FLUIDS

Unit 18, Dr. John P. Cise, Professor of Physics, Austin Com. College, Austin, Texas USA
jpcise@austincc.edu & New York Times April 18, 2018 , Dedicated to Bill Niy, the science guy

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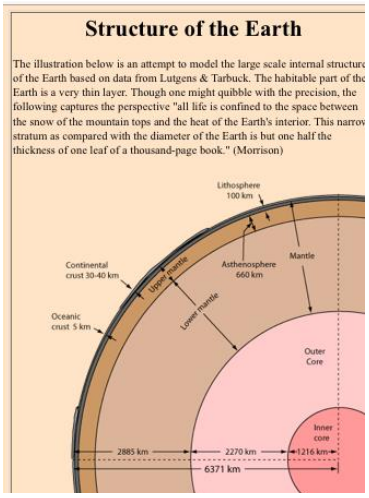
Diamonds in a Meteorite May Be a Lost Planet's Fragments

By NICHOLAS ST. FLEUR, APRIL 18, 2018

Fragments of the 2008 TC3, or Almahata Sitta, meteorite that fell to Earth in 2008. The diamonds discovered inside one of the fragment may have come from a protoplanet that orbited the sun billions of year



Structure of the Earth

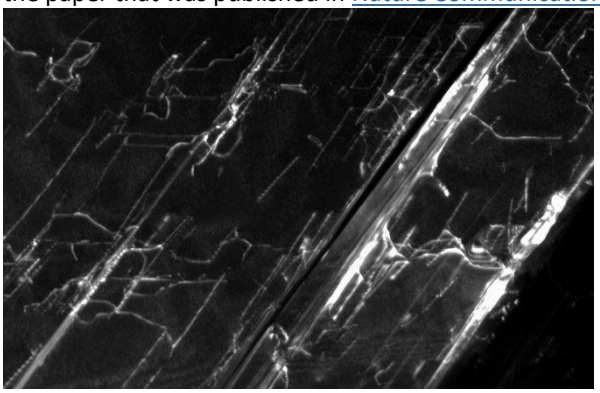
	Thickness (km)	Density (g/cm^3)
Crust	30	2.2
Upper mantle	720	3.4
Lower mantle	2,171	4.4
Outer core	2,259	9.9

8 more rows

Structure of the Earth - HyperPhysics Concepts

In 2008, chunks of space rock crashed in the deserts of Sudan. Diamonds discovered inside one of the recovered meteorites may have come from a destroyed planet that orbited our sun billions of years ago, scientists said on Tuesday. If confirmed, they say, it would be the first time anyone has recovered fragments from one of our solar system's so-called "lost" planets.

"We have in our hands a piece of a former planet that was spinning around the sun before the end of the formation of today's solar system," said Philippe Gillet, a planetary scientist at the Federal Institute of Technology in Lausanne, Switzerland and an author of the paper that was published in Nature Communications.



A transmission electron microscopy image of one of the diamonds recovered from the meteorite.

INTRODUCTION: Purpose of this application is to confirm statement at bottom of page here.

QUESTIONS: (a) Convert 400 mi. to meters?, (b) Convert 3.4 g./cm.^{3} to kg./m^3 ?, (c) Find pressure (P) 400 mi. below earth's surface?, (d) Does article and computed come close?

HINTS: 1609 m./mile, g = 9.8 m./s.^{2} , pressure under any fluid (earth included) = (density) (g)(depth) = ρ g h , g./cm.^{3} = 10^3 kg./m.^{3} Giga = 10^9 ,

ANSWERS: (a) 6.436 X 10^5 meters , (b) 3.4 kg./m.^{3} , (c) 21.3 X 10^9 N/m.^{2} or 21.3 giga Pa , (d) Quite close

Dr. Gillet's colleague Farhang Nabiei made the discovery while taking high-resolution images of a meteorite that had landed in the Nubian Desert in Sudan about a decade ago. **The space rock is classified as ureilite,** a type of rare meteorite that has embedded within it several different types of minerals. And inside this one, they found diamonds. The nano-sized gems were much larger than any meteorite diamond that had been previously found, according to Dr. Gillet. Upon further inspection the team noticed that the diamonds were far from crystal clear. They were riddled with tiny imperfections, called inclusions, made of chromite, phosphate and iron-nickel sulfides.Those flaws made the diamond extraordinary. Our solar system was born of chaos. Some 4.5 billion years ago, prevailing theories hold that dozens of chunks of rock and dust, called protoplanets, circled our sun and collided with each other like cosmic billiard balls. Eventually, the collisions forged the rocky planets that we know today — Mercury, Venus, Mars and, of course, Earth. The inclusions in the meteorite's diamonds told of a similarly turbulent past. Because of the diamonds' size and chemistry, Dr. Gillet and **his team concluded that the diamonds (((formed under intense pressure, of about 20 giga-pascals, which is close to the pressure seen 400 miles below Earth's)))** surface where the upper mantle transitions into the lower mantle.