European Space Agency in June 2015. Although the satellite was not designed to study reefs, it has relatively sharp vision and can operate over more and narrower spectral bands than the US Geological Survey's Landsat-8 satellite, another workhorse of Earth observing. And unlike data from keen-eyed commercial satellites, Sentinel's observations are free to use.

Sentinel-2 will also eventually revisit the same spot every 5 days, compared with Landsat-8's 16-day return period. That makes it a better choice for studying short-term marine phenomena such as coral bleaching and algal blooms, says John Hedley, a remote-sensing expert at Environmental Computer Science in Tiverton, UK, who is on the science team for the Sentinel-2 coral study, Sen2Coral.

Team members are set to report early results on mapping reef bottoms at a coral-reef symposium in Honolulu, Hawaii, on 22 June.

But in the wavelength range applicable to underwater sensing — 430–710 nanometres — Sentinel-2 cannot capture details that CORAL's plane can. The plane carries an instrument that gathers data in more than 100 narrow spectral bands in that range, including the signature of photosynthetic organisms within the living coral itself at 570–575 nanometres.

CORAL will focus on one simple metric: how much coral cover there is on a given reef, as opposed to algae and sand. From that, researchers can calculate how well the coral is doing at transforming sunlight into energy to maintain a reef structure. Hochberg and his colleagues hope to use that information to better understand how local changes, such as an increase in pollution, might affect coral's health.

The June flights in Hawaii will test whether all the equipment is working. From there, the Gulfstream IV plane will go to the Great Barrier Reef in September and October, followed by Hawaii, the Mariana Islands and Palau in 2017. Divers will simultaneously measure the optical properties of the surrounding seawater and the reef condition up close, to cross-check what the plane sees from 8,500 metres above.

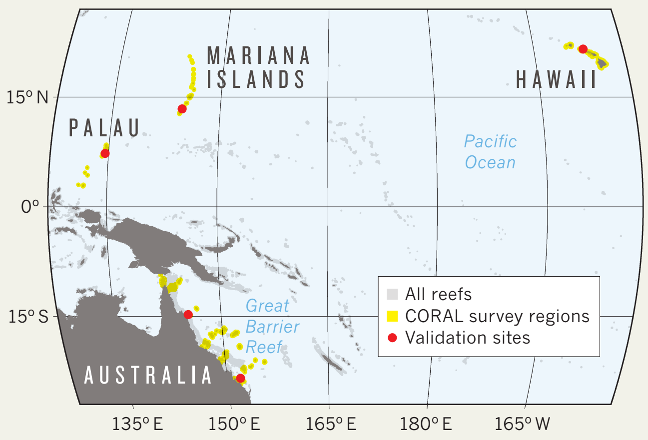
The flights will provide a snapshot of some of the world's most important reefs, says Serge Andréfouët, a marine ecologist at the Research Institute for Development (IRD) in Nouméa, New Caledonia, who led an earlier coral-mapping effort with the Landsat-7 satellite.

But CORAL will be a one-time glimpse only. With limited funding, there are no plans to repeat any flights to see how the reefs change over time, Hochberg says.

Instead, the team hopes to provide a rich set of baseline data for future coral studies. "You have to pick and choose where you go to try to understand how the ecosystem is working," he says. ■

UNDER THE SEA

Over the next three years, a NASA research aeroplane will survey coral reefs throughout the Pacific Ocean — including the rich ecosystems of the Great Barrier Reef in Australia.



SOURCE: ERIC HOCHBERG

PUBLISHING

Biology's big funders boost *eLife*

Open-access journal nets £25 million in support until 2022.

BY EWEN CALLAWAY

When three of the world's biggest private biomedical funders launched the journal *eLife* in 2012, they wanted to shake up the way in which scientists published their top papers. The new journal would be unashamedly elitist, competing with biology's traditional 'big three', *Nature*, *Science* and *Cell*, to publish the best work. But unlike these, *eLife* would use working scientists as editors, and it would be open access. And with backers providing £18 million (US$26 million) over five years, authors wouldn't need to pay anything to publish there.

Four years and more than 1,800 publications later, *eLife*'s funders — the Howard Hughes Medical Institute in Chevy Chase, Maryland, the Wellcome Trust in London and the Max Planck Society in Berlin — announced on 1 June that they will continue their support. They will back the non-profit *eLife* organization with a further £25 million between 2017 and 2022 (see '*eLife* by the numbers').

"*eLife*'s status in the field is rising quite quickly," says Sjors Scheres, a structural biologist at the Laboratory of Molecular Biology in Cambridge, UK. He became an editor at the journal in 2014, overseeing papers on electron microscopy. "I liked the idea behind it — to make a high-impact journal completely driven by scientists, and open," he says. Although scientists like publishing in the journal, it's less clear whether it has catalysed a wider transformation at the elite end of science publishing.

COLLABORATIVE ATTRACTION

The journal's most innovative feature, according to its authors and reviewers, is its collaborative peer-review process. It turns conventional peer review — in which referees submit individual, and sometimes contradictory, reports — on its head. Instead, referees and scientist–editors work together to identify a submitted paper's strengths and weaknesses and any needed revisions. Authors receive one decision letter, not individual reports from each referee.

That makes for a speedy review: last year, *eLife*'s published papers took, on average, 116 days from submission to acceptance. For comparison, *Nature* and *Cell* take around 150 days, although *Science* says that in 2013 it took 99 days from submission to acceptance. *Cell* and two of its sister journals have experimented with a similar peer-review model but none has yet adopted it. Peter Binfield, the publisher of another open-access journal, *PeerJ*, in San Francisco, California, says that he likes *eLife*'s peer-review system, but he thinks that the approach would be impossible to scale up to adopt for all published articles.

SELECTIVE BUT OPEN

As it bids to become a top journal, *eLife* has started to turn down more of its submissions. The journal's acceptance rate dropped from

BEN BISHOP

26% in 2014 to 15.4% by 2015, says its editor-in-chief Randy Schekman, a cell biologist at the University of California, Berkeley. That's approaching the acceptance rates of *Nature* and *Science*, which are both below 10%.

In 2013, Schekman denounced *Nature*, *Science* and *Cell* as "luxury journals", and likened their low acceptance rates and high impact factors to high-end "fashion designers" that artificially stoke demand for their brand through scarcity. Now, he says, *eLife* has become "more selective than I had imagined, but it's not based on any instructions I have conveyed to the editors. It's based on their sensibility of important work."

In 2014, the most recent year for which financial information is publicly available, *eLife* published 537 research articles with expenses of £3.4 million — equating to around £6,300 for each article. "It appears to be a very expensive way to innovate in the publishing space," says Binfield.

The journal says that its per-article cost has dropped — to £3,522 in 2015. It points out that it spends money on technology development, too. Six publishers that use the third-party publishing platform HighWire have tested the *eLife*-developed Lens display technology, for instance. Schekman says that *eLife* plans to diversify its income by asking governments and other charities for funding. It will also eventually charge scientists to publish in the journal. But it won't, he says, establish other open-access journals that accept more papers and have lower selectivity — a strategy that some have used to shore up finances. "We have no interest in creating other lesser journals with lower standards," he says. ■

eLife BY THE NUMBERS

£43 million

Amount committed to the journal over ten years (2012–22) by the Wellcome Trust, Howard Hughes Medical Institute and Max Planck Society.

848

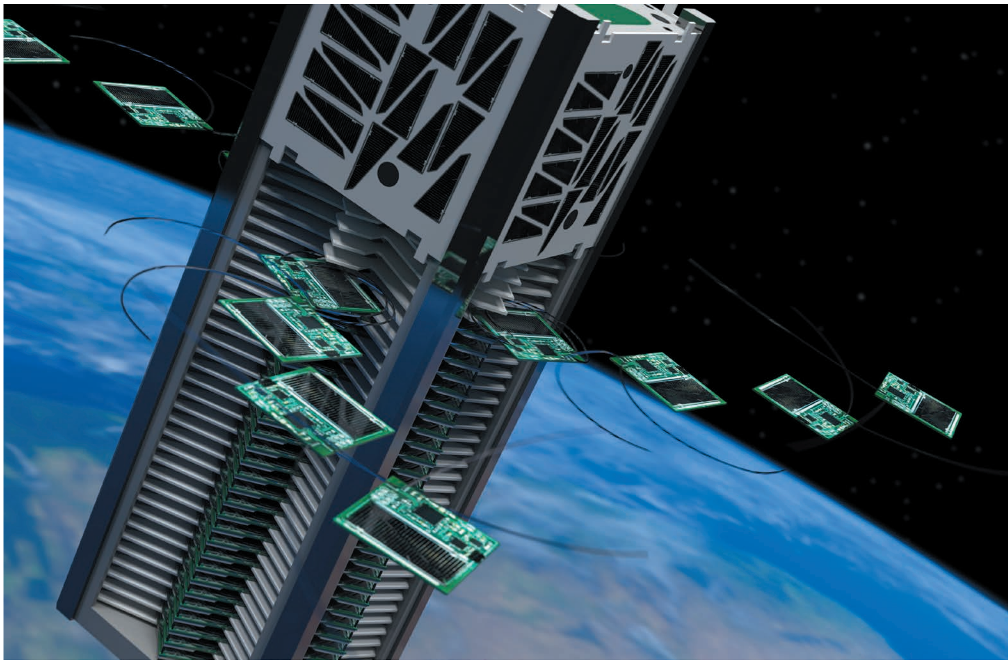
Research articles published in 2015 — all open access.

116 days

Median time to acceptance of paper, 2015.

15.4%

Acceptance rate in 2015.



A KickSat satellite (artist's impression) will launch several minuscule chipsats.

SPACE

First flight for tiny satellites

Launch of 'chipsat' probes in July will test a new way to explore the Solar System — and beyond.

BY NICOLA JONES

On 6 July, if all goes to plan, a pack of about 100 sticky-note-sized 'chipsats' will be launched up to the International Space Station for a landmark deployment. During a brief few days of testing, the minuscule satellites will transmit data on their energy load and orientation before they drift out of orbit and burn up in Earth's atmosphere.

The chipsats, flat squares that measure just 3.2 centimetres to a side and weigh about 5 grams apiece, were designed for a PhD project. Yet their upcoming test in space is a baby step for the much-publicized Breakthrough Starshot mission, an effort led by billionaire Yuri Milner to send tiny probes on an interstellar voyage.

"We're extremely excited," says Brett Streetman, an aerospace engineer at the non-profit Charles Stark Draper Laboratory in Cambridge, Massachusetts, who has investigated the feasibility of sending chipsats to Jupiter's moon Europa. "This will give flight heritage to the chipsat platform and prove to people that they're a real thing with real potential."

The probes are the most diminutive members of a growing family of small satellites. Since 2003, researchers have launched hundreds of 10-centimetre-sided CubeSats — more than 120 last year alone. Engineer Jekan Thanga at Arizona State University in Tempe is now working on an even smaller 'femto-satellite', a 3-centimetre cube that he says has the technological capacity of the first CubeSats. Chipsats, which are smaller and cheaper still, are seen as disposable sensors that could be sent on suicide missions to explore hostile environments, such as Saturn's rings.

"They're all part of the toolbox for next-generation space missions," says Thanga.

The upcoming chipsat test, called KickSat-2, is the second incarnation of a crowdfunded mission developed by researchers at Cornell University in Ithaca, New York. The shoebox-sized KickSat-1 spacecraft successfully launched on 18 April 2014, but it failed to deploy its cargo of 104 chipsats after a cosmic radiation burst reset the clock on its release mechanism. The ▶