Pluto and Impacts

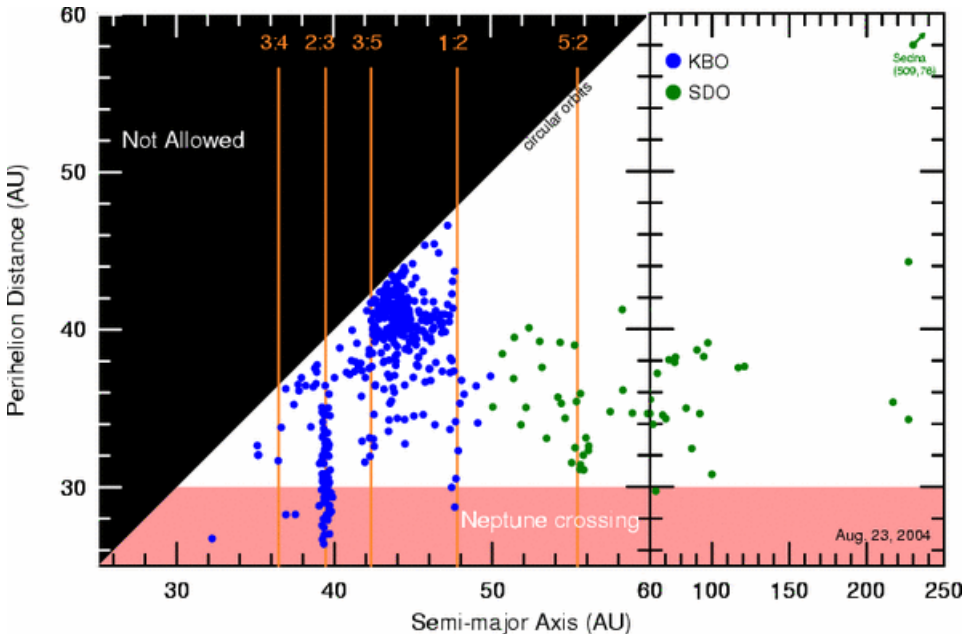
11-21-2005

Opening Discussion

- Do you have any questions about the quiz?

Pluto and Xena

- For obvious reasons, your book can only discuss Pluto, but the discovery of Xena makes the stance of the text even stronger. Pluto is really a large KBO, not a planet.
- Studying Pluto could tell us a lot about this population of bodies.

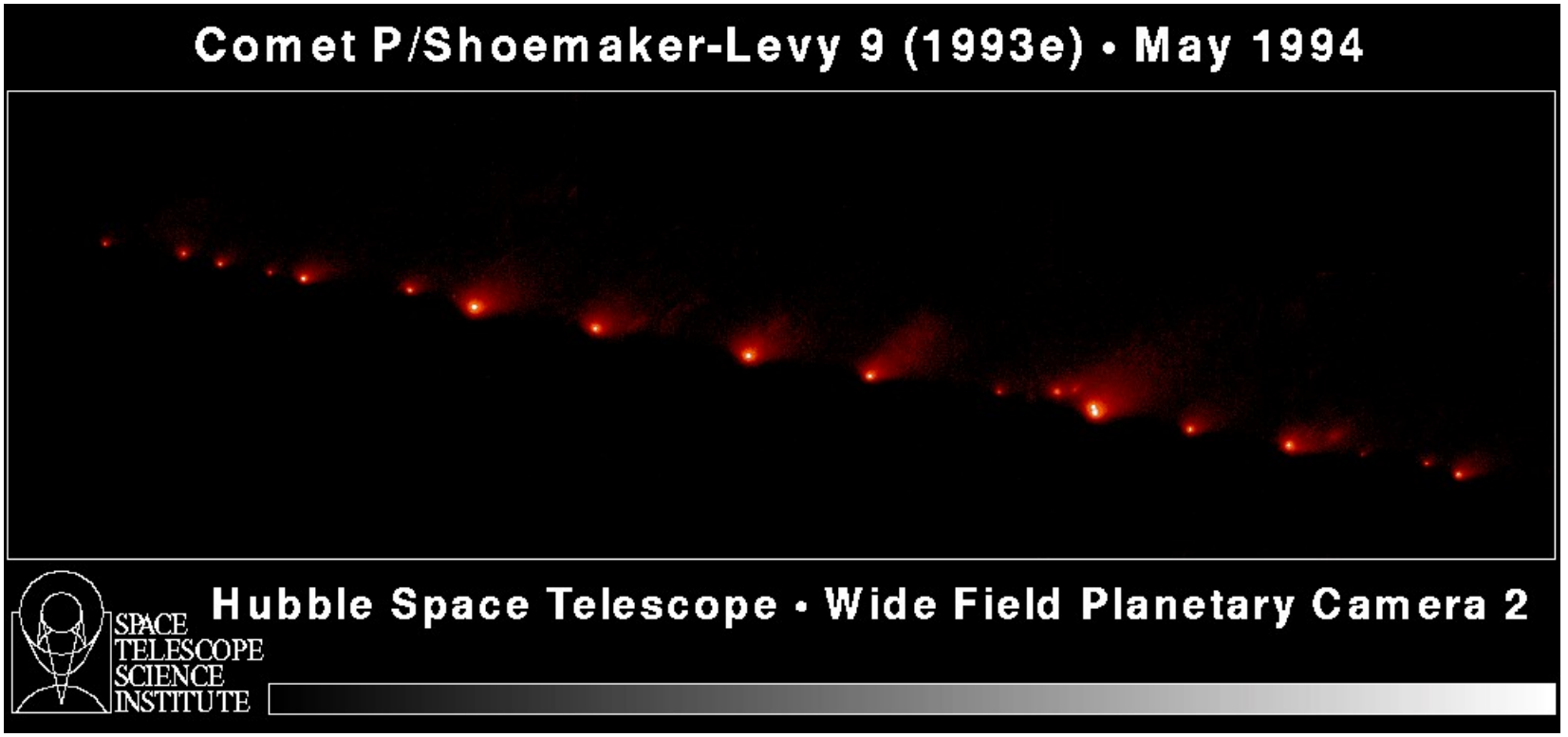


Impacts

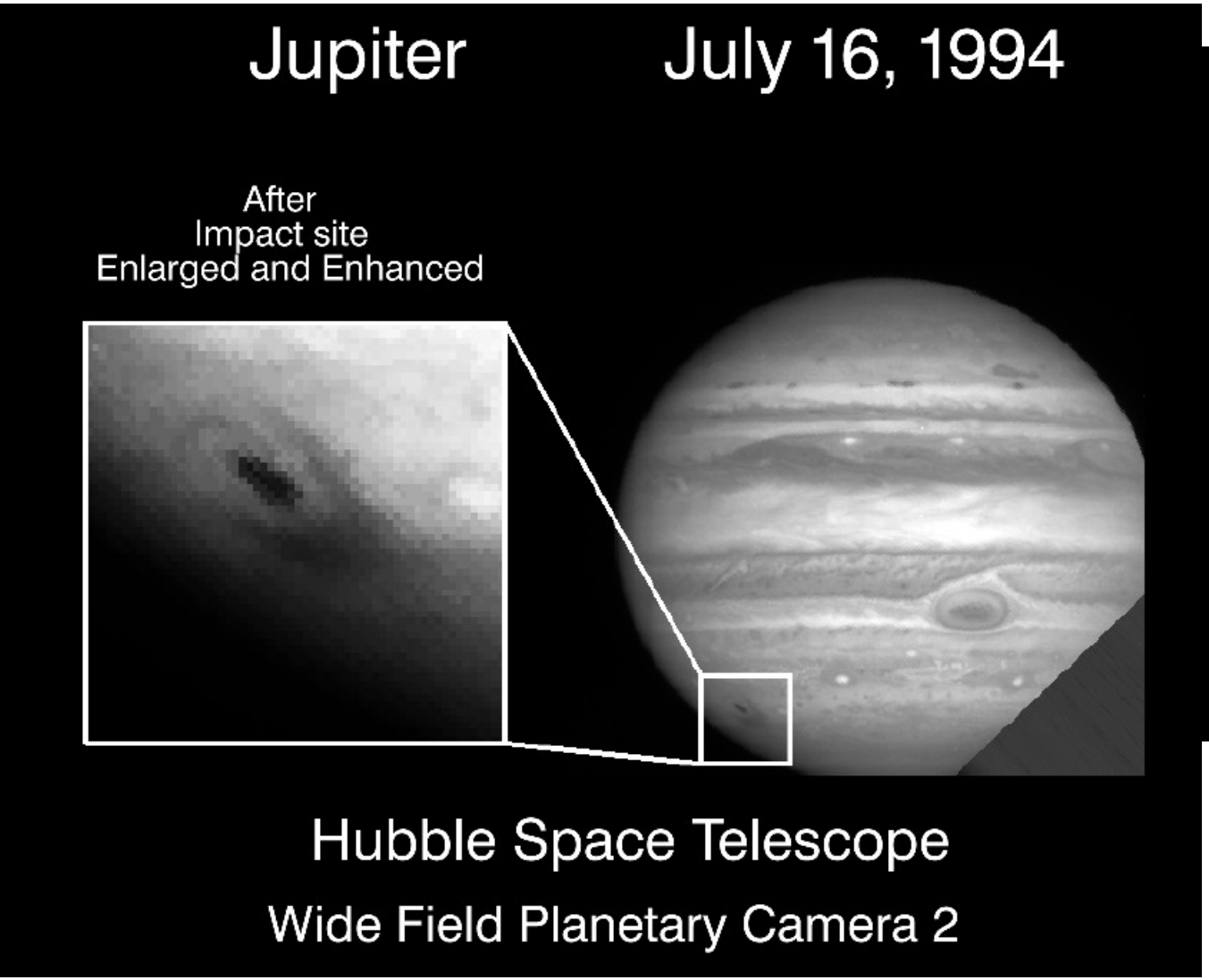
- We have talked a lot about impacts in this class. We have stated that a giant impact likely formed our Moon. We see ample craters on many of the solid bodies in our solar system providing evidence of collisions.
- Not all of these collisions occurred in the ancient past. The highest rate of impacts was during the heavy bombardment when the extra material in the solar system was being cleared out. There are still many small bodies flying about though and occasionally they still run into the planets and moons.

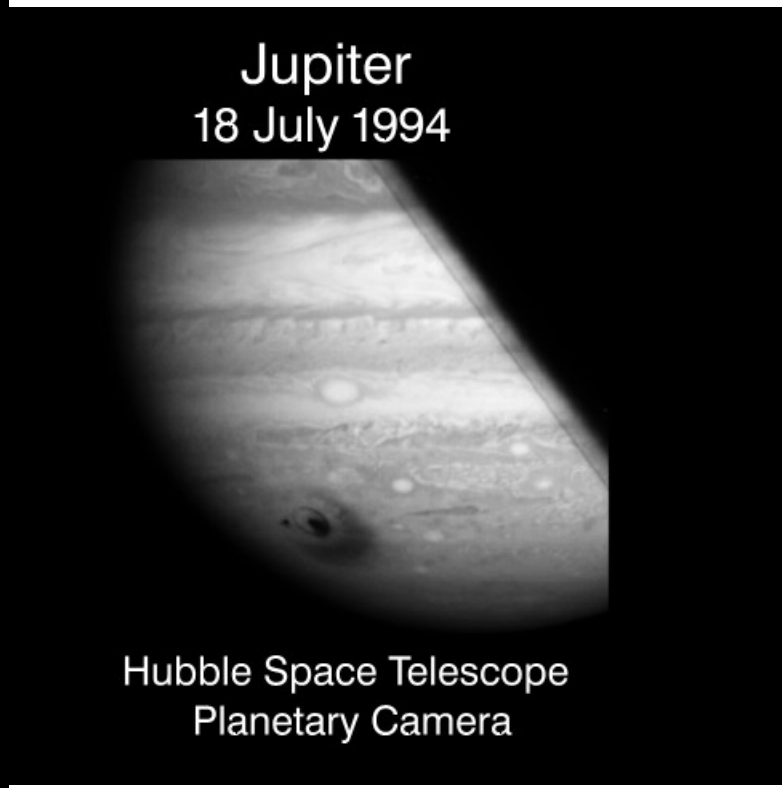
•Shoemaker-Levy 9

- The assertion that impacts still happen went from theory to reality in 1994 when we were able to observe SL9 slamming into Jupiter.



Impact Sites





Impacts on the Earth

- We see evidence of impacts on the Earth as well. Because of erosion, these are difficult to find unless they are fairly recent. More than 100 have been identified.
- Meteor crater shown here was made 50,000 years ago by an asteroid roughly 50m across.

Mass Extinctions

- The fossil record indicates that there have been several times during the history of the Earth when the vast majority of all life, and even the majority of all species, have been killed in a geologically short period of time.
- The most recent of these included the extinction of the dinosaurs 65 million years ago. Roughly 99% of all creatures and 75% of all species on Earth were killed.
- This was actually a fairly small extinction event compared to others in which 90% of all species have been killed.

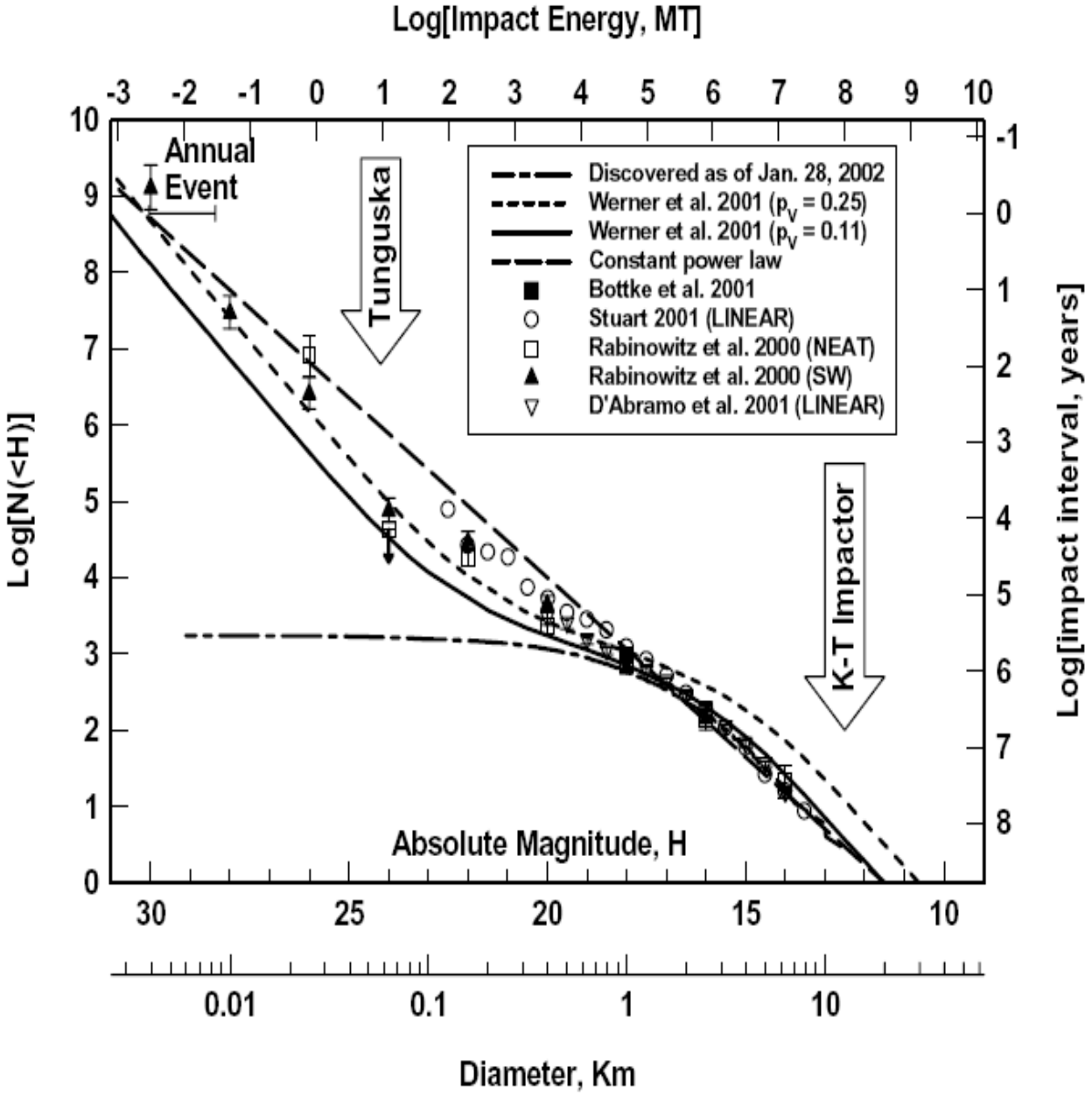
Impacts and Mass Extinctions

- The layer of dirt that separates the Cretaceous and Tertiary sediment layers (the point of dinosaur extinction) shows evidence of a large impact. The layer is high in iridium and other rare Earth metals. It has shocked quartz and spherical rock “droplets”. It also contains soot as would be produced by fires. In 1991 a crater from roughly the right time was found at the edge of the Yucatan peninsula. The crater is 200 km across indicating an impactor roughly 10 km across.
- The impact itself would only kill off things nearby. Ejecta and longer term atmospheric changes did the rest.

Recent Impacts

- In 1908 a fireball was seen streaking across the sky of Siberia. It exploded leveling trees, breaking windows, and knocking people off their feet hundreds of miles away.

Impact Probabilities



Minute Essay

- The plot on the previous slide is really only for asteroids and the searches that are being done are of the Near Earth Asteroid population. Comets can also hit the Earth and a 20 km comet would also cause a mass extinction. Why aren't scientists searching for all the comets that could hit the Earth?