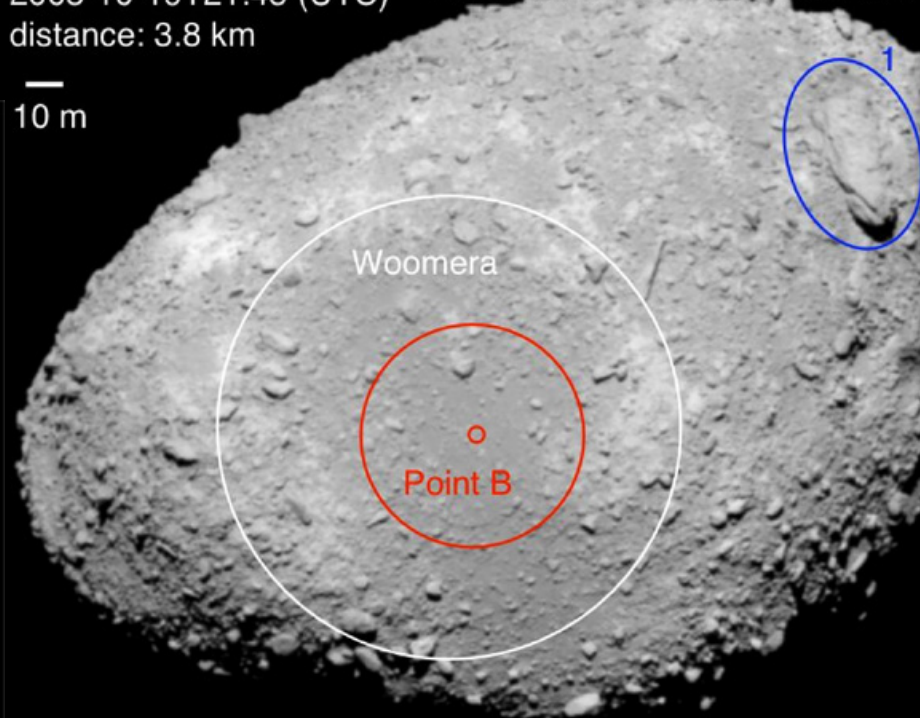
NEAR is the first asteroid to be visited by a spacecraft. It was discovered by the NEAR Shoemaker mission in 1991.



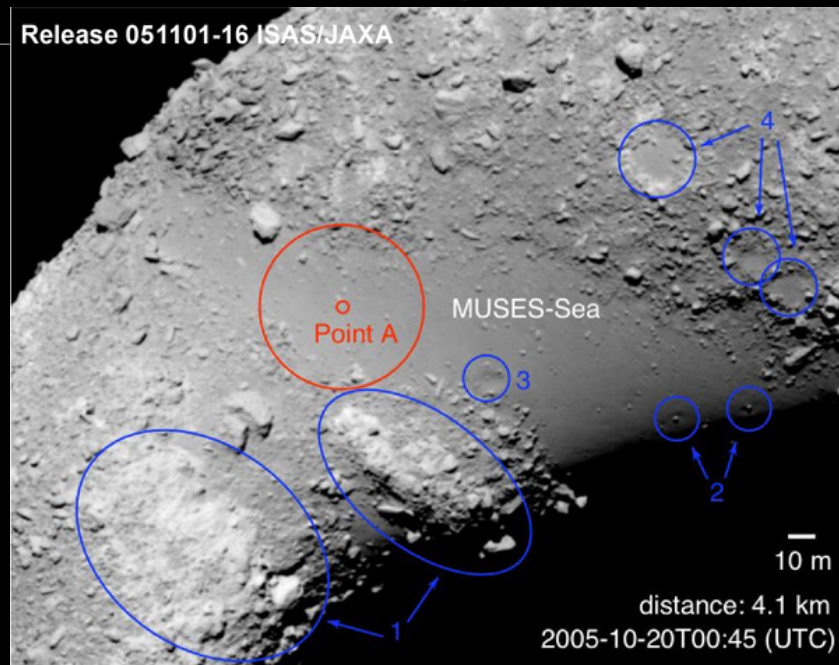
Release 051101-3 ISAS/JAXA

2005-10-19T21:45 (UTC) Release 051101-17 ISAS/JAXA
distance: 3.8 km

10 m



Release 051101-16 ISAS/JAXA





HMC COMPOSITE IMAGE



COMET HALLEY

HALLEY MULTICOLOUR CAMERA

13-MAR-1986



IMAGE #3416 - 25 600 km



IMAGE #3444 - 10 000 km



IMAGE #3461 - 13 400 km



IMAGE #3475 - 9 600 km



IMAGE #3491 - 5 200 km



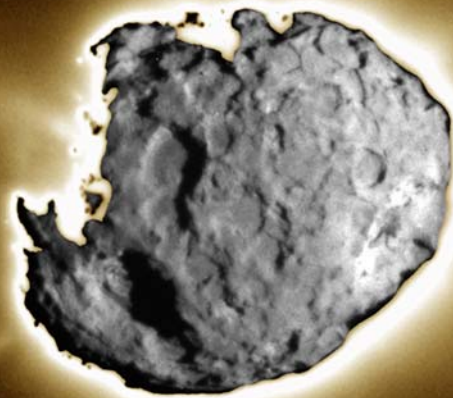
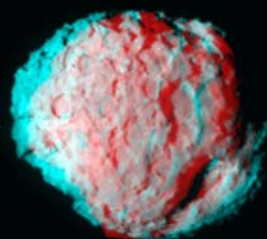
IMAGE #3496 - 3 900 km

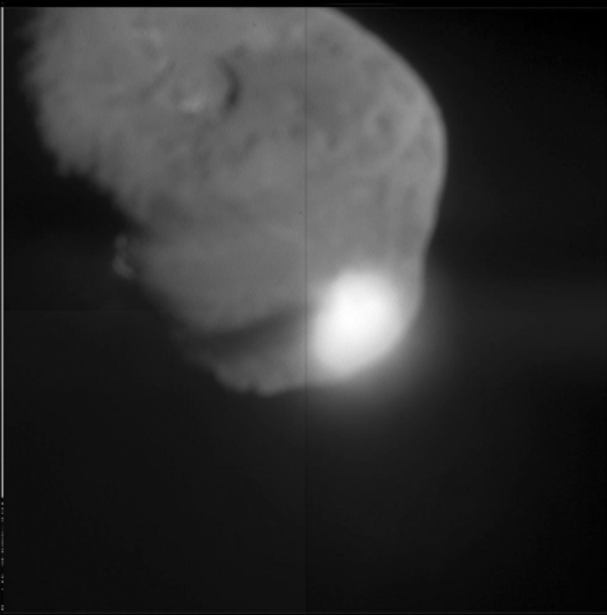
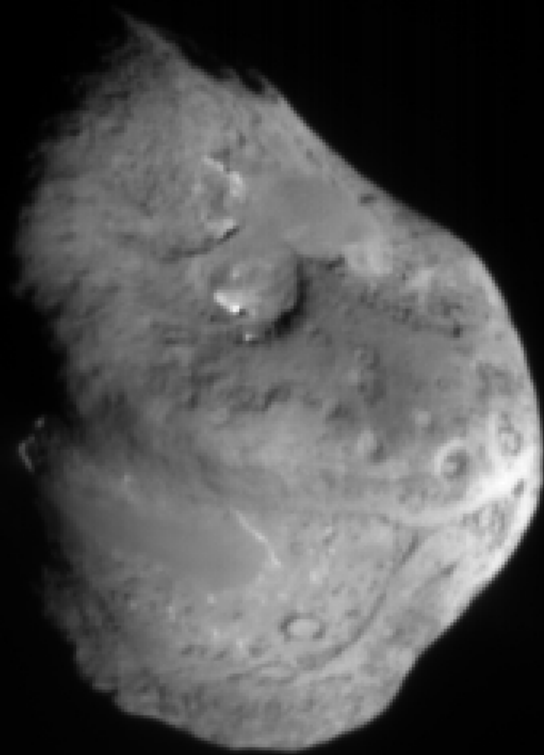
Copyright MPAE 1986

MAX-PLANCK-INSTITUT FUER AERONOMIE

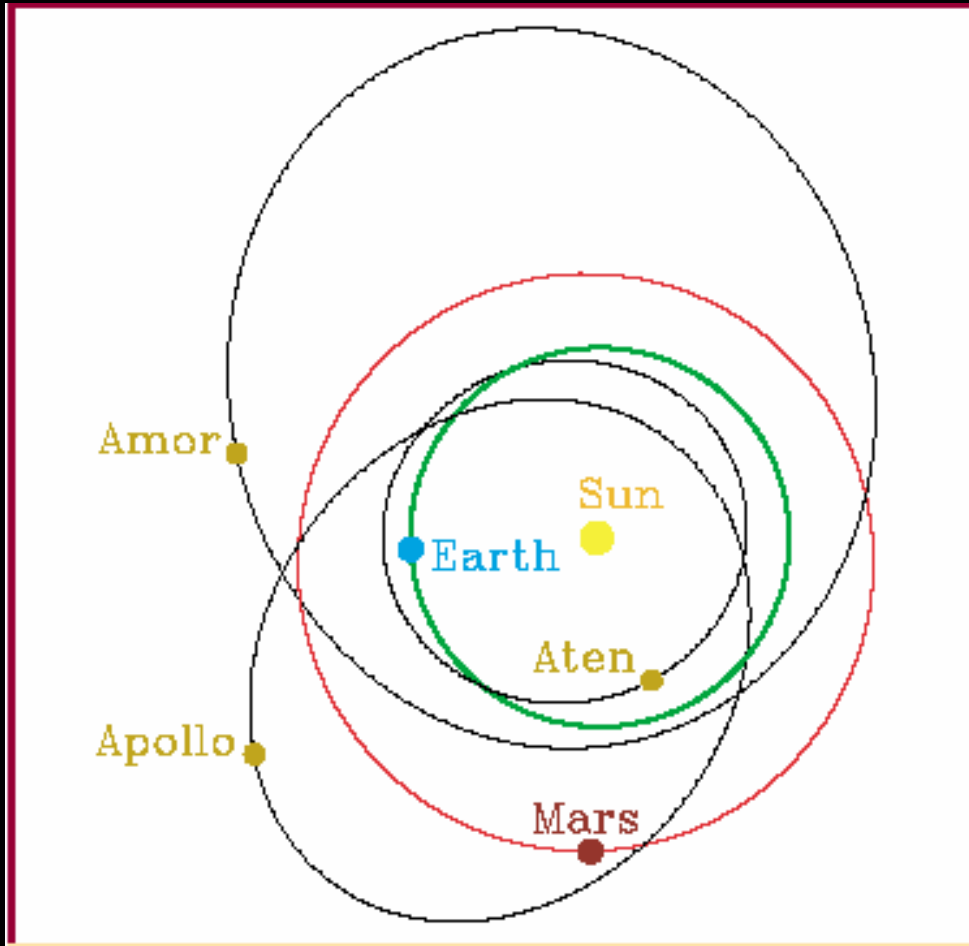




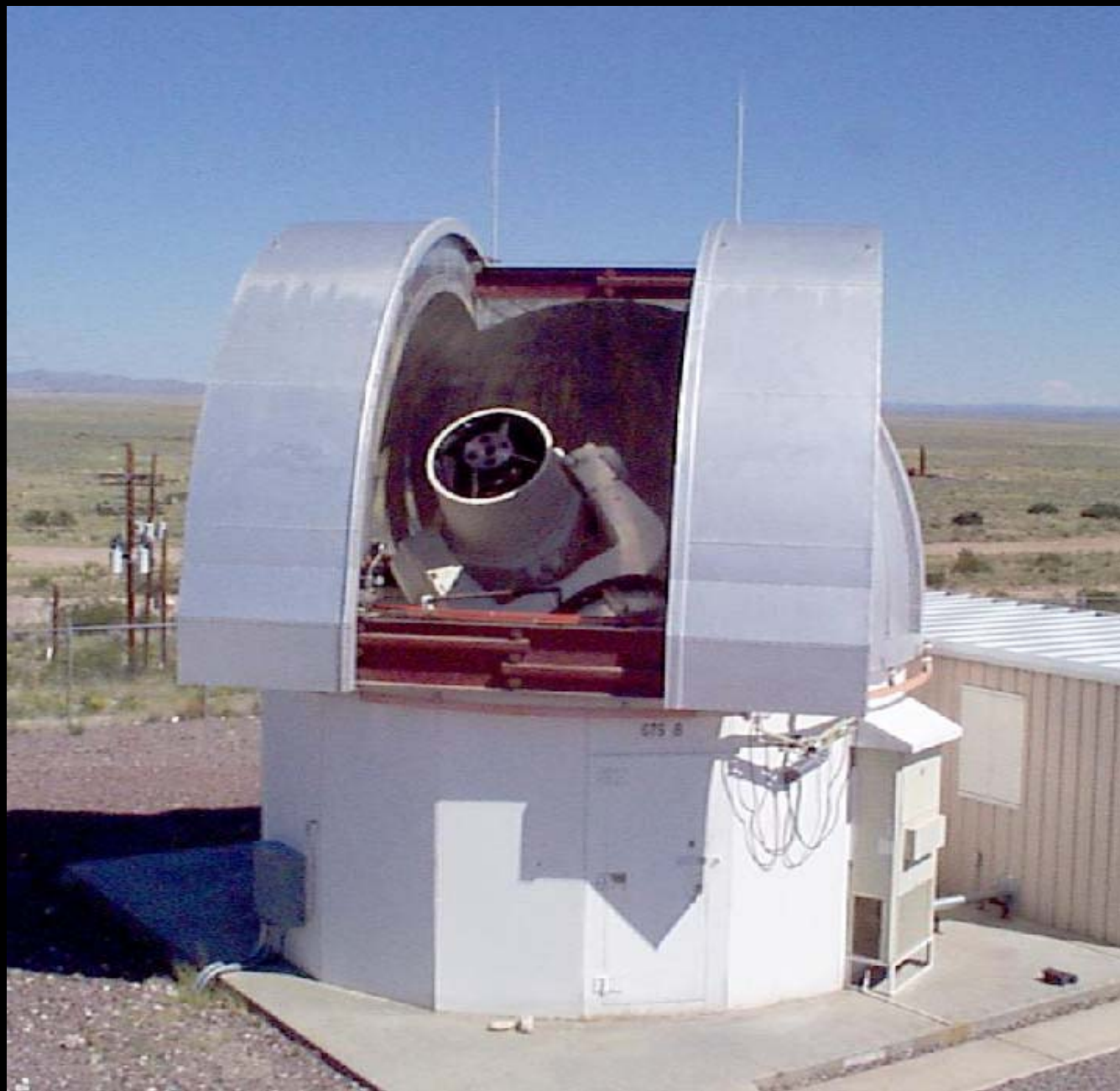




NEAR EARTH ASTEROIDS (NEA)

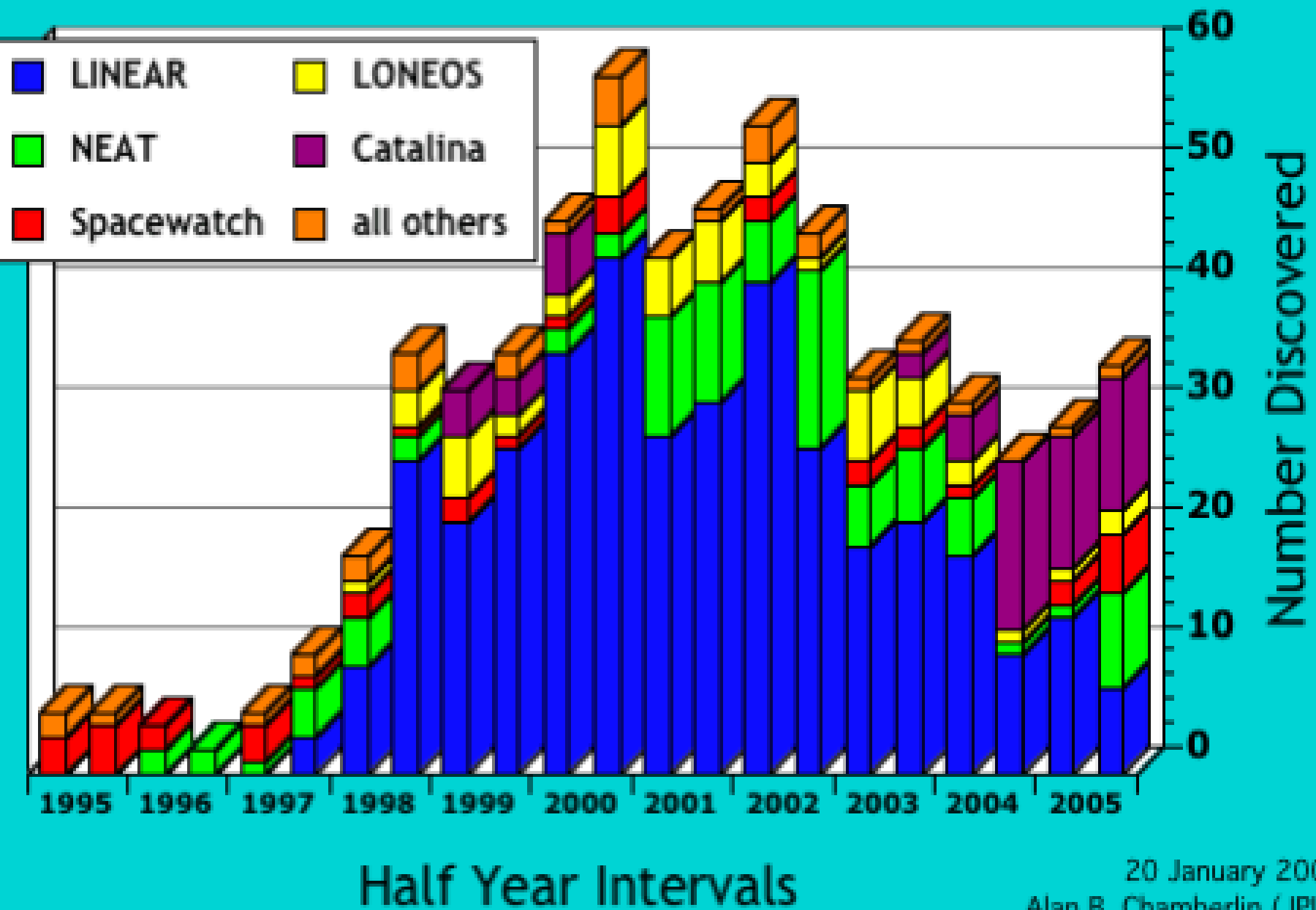


- Potentially Hazardous Asteroids (PHA): gli asteroidi che possono transitare a meno 0,05 UA $\cong$ 7,5 milioni di km dalla Terra e con un diametro maggiore di circa 150 m sono definiti potenzialmente pericolosi. Attualmente se ne conoscono poco meno di 800.



Near-Earth Asteroid Discoveries

Large Asteroids (kilometer sized and larger)

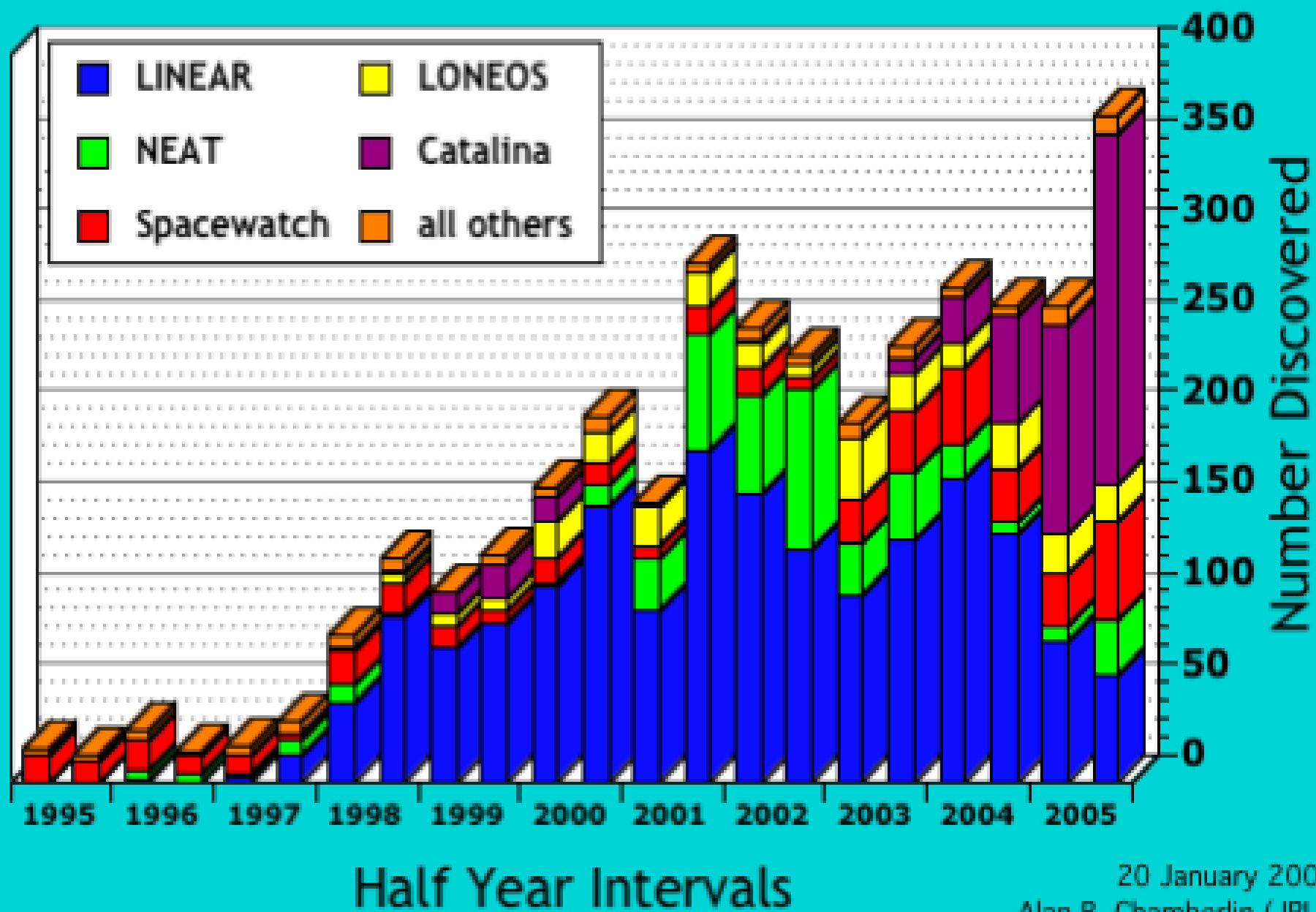


20 January 2006

Alan B. Chamberlin (JPL)

Near-Earth Asteroid Discoveries

All Asteroids

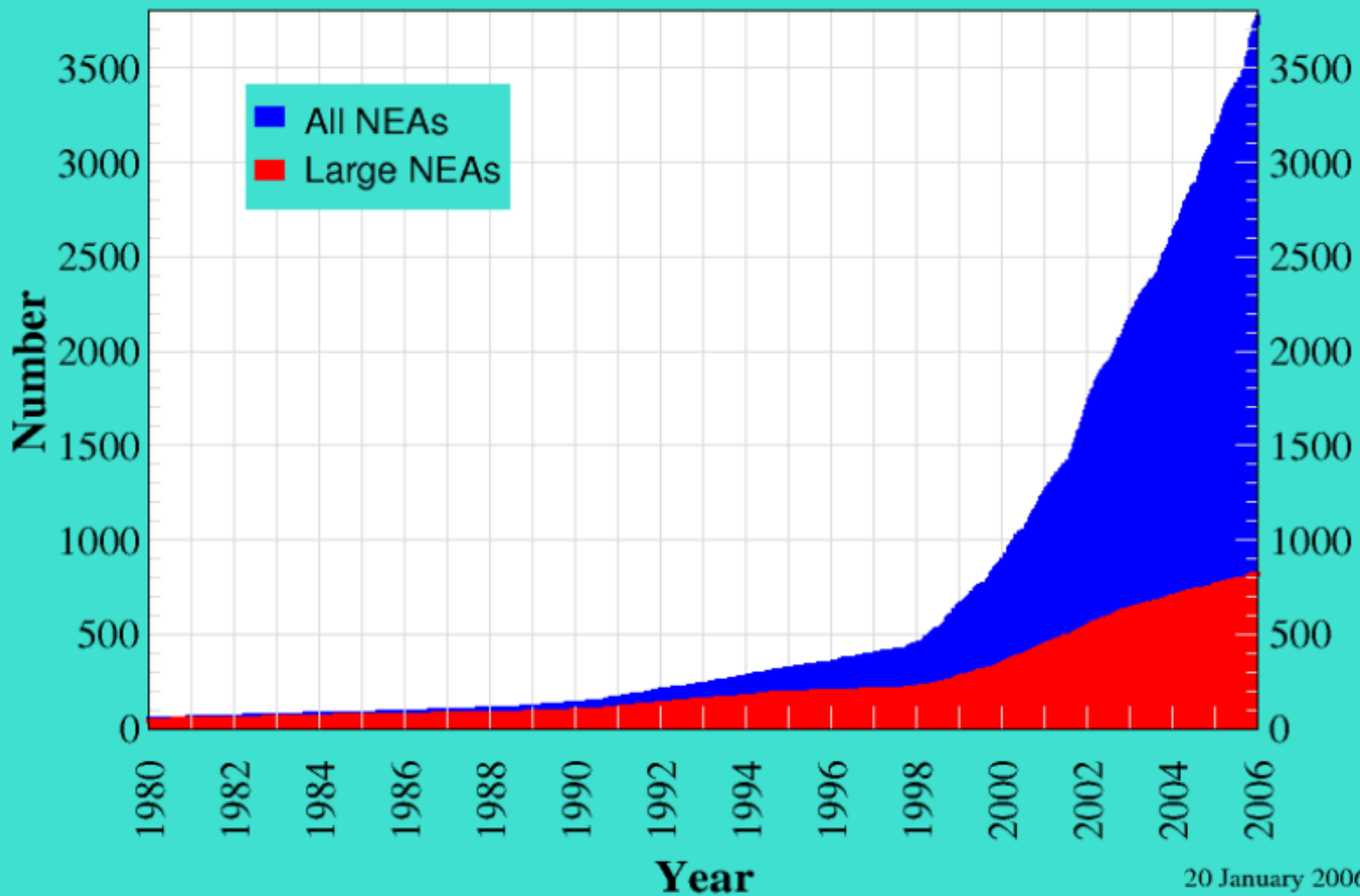


20 January 2006

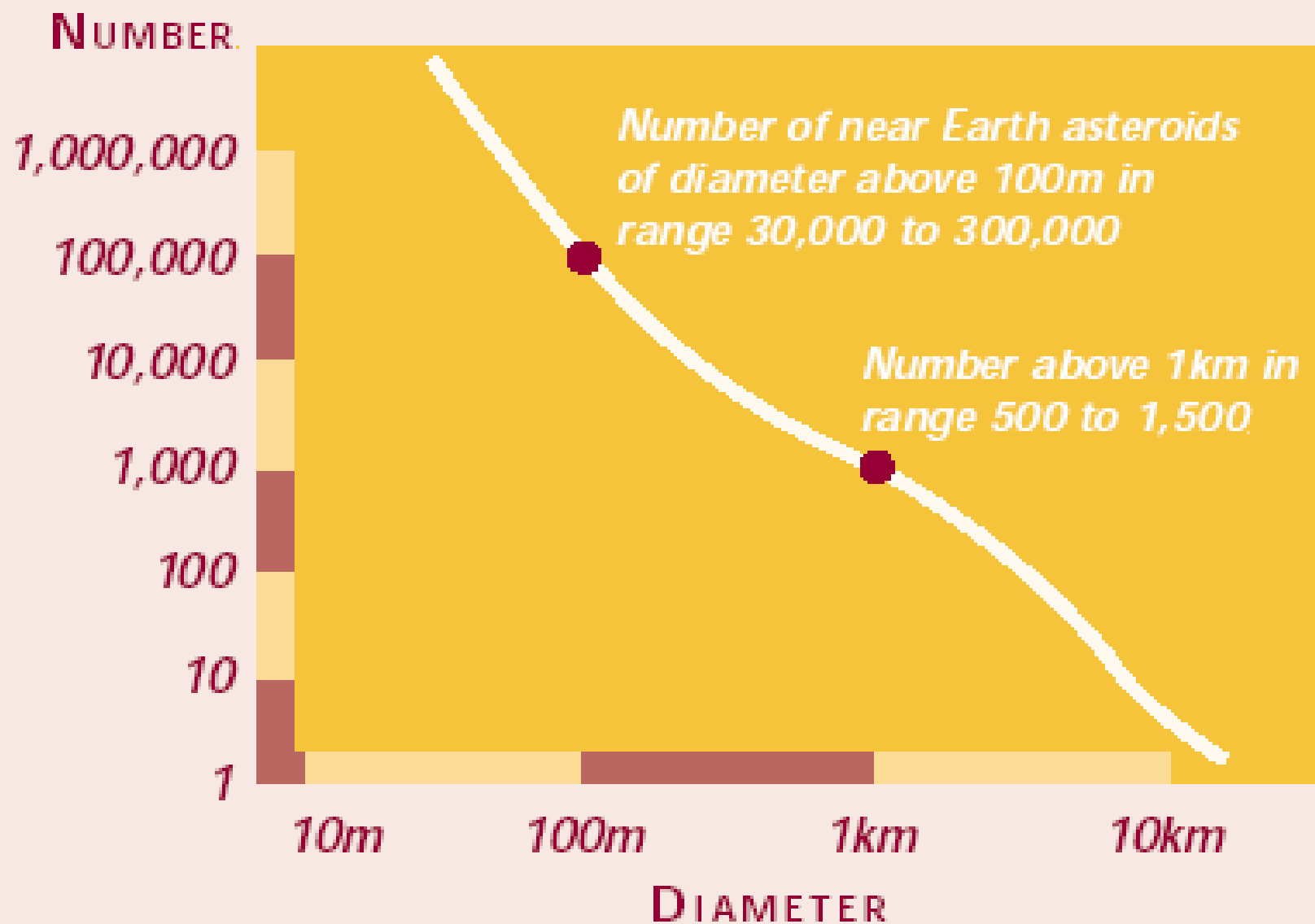
Alan B. Chamberlin (JPL)

Known Near-Earth Asteroids

1980-Jan through 2005-Dec



20 January 2006
Alan B. Chamberlin (JPL)



Civilization **Threatening** Impact

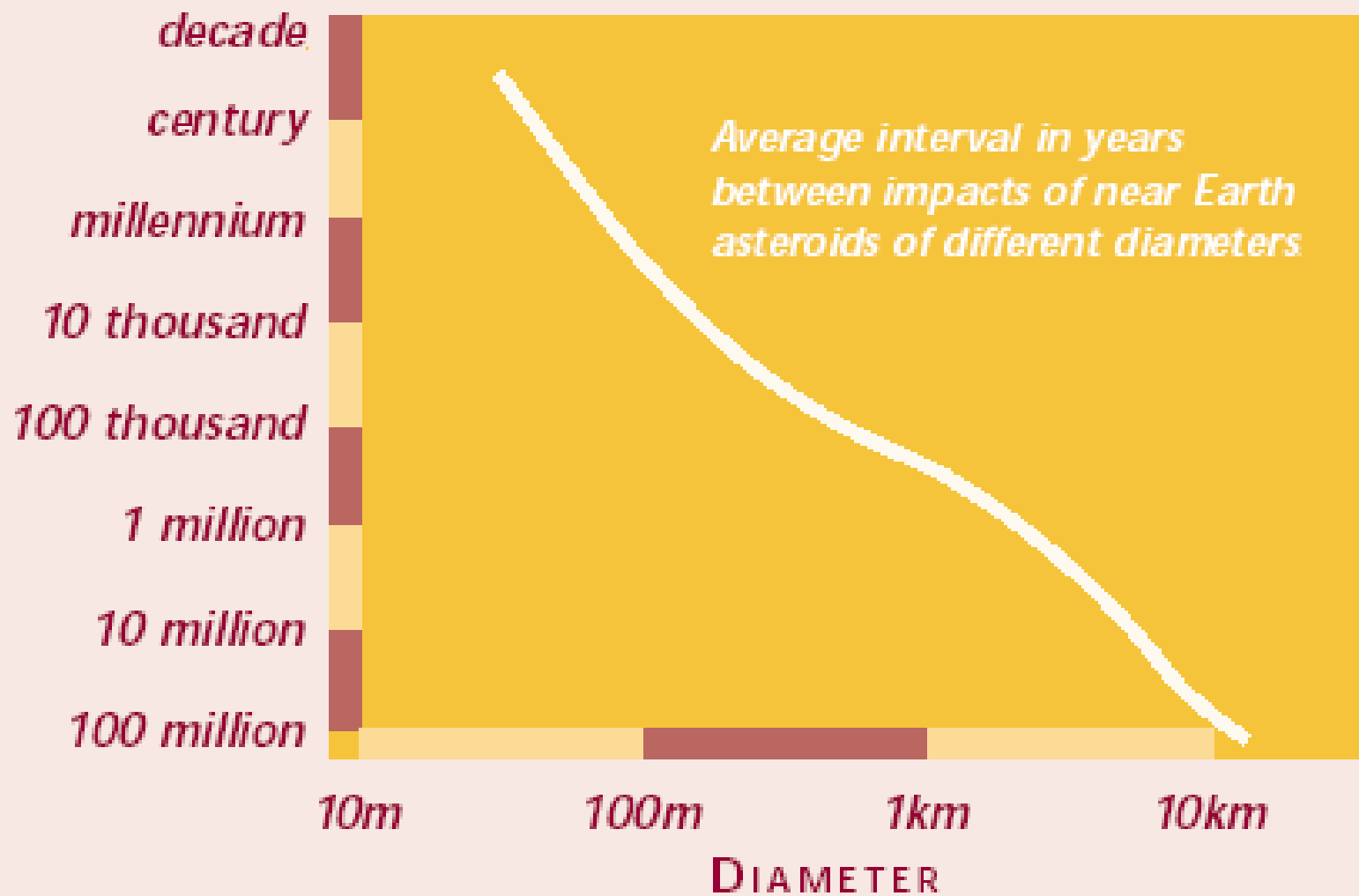


Mass **Extinction** Impact

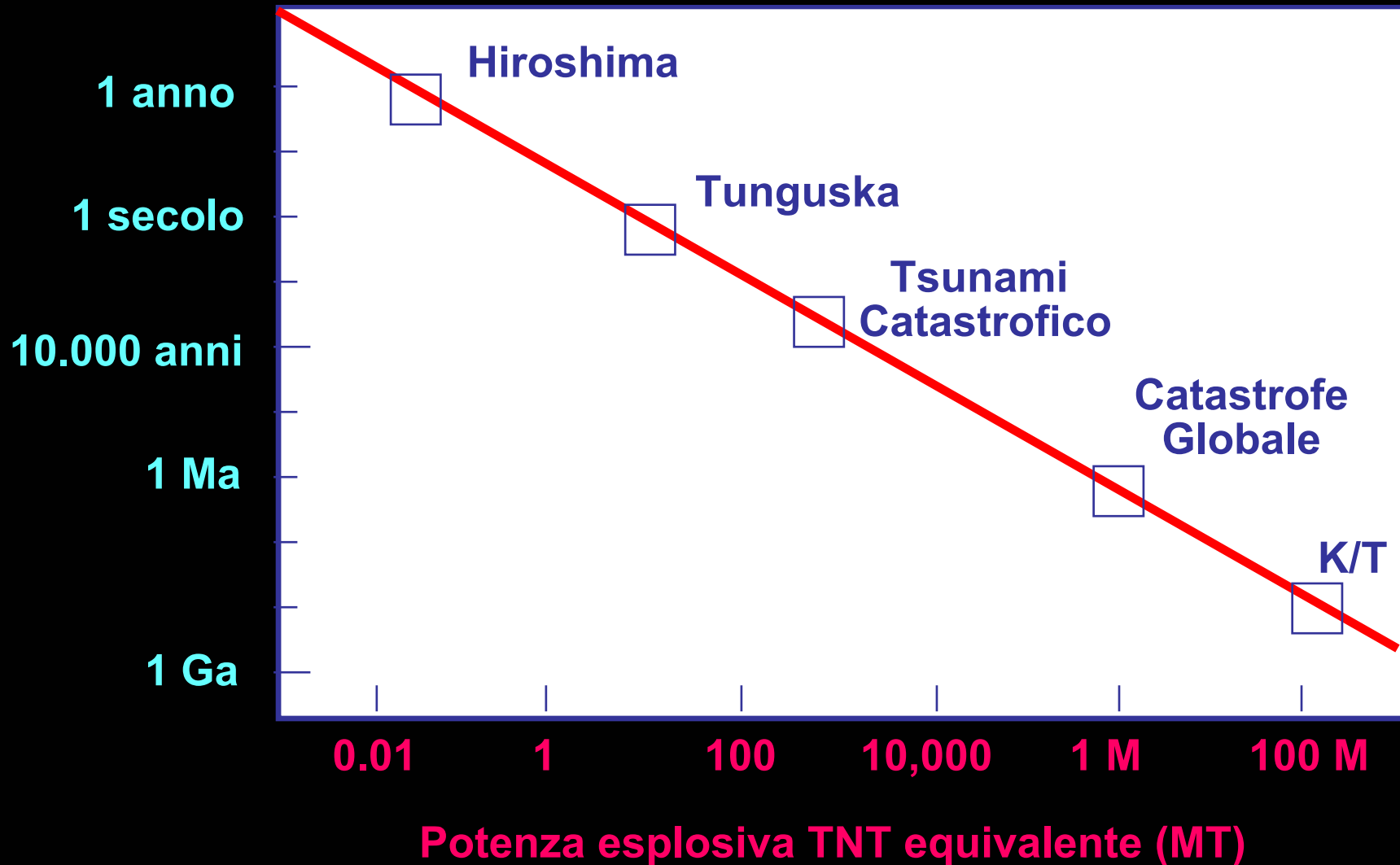


Earth **Sterilizing** Impact



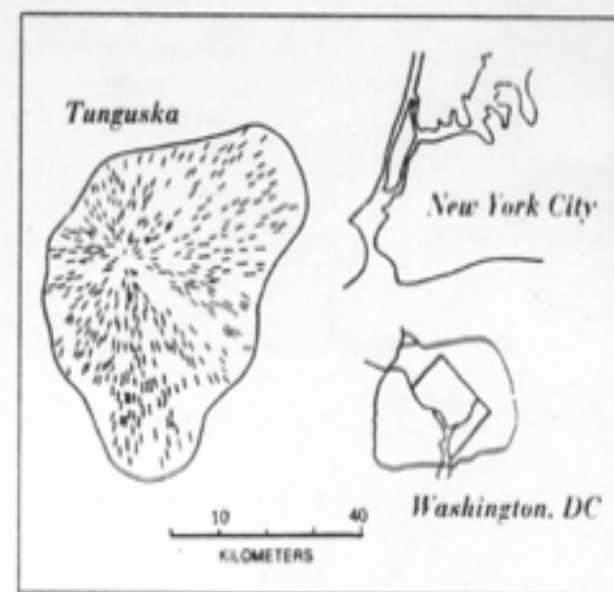


FREQUENZA





Photograph courtesy of the Smithsonian Institution

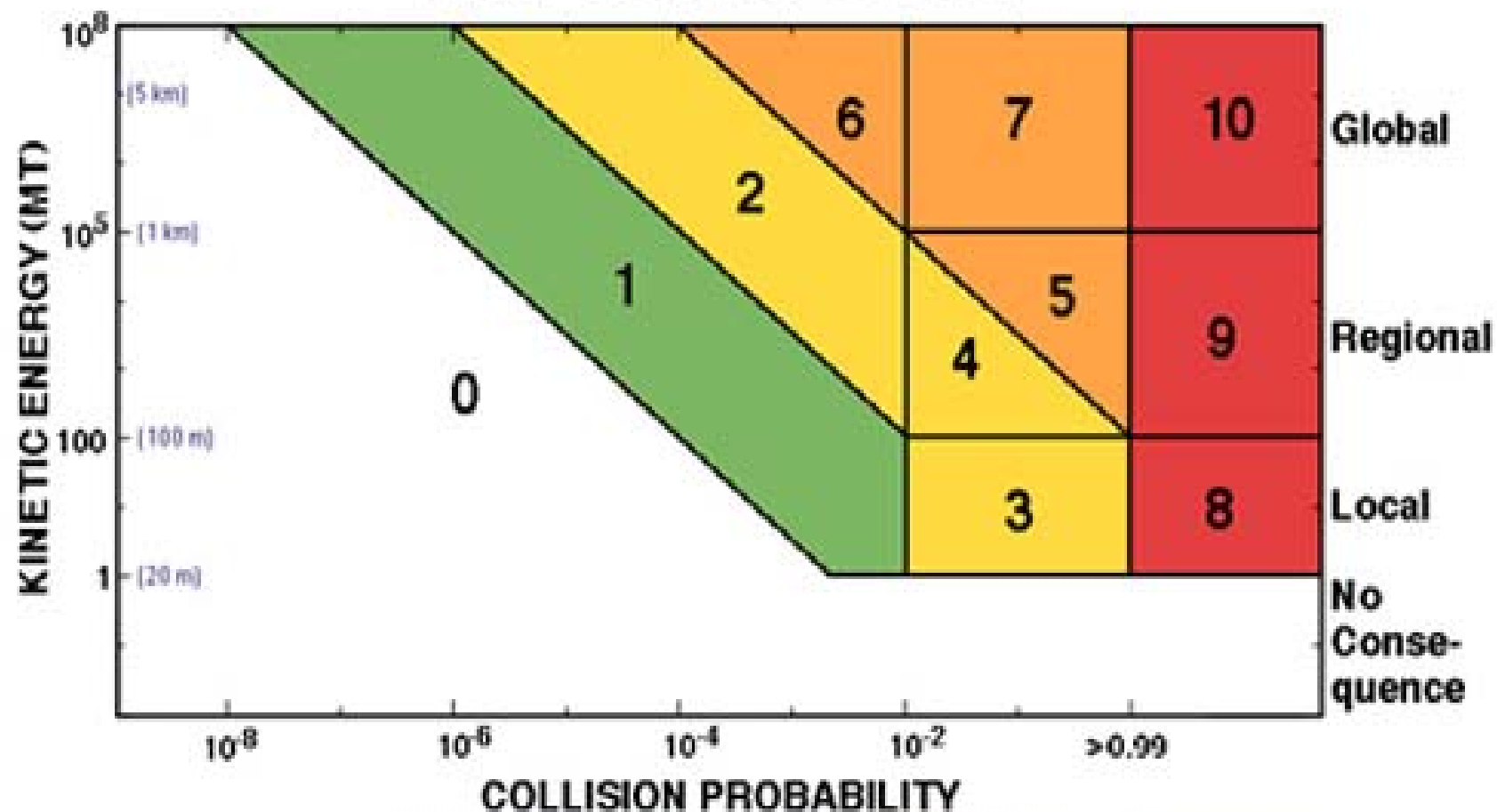


Tunguska in perspective

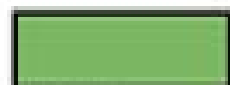
Type of event	Diameter of impactor	Average fatalities per impact	Typical interval (years)
High atmospheric break-up	<50m	close to zero	frequent
Tunguska-like events	50m to 300m	5,000	250
Large sub-global event	300m to 1.5km	500,000	25,000
Low global effect threshold	>600m	1.5 billion	70,000
Nominal global effect threshold	>1.5km	1.5 billion	500,000
High global effect threshold	>5km	1.5 billion	6 million
Rare K/T scale events (of type associated with extinction of dinosaurs)	>10km	6 billion	100 million

ESTIMATED FATALITIES for a wide variety of different impact scenarios
(after Chapman & Morrison, 1994, *Nature* **367**, 33)

The Torino Scale



Events having
no likely
consequences.



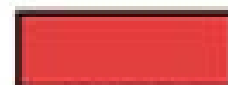
Events
meriting careful
monitoring.



Events
meriting
concern.



Threatening
events.

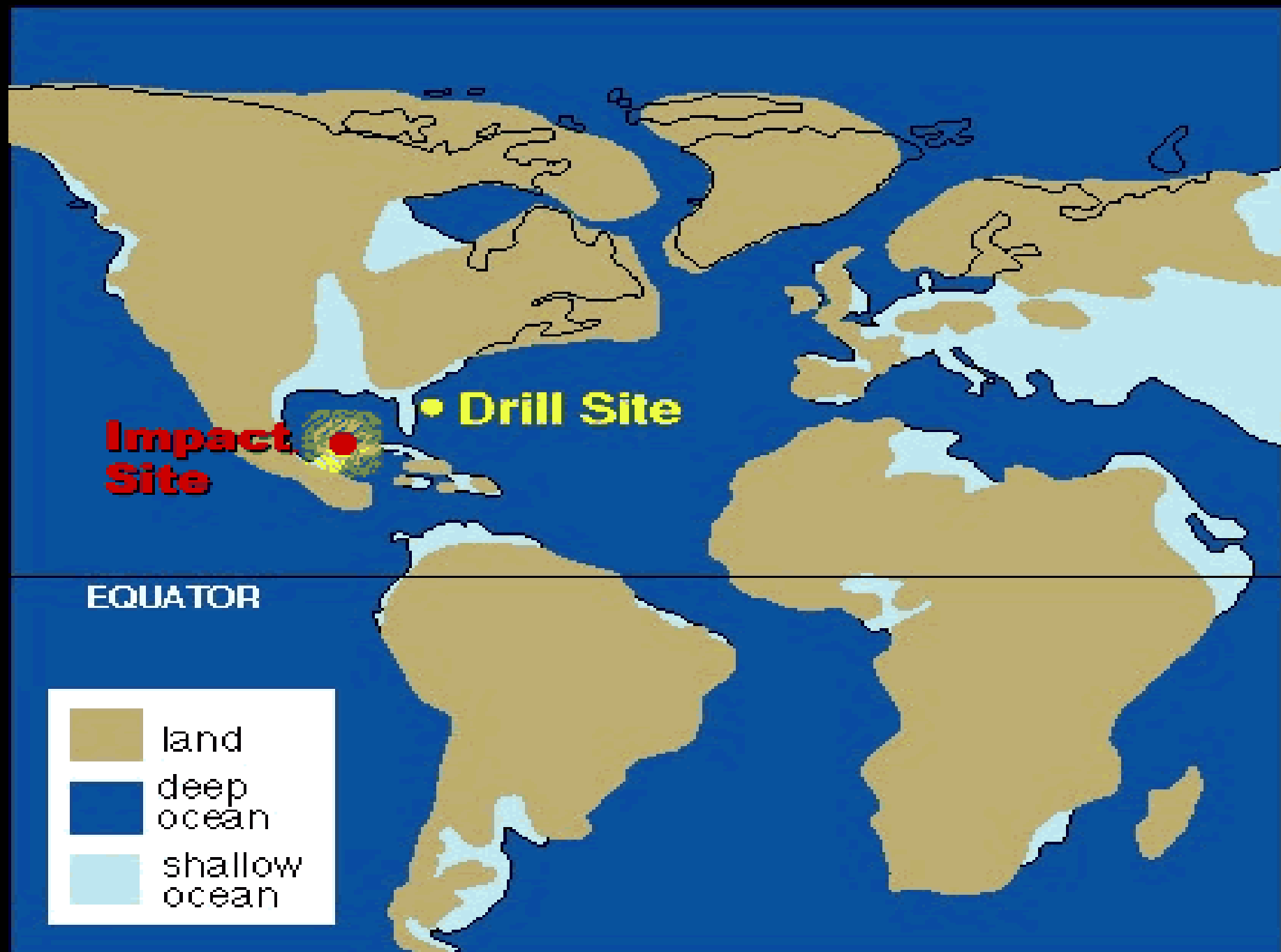


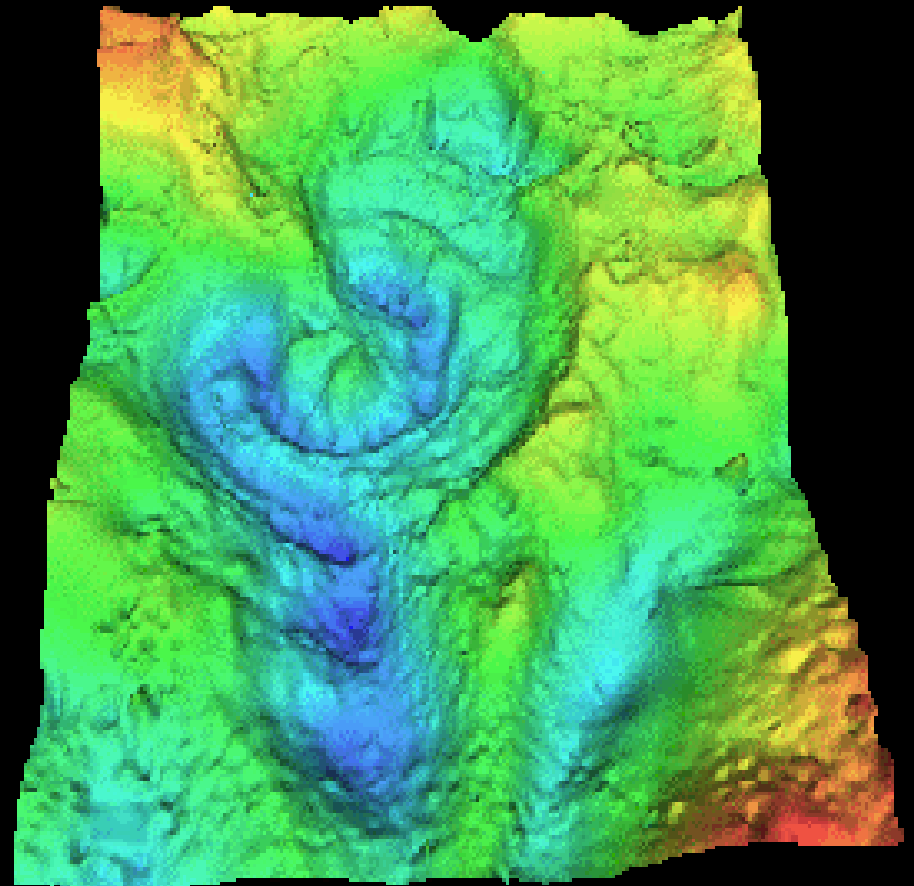
Certain
collisions.

LE ESTINZIONI DI MASSA



- **PRECAMBRIANO**
- **VENDIANO**
- **CAMBRIANO**
- **ORDOVINCIANO**
- **DEVONIANO**
- **PERMIANO**
- **CRETACEO/TERZIARIO**
- **OLOCENE**





Chicxulub, Yucatan (Messico)

Il confine stratigrafico K-T

