



Credit:NASA

# Grove K. Gilbert (1843-1918)



1879-1918: USGS

## THE MOON'S FACE; A STUDY OF THE ORIGIN OF ITS FEATURES.

BY  
G. K. GILBERT.

ADDRESS AS RETIRING PRESIDENT.

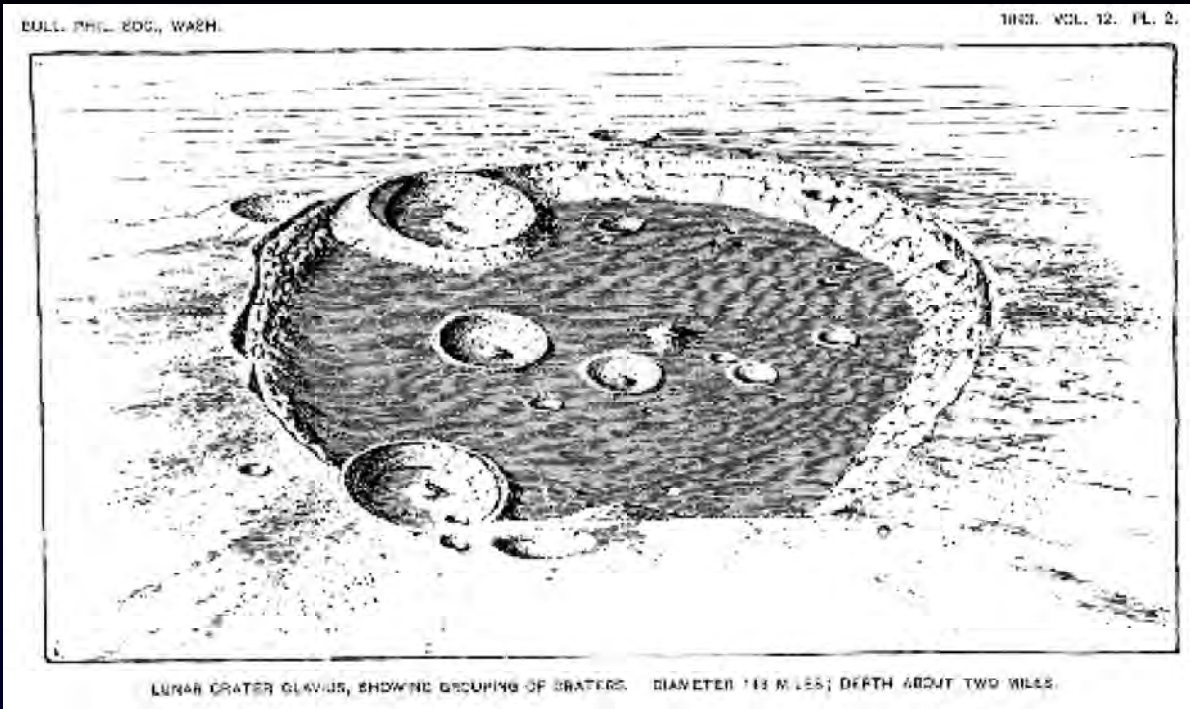
*Delivered December 10, 1892.*

The face which the moon turns ever toward us is a territory as large as North America, and, on the whole, it is perhaps better mapped. As its surveyor, even if armed with the most powerful of telescopes, is still practically several hundred miles away, his map does not represent the smallest features; but as all parts are equally accessible and as he has labored industriously these many years, there is no remaining space on which to write the legend "unexplored." Upon his map are a score of great plains with dark floors, which he calls maria; there are a score of mountain chains; there are a few trough-like valleys remarkable for their straightness; there are many thousand circular valleys with raised rims, which it is convenient this evening to call craters, although for the purposes of detailed description

### First Impact Experiments:

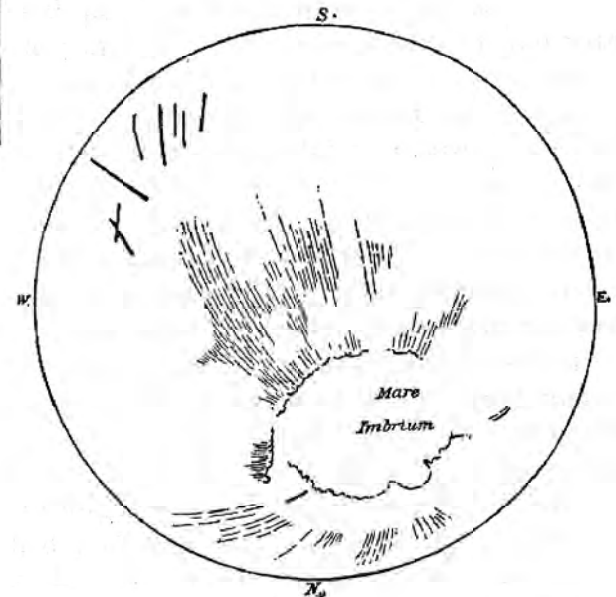
- dropped heavy bodies into a soft mixture of tobacco-pipe clay and water
- pot of boiling alabaster

# "The Moon's Face: A study of the origin of its features" By G.K. Gilbert (Philosophical Society of Washington Bulletin 12)



"Lunar crater Clavius, showing grouping of craters. Diameter 149 miles; Depth about two miles"

**Cryptovolcanic Structures:**  
caused by gas explosions due to heat rising from magma that never reached the surface



**Coon Bute=Barringer Crater = Meteor Crater, Arizona  
"Geoblemes"**

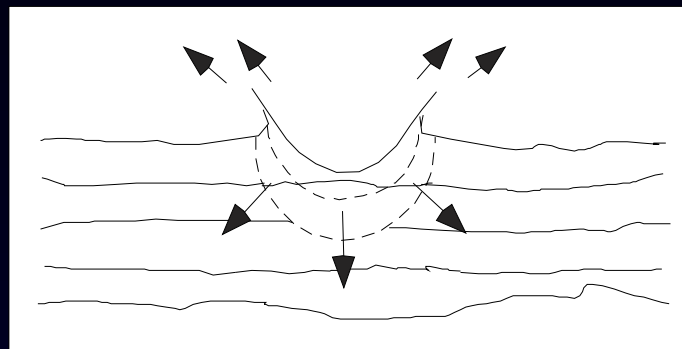


# Robert S. Dietz (1914-1995)



Appointed by Barringer Crater Company

Collisional explosion directly above the rocks



**"Astroblemes"**

- Ries and Steinheim craters, Germany
- Vredefort Crater, South Africa

**Troy I. Pewe, during 1998 Penrose Medal:**

**"It is not too bold to assert that Dietz's contribution to our understanding of the process of meteoric impact and to widespread occurrence of impact structures on Earth has contributed significantly to the awakening of the geologic community to the importance of catastrophic events in Earth's history, even their possible detrimental impact on certain life forms."**

# Daniel M. Barringer ( -1929)



Enjoyed quoting his wife's description of him as "half gentleman and half savage"

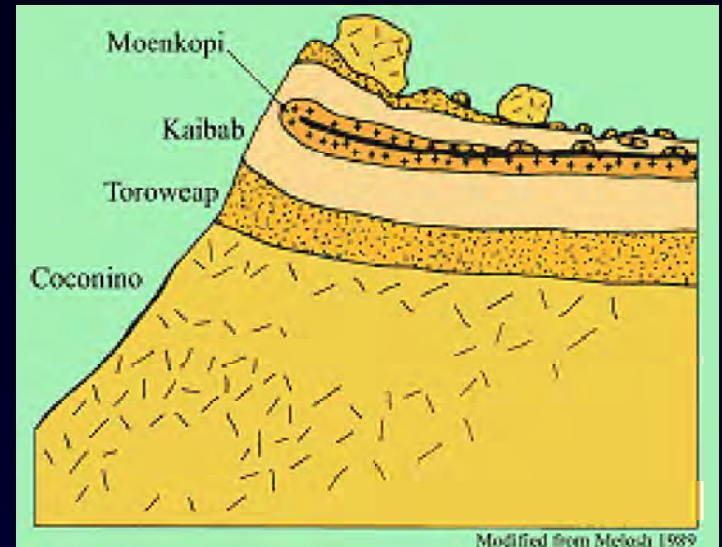
Barringer Crater Company (1903-Present)

1925 - He estimate of its size had risen to 10 million tons, and he was envisioning an ultimate profit of \$250,000,000 on a \$500,000 investment.

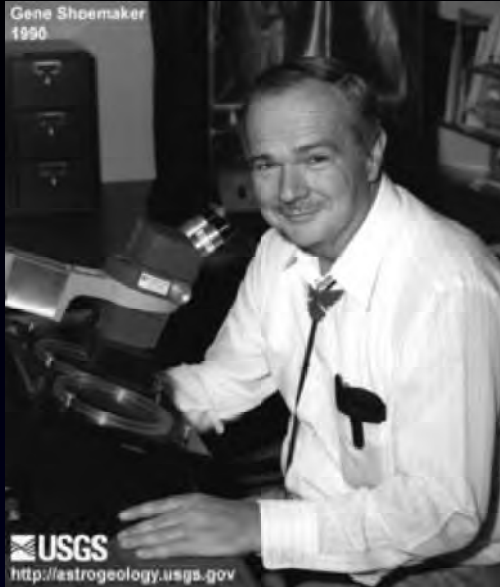
Early 1929: meteorite had probably vaporized as a result of the force of the impact.

September 11, 1929: Further operations suspend

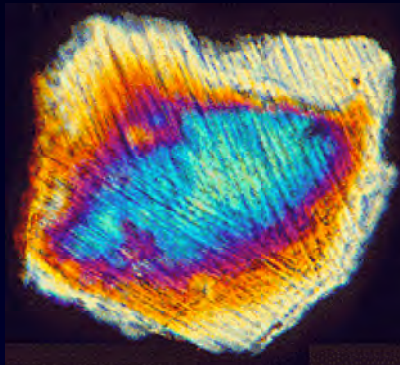
November 23, 1929



# Eugene Shoemaker (1928-1997)



**Coesite**



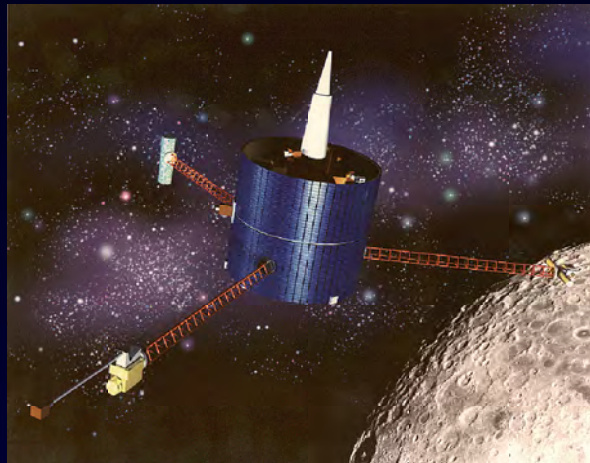
**Contains parallel cleavage  
formed only at high P**



**National Medal Science (1992)**



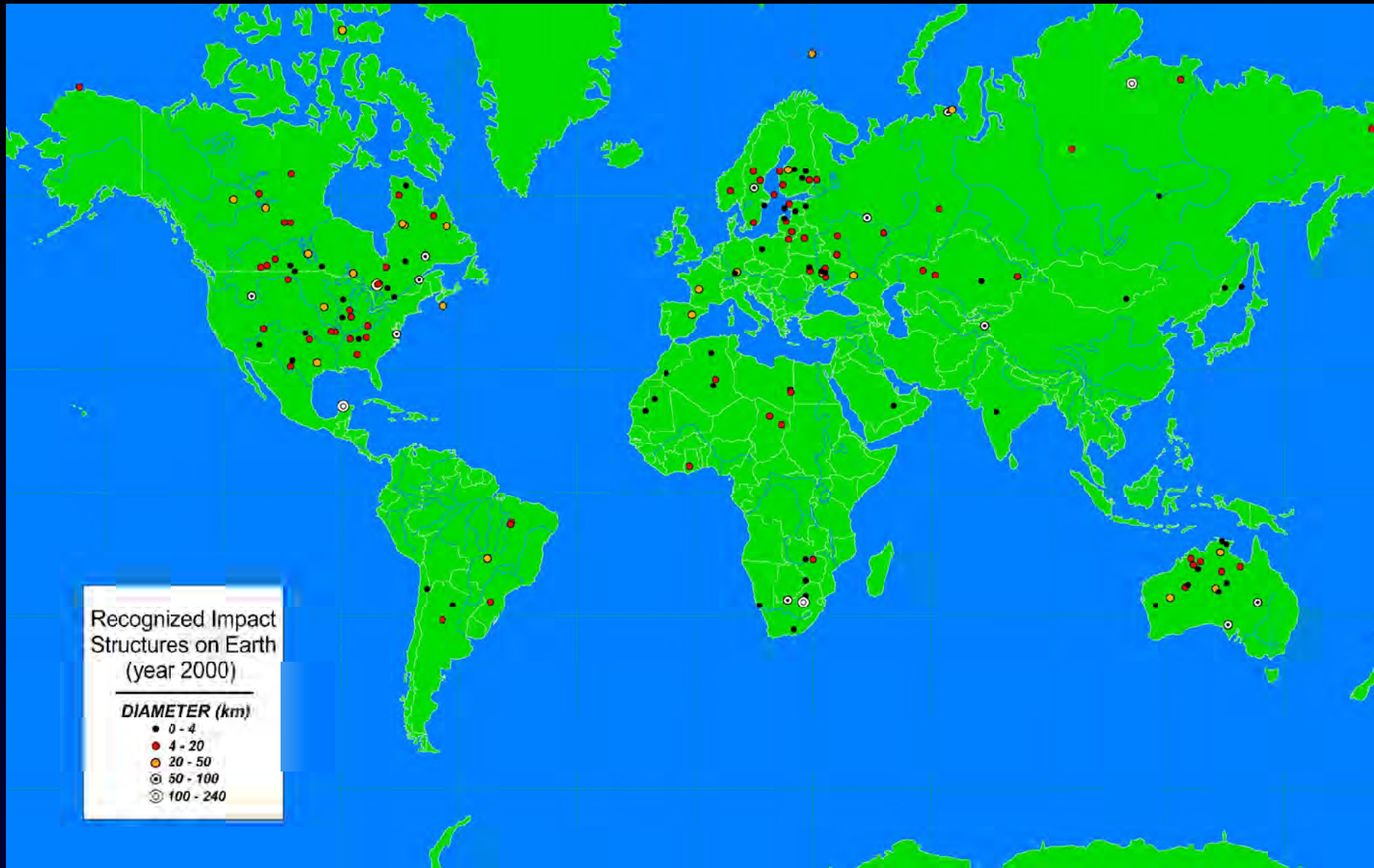
# Shoemaker-Levy 9



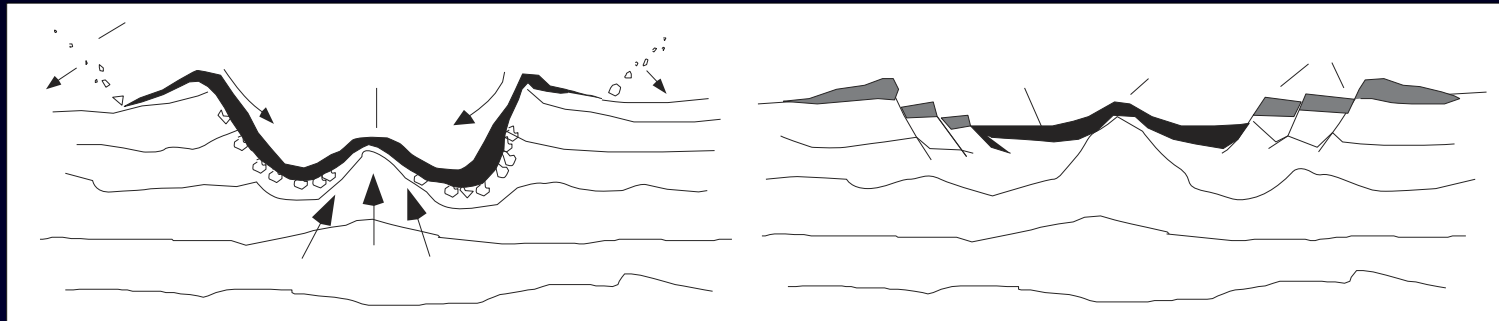
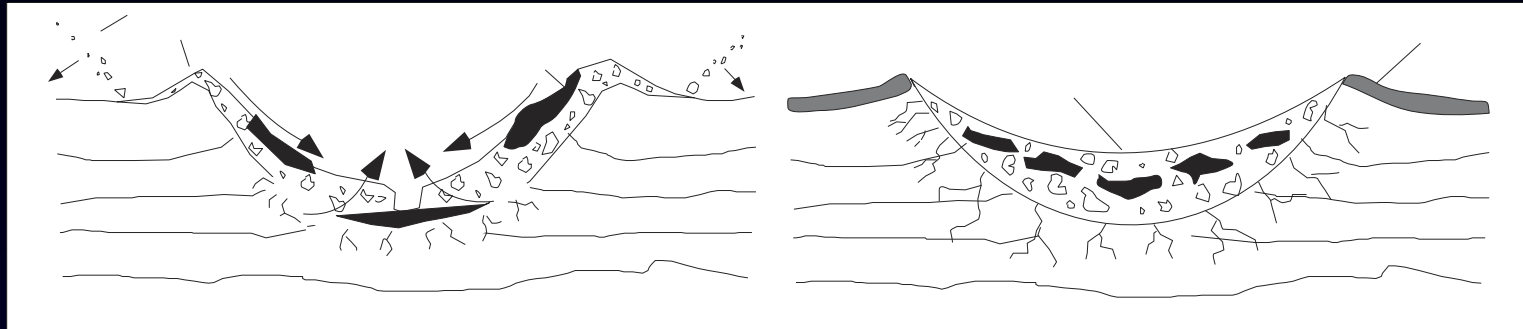
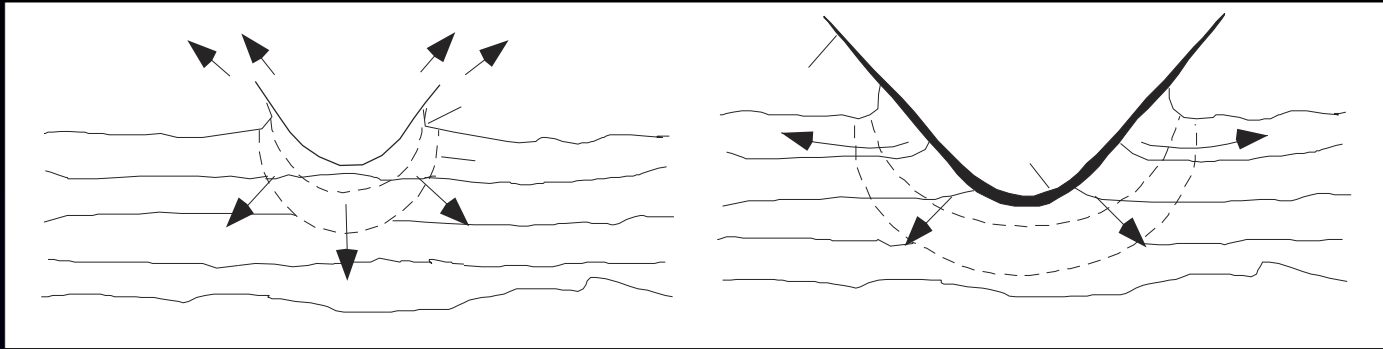
## Lunar Prospector

Ashes carried January 1998

# 174 Identified Impact Structures On Earth



# Impact Cratering as a Geologic Mechanism



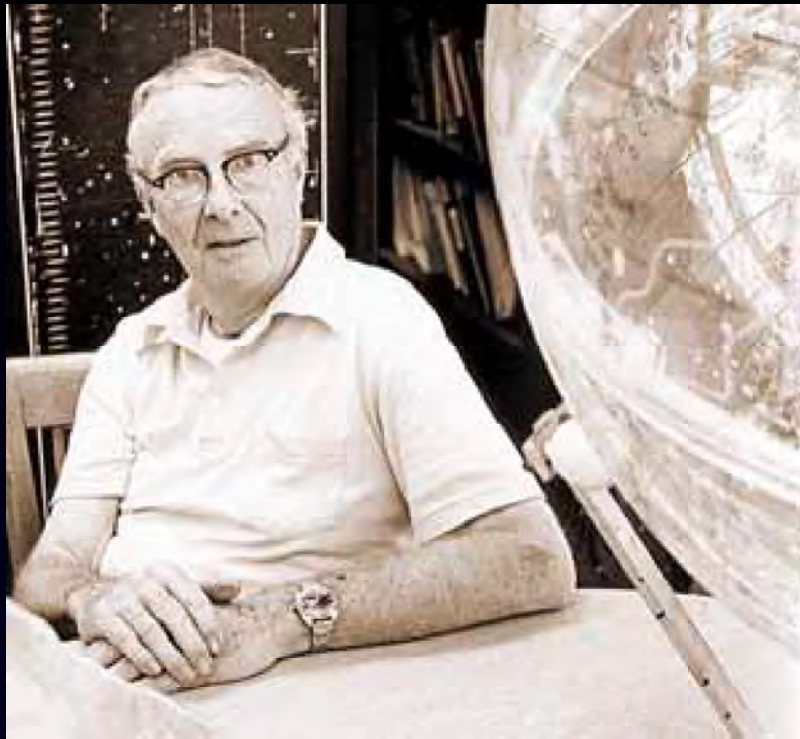


**Meteor Crater, Arizona**  
**Diameter: 1.2 km**  
**Age: 49,000 +/- 3,000 years**

**Vredefort, South Africa**  
**Diameter: ~300 km**  
**Age: 2,023 +/- 4 million years**



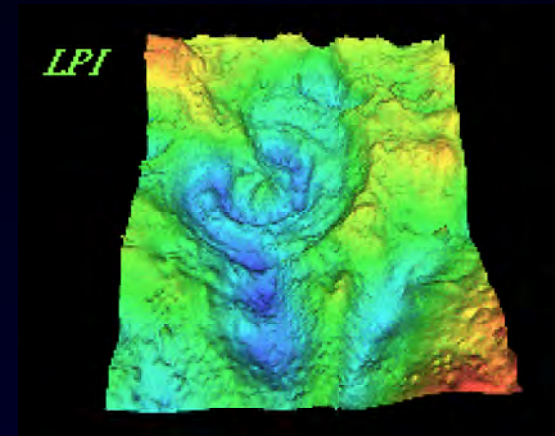




# Luis Alvarez

## Chicxulub Crater

Diameter: ~180 km  
Projectile: ~20 km



Luis Alvarez, his geologist son  
Walter Alvarez, nuclear chemist  
Frank Asaro, and paleontologist  
Helen Michael (right to left)