in developing countries. In Peru, whose universities do not offer astronomy degrees, José Ishitsuka is overseeing the transformation of a 32-meter satellite communications dish into a single-frequency telescope that will be dedicated to observing methanol masers from emerging stars. Once the telescope is running, says Ishitsuka, "it will allow young people to do research and write papers on the world level."

The Africa gap

A few years ago, failed bearings temporarily shut down the Hartebeesthoek radio telescope near Johannesburg, South Africa. With time on his hands, observatory director Mike Gaylard discovered some two dozen 30-meter satellite dishes in as many countries in Africa. "I tracked down a whole lot with stamps and Google Earth," he says, noting that many countries issued postage stamps to mark a satellite dish's inauguration. Although some dishes have been scrapped, he says, "there are dishes in Kenya, Ethiopia, Zimbabwe. . . . It's quite tantalizing for a radio astronomer to consider linking antennas to the VLBI networks."

"Africa is really quite interesting for radio astronomy," says van Langevelde. The EVN does not "have the sensitivity for things extended in the north–south direction because we only have that one telescope [Hartebeesthoek] in South Africa. The whole African continent is a blank spot in our vision."

"We want to identify antennas in Africa to fill the gap," says Jonas, "and at the same time put some flesh onto collaborations." Such collaborations began as part of South Africa's bid to host the SKA—the world's largest radio astronomy array, for which a site decision between that country and Australia is expected next year. "We are going to establish the Africa array whether or not the SKA occurs here. And it's something we can do in the next few years, for a fairly small investment."

Retrofitting a satellite dish involves installing new receivers, fixing or replacing steering mechanisms and electronics, and adding telescope control software, maser clocks for interferometric measurements, and sometimes fiber-optic connections. The cost of refurbishing a dish ranges from $100 000, like the project in Peru, to a couple million dollars, about one-tenth the cost of building a new 30-meter radio astronomy telescope.

Ghana, for one, jumped at the opportunity to retrofit when it was proposed by astronomers from South Africa. A defunct satellite dish about 30 km northeast of Accra, the capital city, will become the flagship of a planned space science and technology center, says Adelaide Asante, a research officer in Ghana's science and technology ministry. With no radio astronomers in the country, Asante notes that the new center will stress both training and research. "In a developing country, you have to balance research with what the facility can do for the country."

A commercial approach

The Goonhilly conversion combines radio astronomy with two potentially moneymaking ventures: a spacecraft tracking business and a visitors' center. Last January partners in academia and industry kicked off the effort to save the site. Ian Jones, who worked in telephone and aircraft communications at Goonhilly in its heyday, is leading the charge.

One of the site's three 30-meter-class dishes will be for radio astronomy, one will be dedicated to tracking spacecraft, and the third will be equipped for both uses. Some of the site's 15-meter dishes will also be fixed up for use in a local interferometer and for training students.

Although the Goonhilly dishes could be used on their own, the prospect of linking to the UK's e-MERLIN inter-

New radio telescope eyes sky from Sardinia

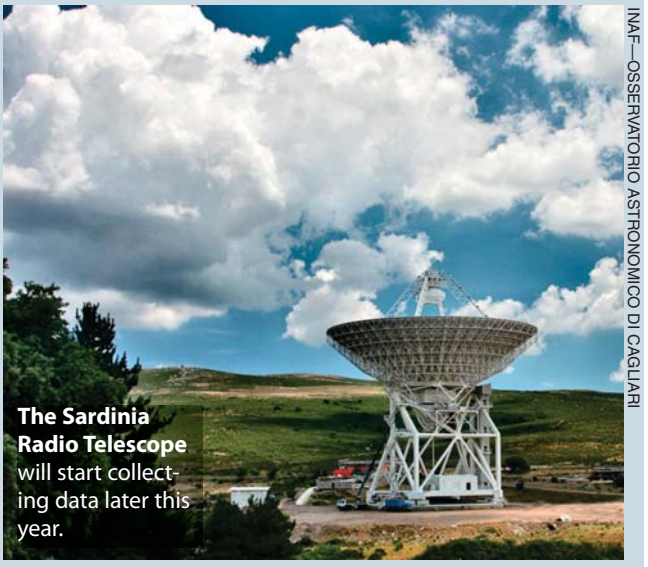
Scientists are set to begin debugging the 64-meter Sardinia Radio Telescope (SRT) in southern Italy and plan to make the first observations later this year.

The 500-ton dish was raised in one piece and placed on its 34-meter-tall platform last year (see videos at http://www.srt.inaf.it/multim/videos). "It was an incredible operation," says project director Nicolò D'Amico. "Usually, dishes are raised in pieces and then aligned and welded up top."

The SRT will be used in conjunction with interferometers such as the EVN—the European Very Long Baseline Interferometry (VLBI) Network. After the 100-meter dish in Effenberg, Germany, the SRT will be the second-largest dish in the network, which links 8 to 13 radio telescopes, depending on frequency. The SRT's initial sensitivity range is 0.3–22 GHz, with a planned stepwise increase to around 100 GHz. The dish's 1008 electromechanical actuators, which compensate for gravitational deformations, are especially important at higher frequencies. Says Huib van Langevelde, director of the Joint Institute for VLBI in Europe, "Such a large telescope that goes to 3 millimeters [100 GHz] is a major addition to the EVN." For example, he says, in Europe "we don't have the sensitivity to probe molecular transitions that produce short-wavelength maser emissions. That will be possible with the SRT." The telescope will also work with other interferometers, including the US's Very Long Baseline Array. On its own, the SRT will be used to study pulsars, masers, and other radio sources; identify targets for the interferometers; and track spacecraft missions.

The €60 million ($87 million) tab for the SRT was paid by local and national governments and by the Italian Space Agency (ASI), which has a 20% share in the telescope. The Italian economy has taken a nosedive since construction began in 2003, and D'Amico is concerned about coming up with €3 million for annual operations. Despite radio astronomers having to deal with interference from transmissions in the ASI satellite-tracking applications, D'Amico says that with money tight, "we are happy that ASI is involved." Given the austere policies introduced into Italy's public sector (see PHYSICS TODAY, December 2008, page 31), hiring the two dozen or so people needed to operate the telescope is on hold.

Toni Feder



INAF—OSSERVATORIO ASTRONOMICO DI CAGLIARI

The Sardinia Radio Telescope will start collecting data later this year.