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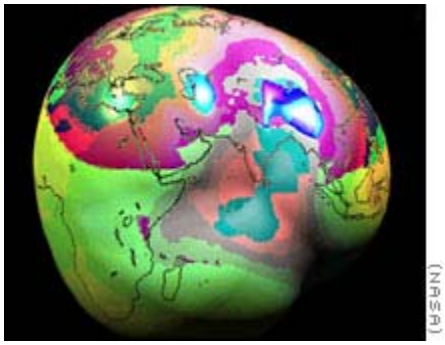
NASA satellite pair to tackle weighty task

January 1, 2002 Posted: 1:09 PM EST (1809 GMT)



An exaggerated map of Earth's "bumpy" gravity field

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By Amanda Barnett
CNN

(CNN) -- Ever have a particularly clumsy day and wonder if maybe the gravity is turned up a bit higher than other days?

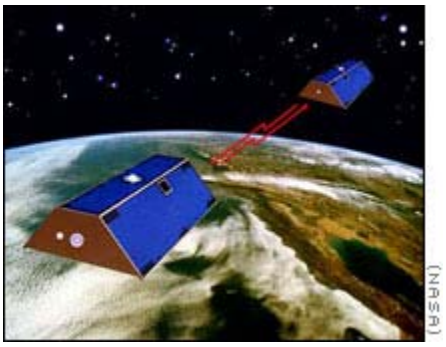
Could be.

A new NASA science mission scheduled for launch in March is aimed at finding out exactly what's up with that invisible, weighty stuff that holds us, and everything else, to the Earth.

"The best way to measure gravity it to drop an object in space and watch its trajectory," said Michael Watkins, the project scientist for the Gravity Recovery And Climate Experiment, or GRACE, at NASA's Jet Propulsion Laboratory.

GRACE involves a pair of satellites that will be launched on a Russian rocket, then "dropped" into orbit about 500 kilometers (about 300 miles) above Earth. As they settle into orbit, one will fall behind the other and trail it by 220 kilometers (137 miles).

The satellites will use super-sensitive microwave range finders to keep very close track of each other. If one satellite changes its trajectory by even one micron, that's about 1/50th the width of a human hair, the other satellite -- and the scientists monitoring the GRACE mission -- will notice.



A drawing of the twin GRACE satellites. The satellites will use a micrwave beam, depicted here by the red lines, to keep track of each other

Scientists will use an instrument called an accelerometer to measure other forces, like atmosphere and radiation pressure from the Sun. When they've accounted for the effects of those variables, any other changes in the motion of the satellites must be due to gravity, according to Watkins.

The data will be used to create the most detailed map to date of Earth's gravity,

100 times better than current maps.

"Every month during GRACE's 5-year expected lifetime we will get a map of Earth's gravitational field," said Watkins.

Scientists already know from existing research that Earth's gravity has bumps here and there -- places where the gravity is tugging a bit more strongly because of everything from movement in the Earth's mantle to variations in rainfall. The maps produced by GRACE are expected to produce a much more precise map of the bumps.

Watkins said it's also important to track gravity on a montly basis, because scientists want to pin down how much it fluctuates over time. Those fluctuations are caused in part by water moving around the Earth, cycling between oceans and polar ice caps.

By sensing gravity and mass fluctuations worldwide, GRACE will give researchers new data for studying the climate and geology of the Earth.

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