of the roughly 60-member BICEP team.

BICEP researchers have taken heat from some of their peers for overstating their result. But François Boulanger, an astrophysicist at the University of Paris-Sud in Orsay, France, and a member of the Planck team, notes that the joint analysis showed that the dust emission was stronger and its polarization varied more from place to place than previously expected. "One has to be fair to the BICEP team," he says. The delicate joint analysis took 6 months, Boulanger says, "and we went through some stages where we thought there probably was a [gravitational wave] signal."

Researchers are optimistic about their chances of spotting the real thing soon. Physicists quantify the B-mode signal using a parameter r, which is the ratio of the strength of the peculiar oscillation of gravitational waves to the strength of more-conventional waves such as sound waves in the early universe. The joint analysis shows that r must be less than 0.12. But if r is close to that limit, then a half-dozen experiments now under way or in the works could detect primordial B modes in the next few years.

For example, John Carlstrom, a cosmologist at the University of Chicago in Illinois, and colleagues will soon deploy SPT3g, an upgrade of the 10-meter South Pole Telescope, which is also in Antarctica. Taking data at three frequencies, SPT3g should be able to detect primordial B modes if r is 0.05 or greater, Carlstrom says. Similarly, Staggs and colleagues are working on Advanced ACTpol, an upgrade to the Atacama Cosmology Telescope in Chile, that will take polarization data at five frequencies. And Kovac and colleagues have already taken data at a second frequency with BICEP2's successor, the Keck Array, and are installing BICEP3.

In case the gravitational wave signal slips past those telescopes and others, cosmologists are developing a plan for a network of telescopes that would have 10 times more sensitivity and could detect B modes if r were as low as 0.005. The $100 million effort would link telescopes at the South Pole, in Chile, and possibly in Greenland or Tibet. In a road map for their field released last May, U.S. particle physicists strongly endorsed the idea, and researchers are hopeful that the Department of Energy will fund it and have it running in the next decade.

After the BICEP2 episode, researchers are quick to say that the discovery of primordial B modes probably won't come in one decisive measurement. "I think it will happen as these things have always happened," Carlstrom says. "Hints will show up earlier." Still, Kovac says, "the bottom line is that we're all feeling very optimistic." ■

PHOTO: ROB PRINGLE

ECOLOGY

Africa's soil engineers: Termites

Kenyan plots show that termite mounds promote ecological health and may slow desertification

By **Elizabeth Pennisi**, *in Mpala Research Centre, Kenya*

Truman Young still remembers his amazement more than a decade ago when he and his colleagues had their first aerial look at the African dryland landscape that they had been studying. From the ground, the acacia trees and bunch grasses seemed randomly distributed—and so did the termite mounds scattered across this combination ranch-field station in central Kenya. But satellite photos taken in 2003 showed these mounds were actually like polka dots, spaced far enough to avoid territorial battles. More startling, a satellite image sensitive to chlorophyll revealed that termite mounds are hotspots for plant growth.

The photo "changed the way we thought" about what shapes this landscape, recalls Young, an ecologist at the University of California, Davis. For decades, thanks primarily to National Science Foundation funding, he and his colleagues have run the Kenya Long-term Exclosure Experiment (KLEE) here, which uses fenced-in 4-hectare plots to assess how elephants, cattle, and other grazing animals affect the savanna. But after studying that image, Young suddenly realized termites had to be added to this list.

"We all tend to think about large mammals as being the big dominant driver of what's happening in the savanna, but the more we look at the termite mounds the more they seem to be driving what's going on," says Robert Pringle, a Princeton University ecologist who works at Mpala. A study on page 651 presents the latest example. By modeling the interactions of termites, rainfall, soil, and plants, Pringle and his colleagues conclude that the termite mounds are an insurance policy against climate change, protecting the vegetation on them from water scarcity.

Jef Huisman, a theoretical biologist at the University of Amsterdam, says the results show that "termite mounds play a key role in arid landscapes." The work also calls into question whether land managers can forecast looming desertification based on aerial views of the landscape. "We should not blindly adopt the early warning indicators predicted by simple models," Huisman says.

Africa's indigenous people have long recognized that the soil in termite mounds is richer than normal and good for crops. Harvester termites, such as the fungus farmers that live at Mpala, spend their days retrieving vegetation to fertilize "gardens" of microbes and fungus, which concentrate nitrogen, phosphorus, and organic matter. At the same time, the termites alter the soil profile as they build their tunnels. In some places, termites add clay to stiffen soil too sandy for tunnels. At Mpala, they dilute the clay-laden soil with sand, making it easier to excavate. "In both cases, it's making a soil that's better than background," Young says. So plants grow more readily. The excavations also help the mounds better hold on to water. "At the right point." Those provisions were also a stumbling block for DeGette, according to a representative from her office.

Another of DeGette's objections involves language added by Representative Andy Harris (R–MD) that would favor early-career researchers in the competition for NIH grants by setting aside funding in the director's office for younger scientists. Benjamin Corb, public affairs director for the American Society for Biochemistry and Molecular Biology in Rockville, Maryland, says his group worries "about saying young investigators are better investigators" who should be favored over established scientists.

Harris also wants NIH to develop an overarching strategic plan that sets priorities for money allotted to it. That idea flopped when the agency last attempted it more than 2 decades ago. And Corb's group is troubled by a proposal that the director of each NIH institute personally sign off on every grant, taking into account whether its goals are "a national priority and have public support" and are "worth the potential scientific discovery." Those criteria don't make sense for basic research, because payoffs can be difficult to predict, Corb says.

Perhaps most troubling, research advocates say, the plan doesn't address the need to boost NIH funding after a decade of flat budgets—a trend that the 2016 budget proposal, rolled out this week, does little to change (see p. 599). "You need to get back to sustained, predictable funding instead of moving money around the margins of the budget," says David Moore, senior director of government relations for the Association of American Medical Colleges in Washington, D.C. The Energy and Commerce Committee's top democrat, Representative Frank Pallone (D–NJ), similarly lamented that the document "does not include any real dollars to fund additional basic research at the National Institutes of Health."

Several sections of the draft remain to be filled in, including one on "precision medicine," an initiative championed by President Barack Obama as part of the 2016 budget.

Upton and DeGette's approach is attracting interest in the U.S. Senate. Senators Lamar Alexander (R–TN) and Patty Murray (D–WA), the top Republican and Democrat on the Senate's health committee, launched a very similar initiative this week. And despite their differences, Upton and DeGette plan to work together, using feedback from this draft, to craft a formal bill, which they aim to have on the president's desk by the end of the year. ■

With reporting by Jocelyn Kaiser.

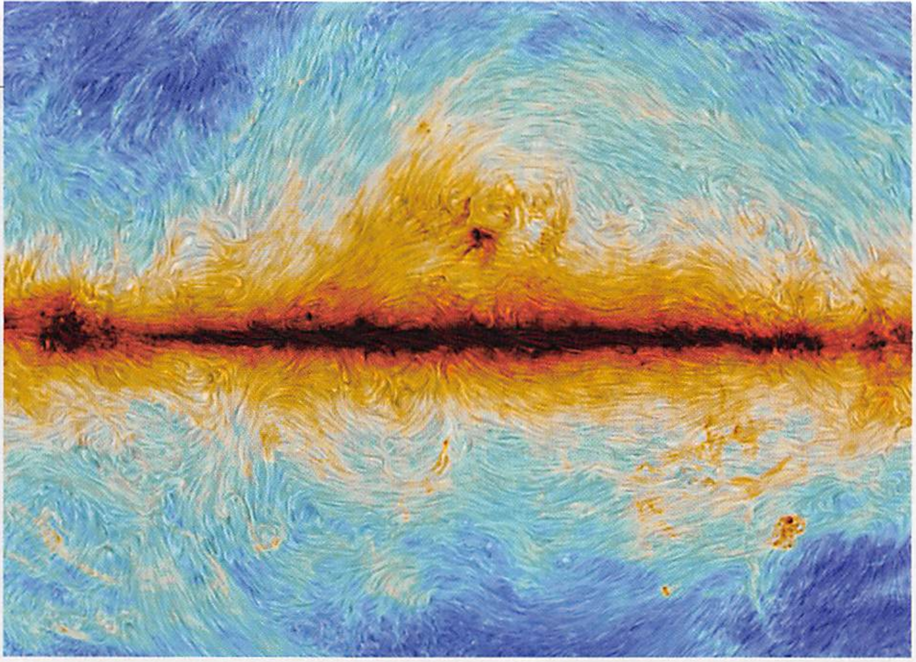

PHOTO: ESA/PLANCK COLLABORATION

COSMOLOGY

Misfire aside, signs of cosmic inflation could come soon

Even as the BICEP result bites the dust, observers like their chances of spotting big-bang gravitational waves

By **Adrian Cho**

Planck mapped the strength (color) and polarization (texture) of radiation from galactic dust.

When the biggest discovery in cosmology in years officially unraveled last Friday, nobody was surprised. Almost as soon as observers announced last March that they had detected evidence of inflation, a bizarre exponential growth spurt thought to have blown up the infant universe, others suggested the signal was merely an artifact of dust in our galaxy. "I would have been surprised if it had turned out otherwise," said Suzanne Staggs, an observational cosmologist at Princeton University, after the last hope faded. Yet she and other cosmologists think a real signal of inflation could be found—perhaps within a few years. "The future's so bright we've gotta wear shades," she quips.

The spurious signal appeared in the big bang's afterglow, the cosmic microwave background (CMB). Standard theory predicts that inflation would have set off ripples in space and time called gravitational waves, which would imprint faint pinwheel-like swirls—called B modes—in the CMB. Cosmologists using a specialized telescope at the South Pole called BICEP2 reported that they had detected those "primordial B modes" when they mapped the polarization of the microwaves in a patch of sky (*Science*, 21 March 2014, p. 1296). In a press conference, the BICEP team claimed the first direct evidence of inflation.

But such swirls can come from other sources. In particular, radiating dust in our galaxy can produce them, so researchers must first strip away this "foreground" contribution to see the CMB signal properly. Ordinarily, experimenters do that by taking data at multiple microwave frequencies. However, BICEP2 took data at only one frequency to maximize sensitivity and relied on preliminary data from the European Space Agency's Planck spacecraft to estimate the foreground contamination. The BICEP team believed it was small. But in May, others suggested that BICEP researchers may have underestimated the dust contribution. In September, Planck's final data suggested that BICEP's patch of sky was as dusty as an old pillow (*Science*, 26 September 2014, p. 1547).

To settle the issue, the BICEP and Planck teams decided to perform a joint analysis, which was released last week. It yields no definite sign of primordial B modes. "If gravitational waves are there, they're probably less than half of the total signal," says John Kovac, a cosmologist at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Massachusetts, and a co-leader