AGU JOURNAL HIGHLIGHTS

Variations in lithosphere thickness affect relationship between mantle flow and lithosphere stress The Earth's rigid lithosphere varies laterally in thickness and strength. Areas of thicker, older lithosphere known as continental roots penetrate deeper into the mantle in some places under continents. Because these continental roots are in contact with deeper, more viscous mantle, the shear traction at the base of the lithosphere in those areas is increased by up to a factor of 4 compared with a model lithosphere without continental roots. To study how those areas of increased traction affect patterns of lithospheric stress above, *Naliboff et al.* examined a model of mantle flow coupled to a model of the elastic lithosphere. They found that greater traction at the bottom of thicker areas of continental lithosphere raised elastic stress in the lithosphere above by at most a factor of 1.5. Furthermore, greater lithospheric stress was not located simply in small areas directly above deep continental roots; instead, increased stress is spread out over a larger regional area. The study highlights the need to incorporate variations in lithosphere thickness and strength into models of both mantle flow and lithospheric deformation. (*Geophysical Research Letters*, doi:10.1029/2009GL040484, 2009)

New evidence about the origin of Moon's exosphere Several decades ago scientists discovered that the Moon, long thought to have no atmosphere, actually does have an extremely thin exosphere. Scientists generally believe that the ions that make up the lunar exosphere are generated at the Moon's surface by interaction with solar photons, plasma in the Earth's magnetosphere, or micrometeorites. However, scientists have been uncertain about which processes are the main contributors of lunar exosphere ions. Using instruments aboard the Japanese lunar orbiter SELENE (also known as Kaguya), *Tanaka et al.* made the first spacecraft-based observations of the lunar exosphere when the Moon was inside Earth's magnetosphere. They detected ions of several elements at 100-kilometer altitude above the lunar surface. Previous studies have detected Moon-originating ions when the Moon was in the solar wind; this new study was the first to detect such ions when the Moon was not affected by solar wind particles or the Earth's magnetotail plasma. The results, which provide new evidence about the origin of the lunar exosphere, are consistent with the idea that solar photon–driven processes dominate in supplying exosphere components. (*Geophysical Research Letters*; doi:10.1029/2009GL040682, 2009)

Major droughts in Australia differ in nature and causes Southeastern Australia has been subject to several severe, long-term droughts during the past century, including the "Federation" drought (1895–1900), the "World War II" drought (1937–1945), and the "Big Dry" (1997 to present). All three droughts were widespread and devastating, but until now their causes and natures had not been compared. *Verdon-Kidd and Kiem* highlight the differences in the natures and causes of these three droughts. They found that the droughts exhibited different severity, spatial extent, and seasonality. In addition, they resulted from different climate modes: The El Niño–Southern Oscillation (ENSO) and the Interdecadal Pacific Oscillation (IPO) were the primary drivers of the Federation drought; the Southern Annular Mode (SAM) and ENSO were major causes of the Big Dry; and a combination of Indian Ocean, ENSO, and SAM was a causal factor of the World War II drought. The authors note that most attempts at forecasting droughts have focused on ENSO as a primary driver; the new results indicate that planners and drought managers should take into account other climate modes and their interactions when predicting drought conditions. (*Geophysical Research Letters*, doi:10.1029/2009GL041067, 2009)

Record high temperatures occurred twice as often as record lows In the past decade, the United States has experienced twice as many record daily high temperatures as record lows, according to a study by *Meehl et al.* The authors analyzed temperature data from weather stations across the United States that have been operating since 1950 and found that since 2000 there have been 291,237 record highs but only 142,420 record lows. The authors show that this increase in record highs is due to a global warming temperature trend. They point out that if temperatures remained stable over time, one would expect to experience approximately the same number of record highs as lows, and the number of record temperatures would decrease over time as it would become harder and harder to set a new record. The authors also analyzed climate model simulations and found that under a midrange emissions scenario, the United States could see about 20 record highs per record low by midcentury and 50 record highs per record low by the end of the century. (*Geophysical Research Letters*, doi:10.1029/2009GL040736, 2009)

New theory helps explain motion of plasma around Saturn Understanding the motion and source of the plasma around Saturn is important for understanding the dynamics of the magnetosphere. *Pontius and Hill* present a theory that describes plasma transport in Saturn's magnetosphere, including processes that add new mass to the plasma and those that remove momentum from the plasma without changing plasma mass. Using observational data from the Cassini spacecraft on the angular velocity of plasma around Saturn along with chemistry models of Saturn's magnetosphere, the authors calculate the distribution of new mass entering the magnetosphere. They confirm that most of the plasma comes from a neutral gas region near the orbit of Saturn's moon Enceladus and quantify the rate at which plasma mass is added to the magnetosphere from this region. The distribution and source of mass addition is important because it affects the rotation rate of the magnetosphere. The work provides a new method of analysis that could be useful for future studies. (*Geophysical Research Letters*, doi:10.1029/2009GL041030, 2009)

—Ernie Tretkoff, Staff Writer

Corrections

In the 1 December 2009 issue of *Eos* (*90*(48), 456), Vadim Uritsky's name was misspelled in the article entitled, "Nonlinear geophysics: Why we need it." *Eos* regrets this error.

In the 22 December 2009 issue of *Eos* (*90*(51), 497), a sentence in Eric A. Davidson's candidate statement should have read, "I will seek such opportunities within our section, with other AGU sections, and with sister sections in other societies, such as the Ecological Society of America, Soil Science Society of America, Geological Society of America, and American Society of Limnology and Oceanography." AGU regrets this error.

CLASSIFIED

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Inquiries may be directed to Ms. Reeves electronically; by Fax at 206-685-3397; or to the Director,

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