

**Science News**

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**It's a Small World, After All: Earth Is Not Expanding, NASA Research Confirms**

ScienceDaily (Aug. 17, 2011) — A NASA-led research team has confirmed what Walt Disney told us all along: Earth really is a small world, after all.

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Since Charles Darwin's time, scientists have speculated that the solid Earth might be expanding or contracting. That was the prevailing belief, until scientists developed the theory of plate tectonics, which explained the large-scale motions of Earth's lithosphere, or outermost shell. Even with the acceptance of plate tectonics half a century ago, some Earth and space scientists have continued to speculate on Earth's possible expansion or contraction on various scientific grounds.

Now a new NASA study, published recently in *Geophysical Research Letters*, has essentially laid those speculations to rest. Using a cadre

of space measurement tools and a new data calculation technique, the team detected no statistically significant expansion of the solid Earth.

So why should we care if Mother Nature is growing? After all, Earth's shape is constantly changing. Tectonic forces such as earthquakes and volcanoes push mountains higher, while erosion and landslides wear them down. In addition, large-scale climate events like El Nino and La Nina redistribute vast water masses among Earth's ocean, atmosphere and land.

Scientists care because, to put movements of Earth's crust into proper context, they need a frame of reference to evaluate them against. Any significant change in Earth's radius will alter our understanding of our planet's physical processes and is fundamental to the branch of science called geodesy, which seeks to measure Earth's shape and gravity field, and how they change over time.

To make these measurements, the global science community established the International Terrestrial Reference Frame. This reference frame is used for ground navigation and for tracking spacecraft in Earth orbit. It is also used to monitor many aspects of global climate change, including sea level rise and its sources; imbalances in ice mass at Earth's poles; and the continuing rebound of Earth's surface following the retreat of the massive ice sheets that blanketed much of Earth during the last Ice Age.

But measuring changes in Earth's size hasn't exactly been easy for scientists to quite literally "get their arms around." After all, they can't just wrap a giant tape measure around Earth's belly to get a definitive reading. Fortunately, the field of high-precision space geodesy gives scientists tools they can use to estimate changes in Earth's radius. These include:

- Satellite laser ranging — a global observation station network that measures, with millimeter-level precision, the time it takes for ultrashort pulses of light to travel from the ground stations to satellites specially equipped with retroreflectors and back again.
- Very-long baseline interferometry — a radio astronomy technology that combines observations of an object made simultaneously by many telescopes to simulate a telescope as big as the maximum distance between the telescopes.
- Global Positioning System — the U.S.-built space-based global navigation system that provides users around the world with precise location and time information.



This view of Earth comes from NASA's Moderate Resolution Imaging Spectroradiometer aboard the Terra satellite. (Credit: NASA)

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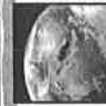
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