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Earth's waistline could be expanding

By Marsha Walton

CNN Sci-Tech

(CNN) --The Earth's gravity field has bulged more in the middle in the past four years and scientists suspect that the same is true for the planet itself.

The observations, based on satellite measurements, reverse a trend at least two decades in the making in which the planet and its gravity field became progressively more round.

Chris Cox, a geological researcher at Raytheon Information and Technology Services who is working with NASA, said the changes, whatever the cause, have "no scary consequences."

Much of the knowledge about Earth's gravity field has emerged only in the past 30 to 40 years, with the measurements made possible by satellites.

"As time has progressed, we've gotten better data from more satellites, and faster computers," Cox said.

Cox and colleague B.F. Chao at NASA Goddard Space Flight Center detail changes in the Earth's mass in this week's edition of the journal Science.

Much of their research involves combining the measurements made by nine different satellites. Experts said such information does a good job of simulating the large-scale features of Earth's gravitational field.

In general, the Earth has more of a pumpkin shape than that of a perfect sphere, wider around the equator than the poles. But that shape has gradually been shifting.

Between 1979 and 1997, researchers have observed in satellite data evidence of "postglacial rebound." It relates to the resurgence since the end of the last Ice Age of the Earth's mantle, the region underneath the crust and extending down the core.

Ice caps at the time, more than 10,000 years ago, were so massive that they actually squished the Earth from the "top and bottom."

"If you think of the Earth as a rubber ball, it is still kind of squished," said Cox. "As this 'rubber ball' bounces back, the Earth becomes less flat, less oblate."

The rebound is still happening, but since 1997 a different and more puzzling geologic pattern has emerged, according to Cox.

The researchers say neither rising global sea levels nor faster glacial ice melting could produce such a sharp change in the gravity field measurements.

Something else is moving mass from the high latitudes to the low latitudes nearer the Equator, causing a suspected bigger bulge around the middle.

Researchers are looking at changes in ocean circulation as one possible explanation for the changes.

The beginning of the shift coincides with the arrival of the strongest El Nino event of the century in 1997 and 1998.

El Nino is the periodic warming of ocean currents in the Pacific, a phenomenon that can bring dramatic climate changes to several continents.

In the coming months, researchers hope to gain more insight about the Earth's gravity field from twin satellites known as GRACE (the Gravity Recovery and Climate Experiment), which NASA launched in March.

GRACE has many missions, from gaining a better understanding of ocean surface currents, to measuring changes in sea floor pressure, to monitoring changes in water and snow on continents.

"GRACE should give us almost revolutionary advancement," Cox said.

While understanding the precise shape of our planet and its gravity field may seem like esoteric endeavors, the data could have a profound impact on everything from weather forecasting to agriculture to making sure there is enough fresh water to support life.

The long-term studies will pay off, Cox said.

"You're not going to see gravity change, or feel it. What these studies do is give us a better way to observe what's going on in the environment. And that will have an impact on our day to day activities."

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