

Geodesy by radio astronomy

One of the possible applications of the radioastronomical technique of long-baseline interferometry is to the precise measurement of distances between points on earth. If two radiotelescopes focus on the same distant object, the time delay between the arrival of a given part of the signal at one telescope and its arrival at the other can be used to calculate the distance between the telescopes.

A trial of the method involving nine experiments with telescopes at Westford, Mass., and Goldstone, Calif., is reported in the Dec. 6 *SCIENCE* by I. I. Shapiro of Massachusetts Institute of Technology and 10 others. The most important point is that the method agrees quite well with itself. The nine measurements came out with a root-mean-square deviation about their mean value of less than 20 centimeters or about five parts in a hundred million. Observations of changes in universal time and polar motion agree rather well with values derived by optical methods. Evidence of solid-earth tides is also found in the data, but "no useful estimate of their amplitude was extracted."

The old Alps a'moverin'

The evidence seems clear that over a long geological time the Alps have moved north. The outstanding question was whether that motion still continues. *DEUTSCHER FORSCHUNGSDIENST* now reports that Kurt Lemcke, a geologist in Munich, has determined that it does.

Lemcke's evidence is the water pressure in the rock debris (molasses) at the northern edge of the Alps. The pressure is abnormally high in self-contained reservoirs trapped in the sandstone strata in the sequence of molasses-layer formations. According to Lemcke, such pressure can be explained only as an effect of compression by the northward moving Alpine front. Since the effect involves water, it testifies to a present or extremely recent stress. So the Alps are still moving, and when the Zugspitze finally gets to Munich. . . .

Tagging the shifting sands

The North Sea coast of Germany has a problem shared by many seashore areas—sand that goes where people don't want it to. Erosion eats away islands that people like, and the washed-away sand is deposited in shipping channels where people don't like it. The key to finding some artificial means of controlling or preventing this erosion is to track the movements of the sand.

It's done by radioactive labeling. The radioactive isotope scandium 46, obtained from scandium 45 by neutron irradiation, is attached to sand grains, and its motion is charted by underwater sensors. But several hundredweight of sand were needed. Scandium 46 can be produced in only small amounts, and safety measures are required in treating the sand with the radioactive material so the project seemed very costly.

Scientists at the Nuclear Research Center in Karlsruhe found a way to reduce the cost by 66 percent—attach non-radioactive scandium 45 to the sand first, then irradiate the lot. Crucial to the method, *DEUTSCHER FORSCHUNGSDIENST* reports, is the high capacity of the FR 2 reactor at the Karlsruhe center and a special large irradiation vessel, developed by engineers at the center, that takes several kilograms at a time. The method has produced two hundredweight of tagged sea sand for spreading beneath the waters by the Schleswig Holstein Water Resources Management Office.

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Underestimating population

Global population may be exploding faster than previously realized, if figures released by the Environmental Fund are correct. According to a study sponsored by the fund, world population has already exceeded four billion and is growing at a rate of 90 million per year—not 75 million, as previously thought.

Most of the errors come from inaccuracies in counting heads in the developing world, but even the U.S. official figures are too low, say fund representatives. Though the Census Bureau has declared that some 5.3 million people were not counted in the 1970 census, these have not been added to the official total of 212 million. Also, the Immigration and Naturalization Service estimates that between seven and eight million illegal immigrants are residing in the country at present.

The most startling figures are those for China. The Chinese claim to have only 800 million people, but that figure is inconsistent with their own published growth figures. The Environmental Fund study concludes that China has at least 917 million people, and probably many more.

Flukes from the dam

Before Egypt's Aswan High Dam was even begun, environmentalists warned that stopping the Nile's flow would lead to serious ecological and public health effects, particularly the rapid increase of schistosomiasis, a snail-borne blood fluke disease. The predictions have proven all too accurate according to an article in the November *ENVIRONMENT* magazine by Henry van der Schalie.

As stable water conditions and increased aquatic plant growth have provided ideal conditions for the snails, blood fluke infestation has grown apace. Below the dam, where year-around irrigation has replaced annual flooding, incidence of schistosomiasis has risen from roughly 5 to 35 percent of the population. Above the dam prevalence of the disease is close to 76 percent.

About the only way to combat the disease on a large scale is to poison the snails with copper sulfate, but water plants make that difficult by soaking up the poison, and removing the plants before treating the water is a costly business. The report concludes gloomily that extra food being produced in the irrigated areas cannot keep up with Egypt's 600,000 persons per year population growth and that the increased incidence of schistosomiasis is likely to "serve as an unfortunate means of population control."

Environmentalism in Africa

Almost a dozen African countries have now added some sort of environmental protection agency to their governmental apparatus, according to an article in November *ENVIRONMENTAL SCIENCE AND TECHNOLOGY*. None of the countries has passed comprehensive legislation but they are developing guidelines on pollution, land reclamation and town planning.

Nigeria, for example, has established a National Coordinating Committee on Human Environment (NCCHE) which will review environmental laws to make them more comprehensive and to strengthen their enforcement. Nigerian priorities include planning of human settlements, waste disposal, water pollution control and protection of productive land from degradation. The other countries include Botswana, Cameroon, Ghana, Kenya, Senegal, Tanzania, Zaïre and Gabon.

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