Astronomers lament loss of telescope

A U.S. telescope that had served for 26 years as a leading tool worldwide for studying cosmic sources of radio-frequency signals came crashing down in minutes last week. While officials at the National Radio Astronomy Observatory (NRAO) in Green Bank, W. Va., investigate why the 300-foot-diameter dish collapsed, astronomers say its demise will profoundly limit their capabilities.

"Radio astronomy is going to be pretty tough without it," says Kenneth J. Johnston of the Naval Research Laboratory in Washington, D.C. He says no set of existing instruments can completely fill the void left by the dish failure. Located in a valley shielded from the human-made radio-frequency interference that hampers other facilities, the telescope combined the capacity to observe a wide field of view with the ability to detect very distant objects.

The dish scanned the sky from the North Pole to 19°S latitude and found radio sources at distances approaching 10 billion light-years. The few radio-telescopes comparable in size to the fallen dish either view less sky or encounter greater interference, says George A. Seielstad, assistant director of NRAO.

Some studies involving the telescope "simply will not be possible with other observatories," Seielstad says. One such recent project, headed by Johnston, detected faint electron clouds around quasars. Perhaps the most noticeable loss associated with the collapse may be fewer discoveries of quasars – considered the most distant and luminous objects in the universe – because signals from many are too weak by the time they reach Earth for other telescopes to identify.

Astronomers had planned to use the dish in conjunction with a U.S. satellite scheduled for launch in 1990 (see story, p.340) to detect gamma rays from pulsars, remnant stars of supernova explosions. The two most visible pulsars produce observable gamma rays, and researchers had hoped the telescope's observations of pulsar radio signals might tell them precisely when and where the satellite might look for more pulsars emitting the high-energy radiation. However, other telescopes can provide information good enough to warrant the study, says Carl E. Fichtel of NASA's Goddard Space Flight Center in Greenbelt, Md.

NRAO's Seielstad says a replacement for the dish would cost at least five times as much as the original – built for $850,000 – and would take at least two years to construct. The large dish played key roles in many astronomical discoveries, including the finding that gravitational fields of galaxies can act as lenses that bend light (SN: 11/21/87, p.326). *– C. Knox*

Onshore earthquakes trigger sea shocks

An earthquake rocks a coastal city, releasing energy built up in an underlying continental plate. The energy accumulated as a result of friction between that slab of the Earth's crust and an oceanic plate descending beneath the continent at a subduction zone offshore. But while attention focuses on the damaged area, a ripple reshaping the crust creeps away, eventually likely to trigger another earthquake – this one at sea.

Based on records of northeast Japan earthquakes since 1600, two geophysicists now propose this scenario in opposition to a long-held theory suggesting offshore earthquakes instead generate onshore quakes.

In the Nov. 17 NATURE, Paul A. Rydelek and I. Selwyn Sacks of the Carnegie Institution of Washington (D.C.) analyze the timing and location of 46 land and 50 sea earthquakes, each with a Richter-scale magnitude of at least 6.5. They conclude that shocks on land trigger temblors beneath the sea an average of 36 years later.

Sacks told SCIENCE NEWS that by the time a deforming ripple, or strain pulse, generated beneath dry land reaches a submerged subduction zone, the pulse has flattened into a horizontal motion that tends to pull the edge of the continental plate slightly away from the oceanic plate. This eases friction holding the oceanic plate in place just enough to help it slip downward, causing an earthquake, Sacks says. Rydelek contends ripples from sea shocks don't similarly unbalance forces on land.

Of the Japanese land and sea events, he says, "Big ones are associated with big ones, but smaller land earthquakes may or may not trigger ones at sea." However, he adds, the sum effect of strain pulses from a few smaller onshore earthquakes occurring over several years can initiate a subduction-zone quake.

Pulses from the temblors studied traveled an average distance of 200 kilometers to the subduction zone at an average velocity of 5.6 kilometers per year. The researchers suggest the speed of a particular pulse depends on the highly variable viscosity of the Earth's upper mantle, on which the crustal plates rest. *– C. Knox*

Older smokers still helped by quitting

Many physicians have suspected that smokers approaching retirement age – especially those suffering substantial heart disease – gain little by giving up their cigarettes. But a six-year analysis of 1,893 people who participated in the national Coronary Artery Surgery Study shows it's never too late to quit smoking. Compared with those who continued smoking, men and women who gave up the habit in their middle 50s or later dramatically reduced – in some cases halved – their risk of heart attacks or early death.

What makes this risk reduction doubly impressive, say the researchers who conducted the study, is that by each of the four measures used to gauge the initial severity of coronary artery disease in these patients, the group that quit smoking started out sicker.

"The benefits of quitting were similar for men and women," report researchers at the University of Washington's Center for Health Promotion in Older Adults, in Seattle, and the Mayo Clinic in Rochester, Minn. More surprising, points out Bonnie Hermanson of the Seattle team, the beneficial effect showed no sensitivity to age: Those 65 and older derived every bit as much benefit as quitters between 35 and 55 – a reduction of 40 to 50 percent in their heart-attack/early-death risk. A report of the work appears in the Nov. 24 NEW ENGLAND JOURNAL OF MEDICINE.

Smoking, while a potent force in heart-disease risk, is by no means the only major one. Another study described in the same issue quantifies physical fitness as a significant, independent, predictive risk factor in cardiovascular death. Again, the beneficial effects showed no relation to age.

It's hardly startling that fit bodies face less risk of death from heart disease. However, points out study coauthor Lars-Göran Ekelund of the University of North Carolina in Chapel Hill, this accepted link between fitness and reduced heart-disease risk comes largely from studies assessing fitness from questionnaires. What makes his study "unique," he says, is that it followed, at 10 North American clinics for roughly 8½ years, 4,276 randomly selected men aged 30 to 69 – many apparently quite healthy. The findings suggest that heart-performance scores during treadmill tests can, like cholesterol levels, serve as a predictive measure of heart-disease death risk. Moreover, the data suggest, poor fitness can be about as risky as smoking.

Why fitness is so beneficial remains a mystery, Ekelund says, since its well-known effect on blood pressure and serum lipids can't explain the magnitude of observed protection. *– J. Raloff*