The research revolution

As the first grants from the European Research Council begin to come through, **Geoff Brumfiel** investigates whether the new system is meeting its goals.

Markus Reichstein is obsessed with dirt. If he could just do a better job of simulating the stuff, says the 35-year-old climate modeller, he could minimize a major source of uncertainty in climate predictions. His fellow climate modellers “don’t like to dig into the soil”, Reichstein explains from his office at the Max Planck Institute for Biogeochemistry in Jena, Germany, located in the hills above that city’s medieval streets and Communist-era smokestacks. Instead, they represent Earth’s incredibly complex and dynamic top layer — which is a huge carbon reservoir — with ridiculously simple approximations.

Until recently, however, Reichstein’s obsession with improving this situation was frustrated by a shortage of money. Research funding in Europe varies considerably from country to country, but scientists are typically funded through their home institutions. And the level of funding rises with seniority — which is why senior researchers receive the bulk of the funding and run the majority of groups. Reichstein wasn’t old enough to get all the money he needed from the Max Planck Institute. Nor was he in any position to go after one of the big research grants given out by the European Union (EU). Those awards are targeted at multinational collaborations, with a stated goal of strengthening ties between member nations. Besides, says Reichstein, who was as frustrated by the system as most other young scientists in Europe, the resulting collaborations “went too much in the direction of applied science”. There was no obvious place for him to marshal the resources needed to tackle his big questions about dirt.

That is why Reichstein paid close attention last year when the European Commission launched the European Research Council (ERC): a semi-autonomous agency that would award its grants in a decidedly different way. Instead of focusing on political goals, its only criterion would be the quality of scientific proposals as judged by an international group of peer-reviewers. By European standards “we are absolute radicals”, says Fotis Kafatos, the ERC’s president and an immunogeneticist at Imperial College in London. “There is no consideration of nationality in the evaluation — absolutely none.”

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— Fotis Kafatos

G. BRUMFIEL

Markus Reichstein’s grant will enable him to improve the simple approximations of soil used in climate models.

The impetus for this radical idea came from the scientific community itself, starting around the turn of the millennium. Researchers were increasingly concerned that the politically oriented selection process of the EU was overlooking some of the best science. Their model was the US National Science Foundation (NSF), a US\$6-billion agency that has been making peer-reviewed grants to individual researchers (as well as to its larger centres) for nearly 60 years, and that is regularly praised for its ability to fund the best research in a broad range of fields. “The dream of everyone is the National Science Foundation,” says Ernst-Ludwig Winnacker, the ERC’s secretary general, based in Brussels, Belgium.

The ERC was formed in February 2007 as part of the EU’s Seventh Framework Programme, which sets the research funding trajectory from 2007 through 2013. The ERC’s total budget for that period is €7.5 billion (\$11.6 billion), or about €1 billion a year. And it mirrors the NSF in several ways: its operations are overseen in part by a scientific council independent of the EU itself; it is divided into directorates that cover everything from the social sciences to physics; and most importantly, it makes its grant selections using a continent-wide network of peer reviewers.

Reichstein was particularly taken with the new council’s emphasis on fundamental research throughout Europe. National funding bodies can be parochial in their choice of which projects to back, he says. The ERC brings a broader perspective. Better still, the ERC’s first round of granting would target researchers like him: early-career scientists who had completed their PhDs between two and nine years ago, and were in the process of establishing an independent group.

Flood of applications

Reichstein saw the ERC as a perfect opportunity to dig into dirt, and lost no time in applying. He was hardly alone: the council received almost 9,200 applications for just a few hundred grants, according to Helga Nowotny, a social scientist from ETH Zurich (the Swiss Federal Institute of Technology) and member of the ERC board. “Some panels were just overwhelmed by sheer numbers,” she says. To deal with the huge volume of applicants, extra evaluators had to be brought in, and a pre-screening process was set up.

The process was further strained by the bureaucratic rules of the European Commission, according to Robert May, a zoologist at the University of Oxford, UK, and, until he stepped down on 31 May, a member of the ERC

SOURCE: ERC

scientific council. Peer-reviewers were required to fill out lengthy conflict-of-interest forms and board members were saddled with travel regulations. Although no fault of the ERC directly, he says, the granting system “is hedged about with multiple bits of paper that makes everything extravagantly cumbersome”.

The selection process

Still, the grant-allocation process moved forward. The pre-screening reduced the pool of applicants to about 550 investigators, who were then brought to Brussels and interviewed. Reichstein was one of them. After a five-minute presentation about his project, reviewers grilled him with questions that were “critical but very constructive”, he says. “They wanted to find out if I was really dedicated.”

The ERC finally announced its first round of grants in December 2007, relatively on schedule. Reichstein heard that he’d been selected while he was attending the American Geophysical Union’s annual meeting in San Francisco. He instantly brought a round of beers for his colleagues. “It was surreal at that point,” he says.

Over the next five years he will receive €1 million to integrate soil data from European observation stations into global climate models. The ambitious project will seek to characterize microbes in the soil, understand carbon transport through its layers, and ultimately develop computer code that can replace current ‘black box’ models of dirt. “The final goal is to move towards a more realistic description of the soil,” he says. “And I think we are at the point where we can.”

Other first-round winners are similarly enthused about the opportunities the grants provide. “In Italy it’s very difficult for young researchers,” says Livia Conti, a physicist at

the National Institute for Nuclear Physics in Padova. Conti will use the money to look at how temperature fluctuations can contribute to noise in gravitational-wave detectors. She says that the funds will allow her to hire a theorist.

“This is way bigger money than anything you could get in Sweden,” agrees Johan Elf, a molecular biologist at Uppsala University. Elf is studying single-molecule dynamics inside cells, and the money will go towards buying specialized equipment and hiring more staff. In September, Elf returned to Sweden after a two-year postdoc at Harvard University. “The ERC money is a great motivation for staying in Europe,” he says.

Of course, the old bureaucratic barriers haven’t vanished overnight. Red tape is still holding up funding for some, although Reichstein’s contracts have finally been signed. The general feeling is that the process was successful, says Nowotny: “Overall it went surprisingly well.”

Members of the scientific council are especially relieved that there has been so little political resistance to the ERC, even though the vast majority of winners work in the traditional strongholds of European research (see map). The United Kingdom, France and Germany together are home to nearly half of the selected proposals. Newcomers to the EU such as the Czech Republic and Hungary fare much worse, hosting only a handful of winners between them. Italian scientists had the lowest success rate — submitting more than 1,500 applications but winning just 26 grants.

Nonetheless “neither the [European] Commission nor the Parliament has interfered

with the process,” says Winnacker. “I actually expected more problems from the politicians,” adds Michał Kleiber, a computer scientist at the Polish Academy of Sciences in Warsaw and a member of the ERC science council. “To my pleasant disappointment, there wasn’t much heard from Poland.” Kafatos thinks that countries on the losing end of the first round didn’t object because they saw the ERC’s process as fundamentally transparent and fair. “They are disappointed,” he says. “But they also realize that they have to do some homework.”

With the first round of grants now complete, the ERC is looking to the future. Later this year, they will award a separate round of 300 ‘advanced grants’ for senior researchers. Meanwhile, they are in the process of nearly doubling their staff of 110 and moving towards becoming a European Commission ‘executive agency’, which should allow them to issue grants more quickly with less paperwork.

The council is also working to reduce the number of substandard applications by requiring applicants to demonstrate a track record and supply a five-page technical summary of their work. Additionally, the eligibility period for young investigators will be narrowed to just three to eight years after their PhD.

Even then, not all the best applications will receive funding. This year, for example, some 130 applicants passed the agency’s threshold, but did not receive money. Kafatos would like national governments to help: “We would like to see the national system use the results in ways that might be helpful to them,” he says. And that is beginning to happen: France, Italy, Spain

and Switzerland have begun national initiatives to fund young investigator grantees that the ERC ranked highly but was not able to fund.

Overall, the ERC is off to a running start, says May. “The critical hurdles have been cleared,” he says. Kafatos agrees: “It’s not everyday that you get more than 9,000 applications for a first call. It has been an amazing experience.” Indeed, says Kafatos, the Council has seen a more manageable volume of applicants for the grants going to senior researchers, thanks in part to refined requirements.

Back in his office in Jena, Reichstein is gearing up for his grant, which will begin in September. He says he will use the money to fund two PhD students, a postdoc and an assistant to begin working on the improved soil model. “It really allows me to attack a big question,” he says. “That would not have been possible before.” ■

Geoff Brumfiel is a senior reporter based in London.

See Editorial, page 958.

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