METEOROLOGY

Carbon-14 Maps Weather

➤ RADIOACTIVE carbon-14, produced either in H-bomb explosions or naturally, is a new tool meteorologists are using to help chart world-wide weather patterns.

L. Machta of the U. S. Weather Bureau said most of the man-made carbon-14 is carried by the rising atomic cloud into the stratosphere, more than 30,000 feet above the earth's surface.

Where this radioactive chemical later falls to earth is a clue to the mixing of stratospheric air with lower layers of the atmosphere, Mr. Machta told a joint Washington meeting of the American Geophysical Union and the American Meteorological Society.

Carbon-14 is produced by the action of neutrons on nitrogen in the atmosphere. It may be created either through cosmic ray bombardment or as a by-product of nuclear tests. (Carbon-14 was recently indicted by Dr. Linus Pauling of California Institute of Technology as a more deadly menace than strontium-90 to unborn generations.)

Naturally formed carbon-14, which loses half its radioactivity in 5,600 years, is uniformly distributed throughout the atmosphere as carbon dioxide. Measurements of increases in carbon-14 due to nuclear explosions indicate the locations and times this radioactive tracer was removed from the stratosphere.

Radioactive tracers have also been suggested for:

1. Studying movements of the fast-moving rivers of air high in the atmosphere known as jet streams.

2. Determining the effects of cold air masses found over the Arctic and Antarctic on the world's weather.

3. Spotting local sources of moisture for rainfall.

4. Charting the exchange of air between Northern and Southern Hemispheres.

The forces at work thousands of miles above the earth's surface, rather than the thousands of feet where weather is made, were described by Drs. Serge A. Korff and Arthur Beiser of New York University.

They studied the electromagnetic forces in nearby space by charting variations in the intensity of cosmic ray bombardment at the earth's surface on a planet-wide basis, Drs. Korff and Beiser suggested these forces are gradually slowing down the earth's rotation period.

They believe electromagnetic forces are twice as powerful in braking the earth's spinning rate as is tidal friction in ocean basins. They suggest this mechanism to account for the difference between the observed rate by which the day is lengthened, about 16 ten-thousandths of a second per century, and the contribution to slowing caused by tidal friction.

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GEOPHYSICS

Forecast "Moon" Recovery

➤ RETURNABLE satellites with payloads of 100 pounds should be launched and recovered by the U. S. in 1959, or "perhaps" 1960, Dr. Herbert F. York, chief scientist for the Defense Department's Advanced Research Projects Agency (ARPA), said.

He also predicts U. S. launching of a one-ton satellite, rivaling the Russians' now defunct sputnik II, within five years.

Dr. York forecast that within a year the U. S. would be launching earth-circling satellites with payloads of 100 to 300 pounds, using the first stages of the intermediate range ballistic missiles (IRBM) Jupiter and Thor to boost them into a 200-mile orbit. Later satellites of this weight range would return about half the total payload.

ARPA is the agency designated by the Defense Department to handle the military aspects of space exploration and research.

Dr. York told the American Physical Society meeting in Washington, D. C., that the next "big advance" in payload launching will result from use of appropriately modified IRBM's. The modifications will be primarily in the fuel and oxidizer tankage, and in guidance.

The IRBM first stages are in the 100,000-pound thrust class and ultimately should be capable of launching up to 700 pounds of net payload into a 200-mile orbit.

For space vehicles traveling to the moon or planets, Dr. York said payloads up to 100 pounds could be sent if the upper stages of the rocket launcher were specifically designed for interplanetary travel. If an extra stage were added to a rocket designed for launching an earth satellite, the moon or Mars vehicle could have a payload of only 60 pounds or so.

Any equipment for slowing down a lunar rocket so that it would orbit the moon would cut the payload in half. Rockets sufficient for a landing soft enough so that instruments would survive the impact would reduce the payload to 15% to 30% of the escape payload.

The next step in the U. S. space race, Dr. York said, would involve using intercontinental ballistic missiles (ICBM's), which have boosters in the 200,000-pound range.

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AGRICULTURE

Hopi Indians Help Lima Bean Breeders

➤ NEMATODE-RESISTANT lima beans are available to growers this year, thanks to the Hopi Indians and a group of state and U.S. Department of Agriculture scientists.

The new variety will produce as much as three times as many beans per acre on nematode-infested soils as other varieties. Also, USDA scientists reported, its yield on nematode-free soil is only slightly less than older limas.

Lima beans selected by the Hopi Indians for adaptability to their infested soils in Arizona were crossed with commercially accepted varieties. The baby, green-seeded line that finally resulted was field tested for five years before being released to seed growers.

Enough stocks of the new variety, named Nemagreen, have been built up for commercial growers and gardeners in the nematode areas. It can be obtained through seed companies, not through the USDA.

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