



The Pattern of Earth's Magnetic Field

DR. T. NEIL DAVIS, left, and Albert E. Belon, researchers at the University of Alaska, discuss computer results of recent experiments proving that auroras seen near the earth's north and south poles are almost identical. The computer, an IBM System/360 Model 40, is being used to analyze data collected in the experiments by two instrument-laden jet aircraft. The warped, plastic rod touching the globe near the polar regions held by Mr. Belon illustrates how lines of force

in the earth's magnetic field extend into space. Energized particles, which cause auroras, were measured as they bounced along these lines of force by the two airborne laboratories. Information being processed by the computer is expected to shed new light on the high altitude nature of the atmosphere, the heights to which occur, and provide a better understanding of auroral rays.

Scientists Use IBM Computer

COLLEGE, Alaska, July 23... Scientists near the Arctic Circle are using a computer to shed some new light on the nature of the aurora borealis.

The computer, an IBM System/360 Model 40, has helped scientists at the University of Alaska's Geophysical Institute prove that auroras seen across the northern and southern portions of the globe are almost identical.

This new knowledge and other investigations into diff-

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IBM Computer . . .

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erent atmospheric phenomena are important to the national space programs and advances in supersonic transportation.

While the primary intent of these studies is basic research, Dr. T. Neil Davis, with the Geophysical Institute, does not rule out their immediate use and application.

"It is well known that the energized particles which cause auroras can be lethal in space, as well as damaging to spacecraft and satellites," Dr. Davis said. "They are a potential danger to passengers in new aircraft such as the supersonic transport, which will cruise outside the shielding atmosphere."

In a recent experiment, the University of Alaska's computer plotted two courses which instrument-laden jet aircraft flew at the two ends of 80,000-mile-long lines of force in the earth's magnetic field.

Energized particles from outer space, which cause the aurora borealis' effects, speed along these lines at nearly a tenth the speed of light. The university's geophysicists were interested in learning whether distortions in the magnetic field would affect similarities between auroras occurring in the northern and southern hemispheres.

"The results of this experiment were remarkable," said Dr. Davis. "Distortions had little effect on the particles and there was a close similarity between the shape, intensity, and the time variations between auroras occurring at opposite ends of the earth."

At precisely prescribed points and pre-established time intervals determined by the computer, special equipment aboard the two airborne laboratories recorded the auroral activity. Scientists found that one second after an aurora occurred over Alaska, energized particles

bouncing back along the lines of force created almost identical auroras over New Zealand.

Data from this experiment, and others measuring auroral activity from satellites and instrument packages aboard rockets, is being analyzed by the computer. It is expected to provide new information about the high altitude composition of the atmosphere, the heights to which auroras occur, and to help scientists gain a better understanding of auroral rays.

Information from these experiments also enables scientists to use the computer to produce mathematical models of auroras. These studies, simulating auroras between the northern and southern hemispheres, are helping to further define auroral similarities and to more precisely map distortions in the earth's magnetic field.

In addition to its studies of the Northern Lights, the institute is using the computer to:

- Investigate magnetic disturbances around the world;
- Study the drift of radar signals reflected from meteor trails;
- Determine the epicenters of earthquakes occurring in the Aleutians;
- Analyze materials in lava flows from active volcanoes in Alaska;
- Probe the nature of man-made ice-fog, an Alaskan air pollution problem, and
- Define the nature and causes of air-glow, a soft lighting of the sky which often occurs in pre-dawn hours around the world.