METEOROLOGY

# Computer Mimics Weather

**One of the world's most powerful computers is helping scientists understand the earth's atmosphere and the ways of the weather by simulating the world's weather realistically.**

➤ HOW AND WHY the world's weather behaves as it does is being attacked by one of the most powerful computers yet built.

The U.S. Weather Bureau in Washington, D.C., dedicated a new research laboratory aimed at gaining better understanding of the earth's atmosphere. Mathematical models of the atmosphere up to 20 miles above the surface are tested in the new laboratory on an International Business Machines' STRETCH computer.

The program is expected to lead to improved long-range weather forecasts and to help bring closer to reality the control of weather.

A team of meteorologists, oceanographers and mathematicians are combining talents to develop the methods of simulating the world's weather realistically on the computer.

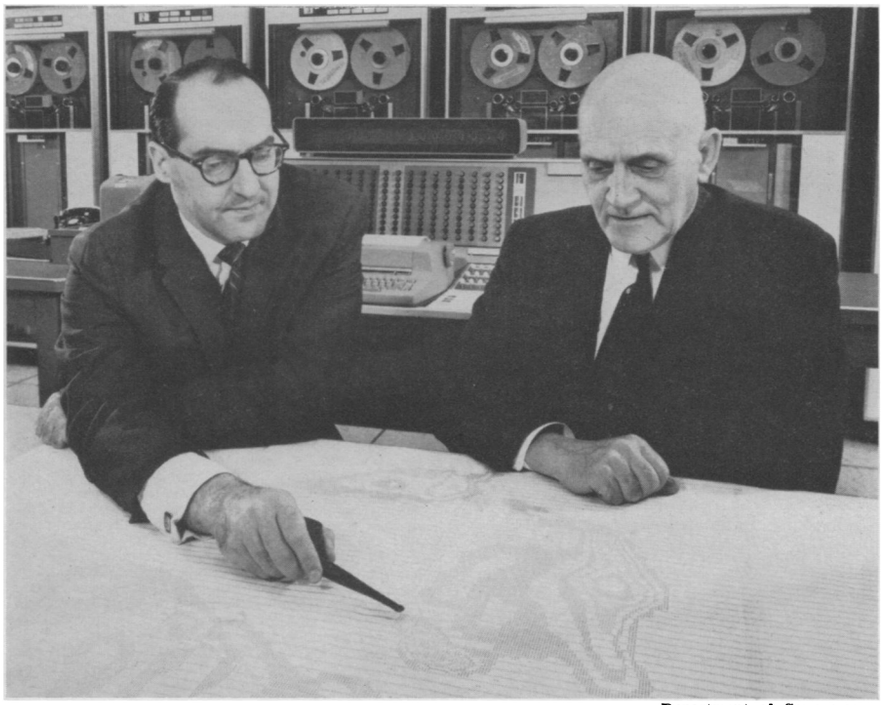
The electronic "brain" is expected to simulate day-to-day changes at 10,000 points around the world, analyzing surface weather patterns plus those at nine levels above the surface.

Some ten billion computations will be required to model these weather changes during a 24-hour period. They were previously impossible because electronic computers did not have sufficient capacity.

Dr. Joseph Smagorinsky is chief of the new General Circulation Research Laboratory. He said global weather will be simulated on the computer first by constructing the mathematical model using the complex equations believed to govern weather changes. Then the computer will be instructed to use this model to predict resulting weather on the basis of weather factors at the 10,000 points.

Results of the first prediction will be used to make a second, and the results of that used to make a third, and so on until a sufficient series has been made for a final analysis. When the theoretical models are able to reproduce natural phenomena faithfully enough to be useful in prediction, the scientists will then investigate the effects of weather modification, either man-made or natural.

They will seek answers to such questions as where and how the atmosphere is sensitive to external influences, such as solar radiation. Could its behavior be changed by the relatively small energy sources available to man?



Department of Commerce

*STRETCH COMPUTER—An elevation contour map of the Northern Hemisphere as printed out by the STRETCH computer is being examined by Drs. F. W. Reichelderfer (right) and Joseph Smagorinsky. Topographic contours are used as part of the input data needed to simulate weather processes with the Laboratory's powerful new computer. The STRETCH console and magnetic tape units can be seen in the background.*

The scientists will try to determine what would happen to world weather and climate if artificial clouds could be created to reflect more sunlight away from earth; if more carbon dioxide were released to the atmosphere; if more forests were converted to agricultural land or cities; or if artificial black ground cover were spread over large areas such as the Arctic ice pack.

Dr. F. W. Reichelderfer, chief of the Weather Bureau, said that the scientists, using the speedy computer for fundamental research, would have no dead lines but would be free to pursue whatever leads appear most promising in solving the many unknown problems about the world's weather.

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GEOLOGY

## Study Underground Salt To Solve Earth Structure

➤ GEOLOGISTS are studying the world's immense resources of underground salt for answers to many unsolved problems in the study of the earth. Interest in salt deposits is due to the unusual combination that salt has a strong influence on the massive subsurface movements of rock and, at the same time, preserves an orderly record of turbulent events in geological history.

Salt has stubborn resistance to change. Even in regions of the world that show intense geological activity, severe deformations of rock and sediment have produced no change in the physical and chemical properties of the surrounding salt.

It has plastic behavior even at relatively low temperature and pressure. Salt in its crystalline form tends to flow in response to even very slight amounts of stress in the earth's crust.

The low density and high plasticity of salt cause it to be pushed out of the way by heavier overlaying layers of rock and sediment and thus to become an important agent of movement in the earth's crust. Due to high plasticity salt maintains a continuous structure, thereby preserving an orderly record of the earth's early history.

In the United States alone, there are vast underground expanses of salt in 24 of the 50 states.

Salt folded into the earth's crust promises to afford radioactive waste disposal. A salt deposit is ideal for the disposal of liquid wastes since a hole drilled in the deposit to admit the radioactive material will quickly seal itself off and thus prevent contamination of ground water.

In the U. S. atomic Project Gnome near Carlsbad, N. M., the prospect of containing the energy generated by a nuclear explosion within a salt deposit was investigated. This stored energy might provide a long-term source of heat as well as radioisotopes for scientific research.

A perambulating international conference on saline deposits held by the National Academy of Sciences visited the deposits of salt in Colorado, Utah, New Mexico and the Gulf Coast and culminated in sessions with the Geological Society of America at Houston, Texas.

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