



People in the developing world could benefit from improved precipitation forecasts.

company's technology without access to more data.

"The fact that a start-up company and commercial investors are willing to put money into this technology is good news, but I believe there is room for all," says Hagit Messer, an electrical engineer at Tel Aviv University in Israel, who led the 2006 study. She is part of the research consortium led by Overeem.

Previous projects by group members that tested the technology have met with success. In 2012, for instance, Overeem and his colleagues showed that the technology could be applied at the country level using commercial microwave data in the Netherlands². And in 2015, the Swedish Meteorological and Hydrological Institute (SMHI), headquartered in Norrköping, launched a prototype real-time 'microweather' project in Gothenburg. It collects around 6 million measurements in the city each day in partnership with the telecommunications company Ericsson and a cellular-tower operator. The result is a minute-by-minute estimate of rainfall on a 500-metre-resolution map that encompasses the city.

A BRAVE NEW WORLD

Jafet Andersson, an SMHI hydrologist, says that the project has helped to advance the technology. For example, he notes that microwave data often overestimate rainfall by as much as 200–300%. But the team has worked out how to correct for that bias without relying on reference measurements from rain gauges or ground-based radar. This will make it easier to extend the

technology to developing countries.

"It will take some time, but we are in the process of industrializing it on a country scale, or even a global scale," Andersson says.

Researchers with the consortium have deployed the technique in African countries that do not have access to ground-based radar and extensive rain-gauge networks. A team led by Marielle Gosset, a hydrologist at the French Institute for Development Research in Toulouse, demonstrated a proof-of-concept system in Burkina Faso³ in 2012 and has since branched out to other countries, including Niger and Cameroon.

The technology is attracting interest in Africa because conventional weather-monitoring systems such as radar are too expensive, Gosset says. Weather forecasts based on microwave signals give developing countries a similar system, but for less money, she says.

Access to commercial data is getting easier, too. Researchers say that telecoms companies are beginning to see the value of releasing the data, and the consortium plans to create a central repository for processing the information. Project scientists hope to create a model that will enable a smooth partnership with the industry.

"I think that this door is just about to open," says Andersson. ■

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MICROBIOTA

Fish live longer on 'young poo'

Gut microbes of young killifish can extend lives of older ones.

BY EWEN CALLAWAY

It may not be an appetizing way to extend life, but researchers have found that older fish live longer after eating microbes from the poo of younger fish. The findings were posted to the bioRxiv preprint server on 27 March by Dario Valenzano, a geneticist at the Max Planck Institute for Biology of Ageing in Cologne, Germany, and his colleagues (P. Smith *et al.* Preprint on bioRxiv at <http://doi.org/b5kq>; 2017).

'Young blood' experiments have found that joining the circulatory systems of a young and an old rat can extend the older one's life. But the latest study looked at the effect of transplanting gut microbiomes. Previous work has hinted at links between gut microbes and lifespan: humans and mice lose some gut microbial diversity with age, and once-rare and harmful species can take over. The same holds in the turquoise killifish (*Nothobranchius furzeri*). To test whether the changes had a role in ageing, Valenzano and his colleagues transplanted gut microbes from 6-week-old fish into middle-aged, 9.5-week-old fish.

First, they gave the middle-aged fish antibiotics to clear out their gut flora, and then put them in a sterile aquarium with the gut contents of young fish for 12 hours. Killifish don't usually eat faeces, Valenzano notes, but they bit at the gut contents, ingesting microbes in the process.

These microbes recolonized the guts of the middle-aged fish. At 16 weeks old, the middle-aged fish that received 'young microbes' had gut microbiomes that resembled those of the 6-week-olds. The transplant also dramatically affected longevity: median lifespan was 41% longer in fish that received 6-week-old microbiomes than in control fish exposed to microbes from similarly aged animals. Microbes from older fish had no lifespan effect on young fish.

How microbes influence lifespan is hazy, Valenzano says. One possibility is that immune systems wear out with age, allowing harmful microbes to take root. A transplant might reset a middle-aged fish's microbiome, he says.

In humans, faecal transplants can treat some recurring infections. But Valenzano says it is much too early to consider transplants for life extension. "This is really early evidence that this has a potential positive effect," he says. ■