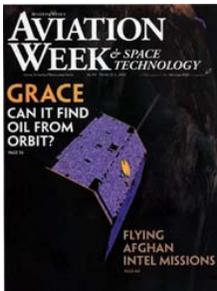


Amazing GRACE: NASA's Gravity Recovery and Climate Experiment M. Baguio¹ and GRACE Master Teachers², ¹University of Texas Center for Space Research and NASA's Texas Space Grant Consortium, 3925 W. Braker Lane, Suite 200, Austin, Texas 78759, baguio@csr.utexas.edu

Introduction: If Earth were a smooth sphere composed of similar elements or ingredients, there would be no need for a mission to study gravity; the assumption made in most introductory physics courses that the acceleration due to Earth's gravitational field has a constant value would indeed be correct – end of story. However, previous observations have clearly demonstrated that our Earth isn't smooth and homogeneous and it really isn't even a sphere. The reality is that the gravity field is continually changing, mostly due to variations in water content as it cycles between the atmosphere, oceans, continents, glaciers, and polar ice caps.

When *Popular Science* recognized GRACE as one of the top 100 "Best of What's New" and top 10 technological innovations after launch in 2002, expectations for the mission were high and GRACE has lived up to those lofty expectations. To date, hundreds of articles have been written worldwide [including *CNN*, *BBC*, *National Geographic*, and *the New York Times*] relating to climate and geohazards related applications of GRACE and its gravity field measurements.



The GRACE gravity field has improved the accuracy of our knowledge of Earth's gravity field by over 100 times. The approach to education and outreach by the GRACE team goes far beyond the mission and its findings as reported by the press. <http://www.csr.utexas.edu/grace/press>

The goal of the GRACE EPO program is to develop and promote materials, opportunities, and activities that enhance understanding how gravity changes on Earth and its link to climate variability and hydrology to teachers, students, and the general public. The general public is aware that climate change, hydrology, water storage, etc. are important



issues but many do not fully understand how GRACE is contributing to an improved understanding of these issues. We want the world to understand why gravity measurements should matter to them. We wish to cultivate citizens' abilities to understand the facts and

satisfy their own curiosity about how the Earth works, and ultimately promote a more scientifically literate society. Since the beginning of the mission, the GRACE team and its partners have generated informational products, developed curriculum, conducted trainings, sponsored STEM career fairs, and organized educational activities and events.

The EPO team works closely with the science team to develop coherent, easily understood messages:

- 1) the amount of water flowing through a specific area on Earth varies from month-to month, and can be monitored from space by looking at how it alters Earth's gravity field;
- 2) data from GRACE helps scientists monitor changes in water storage over large areas;
- 3) the GRACE gravity field has improved our accuracy of knowledge of Earth's average gravity field by over 100 times; and
- 4) GRACE gives a new global view of the Earth's gravity field every 30 days.

Master teachers were selected through an application and review process to be actively involved in the GRACE mission. After training from the GRACE science team, these 12 Master teachers evaluated, promoted, and developed GRACE-related materials. Materials developed by the GRACE Master teachers are activities-based and cross-curricular, matched to the National Education Standards.

GRACE outreach efforts use the internet, print media, as well as partnerships with the GRACE Master teachers, professional educator associations, national youth organizations, and community groups to deliver rich and innovative messages about space science and technology. GRACE products are also distributed at various conferences and meetings via the One NASA exhibit and the multi-organizational GRACE outreach team.

NASA's GRACE EPO partners include: University of Texas Center for Space Research (UTCSR), NASA/Jet Propulsion Laboratory (JPL), NASA Goddard Space Flight Center, (GSFC), and GeoForschungs-Zentrum Potsdam (GFZ).

