GEOPHYSICS

From our reporter at the annual meeting of the American Geophysical Union in Washington

Back to the drawing board

One of the problems affecting the precision of some radiocarbon dating efforts has been the presence of some regions in which radiocarbon ages mysteriously appear to be older than their surroundings. The possibility had been suggested that if lightning bolts produced neutrons in sufficient numbers, they might account for some known dating anomalies, as well as allow local lightning histories to be inferred. Although tests with simulated lightning failed to produce enough neutrons, says Robert L. Fleischer of General Electric's Research and Development Center in Schenectady, N.Y., "it was felt that natural lightning must be tested before the experimental situation would be clear."

For the test, passive, integrating neutron detectors were installed atop a 300-meter-high television antenna that had frequently been struck by lightning, and operated for a test period of 228.1 days. "The number of pits and protrusions on the copper caps on which the detectors were mounted," says Fleischer, "imply that at least 236 lightning strokes ended within 11.5 centimeters of the detectors."

Unfortunately for the theory, but valuable for minimizing the significance of a former culprit, the neutron counts were still low. The integrated counts yielded an upper limit of 10 billion thermal neutrons per stroke and a value of 12 billion to 20 billion neutrons of energies up to 2.45 million electron volts—a little higher than the laboratory simulations, but not enough to be significant, Fleischer says.

Bombing the ozone layer

Some researchers have suggested that one of the side effects of a nuclear war would be the partial depletion of the ozone layer in earth's atmosphere by the nitric oxide produced in nuclear explosions. Now it has been calculated that such an effect could be extremely severe indeed.

William J. Borucki and Robert C. Whitten Jr., of the National Aeronautics and Space Administration's Ames Research Center in California and R. P. Turco of R&D Associates, also in California, based their calculations on the assumption that 10^{32} NO molecules are produced for each megaton of nuclear blast. They made estimates for the low-altitude detonation of 5,000 and 10,000 megatons of weaponry, half as 1-Mt and half as 5-Mt weapons in each case.

If the nitric oxide is spread uniformly over a zone from 30 degrees north latitude to 70 degrees north, they report, the maximum ozone depletion is 59 percent for 5,000 megatons and 70 percent for 10,000 megatons, about two months after the explosions, with 26 percent and 38 percent depletions, respectively, after three years. If ("as appears more likely," they say) the injected NO spreads over the entire northern hemisphere, the depletions are reduced to still-substantial levels of 16 and 25 percent.

Long days on Uranus

Very little is definitely known about Uranus, third most distant planet in the solar system, but for more than 40 years its day has been considered to be about 10.8 hours long, a calculation that has found its way into many textbooks. Now a team of astronomers has decided that it is nearly one-seventh longer.

A day on Uranus is about 12.3 hours long, according to J.T. Trauger and F.L. Roesler of the University of Wisconsin and Guido Munch of Hale Observatory, based on a rotational velocity of 3.7 kilometers per second, calculated from the 5281.8-Angstrom reflected solar Fraunhofer line.