improved quite a bit in recent years when it comes to analysing data. And yes, in the past, suboptimal analyses have been applied.” But he does not accept the findings of the meta-analysis. He says that it would have produced different conclusions if the researchers had included all previous UTA experiments, rather than excluding some and relying on a subset. He adds that “the evidence for UTA is growing quickly” and is widely accepted.

UTA is not the only ‘smart-unconscious’ claim to come under scrutiny. For example, experiments carried out under the “Many Labs” Replication Project, which coordinates labs internationally to repeat psychological studies in order to validate their claims, as well as several separate studies,

have challenged another psychological concept, social priming. Under social priming, certain behaviours are claimed to be modified unconsciously by previous exposure to stimuli, such as an American flag, or thinking about money⁵.

Other doubts raised about unconscious thought include its role in some types of decision making under uncertainty.

In spite of the most recent findings, Brian Nosek, a psychologist at the University of Virginia in Charlottesville who co-launched Many Labs, says that he remains optimistic about the theory underlying UTA. “I would be surprised if unconscious-thought theory did not hold up, because it fits with contemporary theories,” he says.

Shanks agrees that the debate over unconscious-thought theory is probably not over. “How we make decisions, and how we might make them better, has practical and intellectual importance,” he says. “If there is any evidence that distraction or unconscious rumination helped, we’d want to know about it — but the conclusions are so far very premature.” ■

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OCEANOGRAPHY

US ocean sciences told to plot fresh course

Major report calls for cuts in infrastructure funding to increase spending on science.

BY ALEXANDRA WITZE

Faced with the rising costs of going to sea, the ocean-sciences division of the US National Science Foundation (NSF) should slash what it spends on marine hardware to fund more research, says a major report by the US National Research Council. It proposes making the biggest cut to the showcase US\$386-million Ocean Observatories Initiative (OOI), which after years of construction is just months away from being finished.

The report’s authors suggest that the NSF should cut 20% of the OOI’s operations budget, and reduce its contributions to the international scientific ocean-drilling programme and the US academic research fleet. If the agency takes that advice, it could free up enough money for US oceanographers to begin to reclaim much of their lost science, as well as expand partnerships with international researchers.

“It’s an exciting time to be in ocean science,” says Shirley Pomponi, an oceanographer at Florida Atlantic University in Fort Pierce and co-chair of the report committee. “But we need to take steps to make that better.”

US oceanography has been in trouble for a while. The US Navy paid for the bulk of the country’s academic oceanographic work until the 1960s, after which the NSF began shouldering more of the burden. But even as filmmaker James Cameron, flush with private money, explored the Pacific Ocean’s Mariana

SINKING SCIENCE

As the US National Science Foundation (NSF) has increased its spending on ocean hardware, such as ships and instruments, its funding for ocean science has fallen.

SOURCE: NRC

Trench with a handful of scientists in 2012, most research oceanographers found themselves with fewer ways to get to sea.

EIGHT PRIORITIES

Over the past decade, the NSF’s ocean-infrastructure expenses have risen by 18% — even as the ocean-science division’s inflation-adjusted budget dropped by more than 10%, to just under \$350 million annually. In 2013, the division started to spend more on infrastructure than it did on science (see ‘Sinking science’). That is when the NSF asked for outside advice on how to cope.

The report, which was published on 23 January, lays out eight science priorities for the next decade, including studies of sea-level change, marine biodiversity, earthquakes and tsunamis, and life beneath the sea floor. Unusually, it also suggests how to pay for the studies — an immediate 10% cut in infrastructure, spread unequally among three programmes, followed by a similar or larger cut over the next five to ten years. “This document gives them the flexibility to make some really hard decisions,” says Samantha Joye, an oceanographer at the University of Georgia in Athens.

The smallest suggested cut, just 5%, applies

The RV *Thomas G. Thompson* is part of the US academic research fleet, which may have its budget cut by 5%.

to the NSF contribution to the 20-vessel US research fleet, because ships enable more of the science priorities. Even so, the report recommends that the agency builds no more than two new 'regional class' vessels in the coming years; it had considered building three.

A cut of 10% is recommended for the scientific ocean-drilling programme, which collects cores from the sea floor; its workhorse, the US-funded *JOIDES Resolution* drilling ship, has already endured a number of cutbacks.

Finally, Pomponi and her colleagues suggest a 20% cut to the OOI's operations budget, which will run at between \$55 million and \$59 million when it begins full operations this year. They note that the OOI is made of many components, and that some are better than others for studying the science priorities.

For instance, a cabled sea-floor observatory off the coast of Oregon addresses the risks of underwater earthquakes and tsunamis. Two movable arrays of instrumented moorings — one off the US east coast and one off the west

coast — tackle problems such as regional sea-level change. But four deep-water sites — two at high northern latitudes and two in the far south — are much less crucial for the eight

"This document gives them the flexibility to make some really hard decisions."

priorities, says the report. It argues that at least one of the southern sites could be sacrificed without much scientific loss, and that others may need to be instrumented for only two or three years to understand ocean change, rather than for the 25-year planned lifetime of the OOI.

"We didn't say the OOI was not important," says report co-author Melbourne Briscoe, an oceanographer who has previously worked for the government and now runs an environmental consulting company in Alexandria, Virginia. "It's just that it wasn't as relevant to that set of eight questions as other pieces of infrastructure were."

Officials of the Consortium for Ocean Leadership, an organization based in Washington DC that is building the OOI, declined to comment, saying that they needed more time to digest the report and its implications.

Richard Murray, director of the NSF ocean-sciences division, says that his top priority is to work out how to move forward with the new advice. "We're looking at this report very, very seriously," he says. "We hear very clearly the committee's recommendation that something needs to be done."

Mitchell Lyle, an oceanographer at Oregon State University in Corvallis who was not involved in the report, says that the field needs to take a fresh look at what US oceanography can really afford. "Funding levels are now dropping below a sustainable level to support the number of ocean scientists that we now have," he says. Oceanographers might need to consider more dramatic options to cope with declining federal research dollars, says Lyle, such as closing some oceanographic institutions. ■

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