New calculations show Earth's core is much younger than thought

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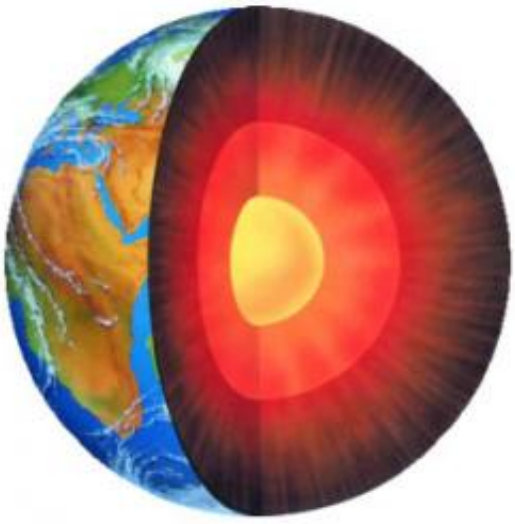

An artist's conception of Earth's inner and outer core.

A trio of researchers in Denmark has calculated the relative ages of the surface of the Earth versus its core and has found that the core is 2.5 years younger than the crust. In a paper published in the *European Journal of Physics*, U I Uggerhøj and R E Mikkelsen with Aarhus University and J Faye with the University of Copenhagen, describe the math involved in their effort and their results.

During one of his famous lectures at Caltech in the 1960's, Richard Feynman remarked that due to time dilation, the Earth's core is actually younger than its crust—a difference he suggested that was likely a "day

or two." Since that time, physicists have accepted both the notion that the core is younger than the surface, and the amount of time given by Feynman, without checking the math.

General relativity suggests that really big objects, like planets and stars, actually warp the fabric of spacetime, which results in a gravitational pull capable of slowing down time. Thus, an object closer to Earth's center would feel a stronger pull—a clock set near the core would run slower than one placed at the surface, which means that the material that makes up the core is actually younger than the material that makes up the crust. This seems counterintuitive to our sense of reason. Such oddities have long been taken for granted in physics, as has the degree of time difference offered by Feynman during his lecture. In this new effort, the research trio ran the math to discover the actual number involved. They found that over the course of our planet's 4.5 billion year history, the pull of gravity causes the core to be approximately 2.5 years younger than the crust—ignoring geological processes, of course.

The findings by the team not only serve as an example of the influence of gravity over time, but the problems that can arise when scientists take the words of famous colleagues at face value, simply because of their prestige. No one should be above review, of course, which, as many who knew Feynman can attest, was one of his mantras.

More information: U I Uggerhøj et al. The young centre of the Earth, *European Journal of Physics* (2016). DOI: 10.1088/0143-0807/37/3/035602