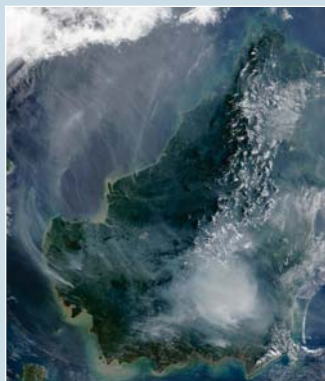


antiprotons that could be misidentified as antihydrogen, they had first applied an electric field to clear those charged particles out. In retrospect, collaboration members realized that the old antihydrogen position distributions would reveal how their antiproton-sweeping field influenced the antiatoms' motion and thus enable them to determine the antihydrogen charge. ALPHA's finding complements indirect measurements obtained by separately determining the charge of the antiproton and positron. But the ALPHA result is more stringent by about a factor of two and could be improved by procedures designed with charge testing in mind. (C. Amole et al., ALPHA collaboration, *Nat. Commun.* **5**, 3955, 2014.) —SKB

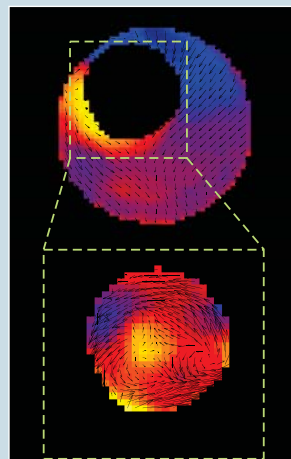
Extreme weather to increase around Indian Ocean. In austral spring, southeasterly trade winds blow across the Indian Ocean from Northern Australia past Indonesia to Kenya and the countries of eastern Equatorial Africa. In most years, the patterns of temperature and rainfall associated with the winds are steady, but in some years an anomaly known as the positive Indian Ocean Dipole (pIOD) develops. Triggered by a



lowering of the sea surface temperature off Java and Sumatra, a pIOD strengthens the easterly winds in that region and along the equator. The winds deprive Australia and Indonesia of moisture, but when they reach the waters off East Africa, they boost evaporation and, ultimately, rainfall. The consequences can be devastating. The pIOD event of 1997 led to thousands of flooding deaths in East Africa and to costly wildfires in Australia, Borneo, and other Indonesian islands (see

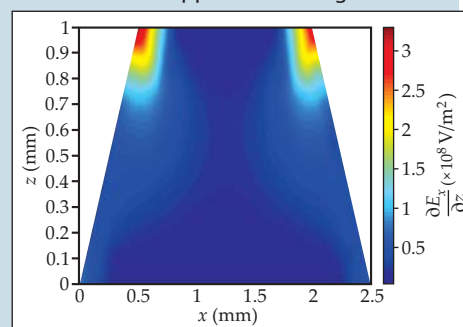
satellite image). As Earth's climate warms, the frequency and severity of pIOD events could conceivably change. Although climate records suggest that pIOD events are indeed increasing, whether global warming is responsible is unclear. To assess future pIOD behavior, Wenju Cai of CSIRO Marine and Atmospheric Research in Aspendale, Australia, and his collaborators ran 23 climate simulations for the years 1900–2099. According to the models, if the concentration of greenhouse gases continues to rise as expected, the frequency of pIOD events will rise from one every 17.3 years over the 20th century to one every 6.3 years over the 21st century. (W. Cai et al., *Nature* **510**, 254, 2014.) —CD

Ultrafast MRI of immiscible fluids. Understanding the dynamics of immiscible fluids is critical for a wide variety of applications, but imaging their flows is notoriously difficult. Most conventional techniques are intrusive—introducing tracer particles, for example—or require optical access. Magnetic resonance imaging (MRI) is an attractive alternative: It can quantitatively map velocity distributions and is inherently sensitive to different molecular species. But as usually implemented, MRI is slow, and schemes to reduce data acquisition times can introduce artifacts if multiple chemical species are present. The use of MRI for multiphase flows, which can exhibit such transient phenomena as shape oscillations and vortex formation, has thus been limited. Now Andy Sederman, Lynn Gladden, and colleagues at the University of Cambridge have demonstrated a way to obtain high-speed MRI images



water, the team could follow the evolution of the system, including the internal dynamics of the droplets, at 188 frames per second with a resolution of 385 μm . This sample image shows the velocity fields obtained for the water and droplet (inset) as the droplet passed through the imaging plane. The approach could offer promise for the quantitative study of hydrodynamics and chemical reactions in multiphase systems. (A. B. Tayler et al., *Phys. Rev. E* **89**, 063009, 2014.) —RJF

Bringing out the flex in flexoelectrics. Bend a dielectric and it will become electrically polarized. Conversely, an electric field gradient in the dielectric will induce a strain. The effect is called flexoelectricity, and unlike the better-known piezoelectric effect, it can arise in crystals with any symmetry. But it's typically so small that it's hard to disentangle from the larger effects of piezoelectricity and electrostriction, constriction caused by field-induced alignment of electrical domains. Now, North Carolina State University's Xiaoning Jiang and his colleagues have devised a way to isolate the converse flexoelectric effect. They attached electrodes on the slanted faces of trapezoidal blocks of barium strontium titanate, a ceramic known to exhibit an anomalously large flexoelectric effect. Each sample essentially acted as a nonparallel-plate capacitor so that in the z direction, the field component was very small but the field gradient was large, as shown in this image from a simulation. The researchers then applied AC voltages to the electrodes and measured the shear deformation along the x direction. In principle, their setup should eliminate electrostrictive and piezoelectric deformation. In practice, the experiment showed



some contributions from each effect, but they could be readily accounted for. Based on their analysis, the researchers predict that the flexoelectric effect should strengthen relative to the piezoelectric effect, and may even become dominant, as the trapezoid becomes smaller. If true, that could be interesting to makers of micro- or nanoelectromechanical devices. (L. Shu et al., *Appl. Phys. Lett.* **104**, 232902, 2014.) —SC ■