

## METEOROLOGY

# From Now On: Weather

Long range weather forecasts will chart weather far in advance with techniques of the future. The cold and warm years may also be predicted.

By WATSON DAVIS

*Nineteenth in a series of glances forward in science.*

➤ THE day has long since passed when a farmer or a business man went to a patent medicine almanac for his weather forecast. He now reads the daily forecast in his newspaper, checks changes in predictions hour by hour by telephone or radio, and governs his work and pleasure accordingly.

The airplane pilot has his flight path determined for him by the airport meteorologist. Thanks to a vast world system of weather reports, almost every place knows the weather of every other place as it happens.

A couple of decades ago trying to foresee what was going to happen in the earth's atmosphere—what we call "weather"—was largely a two-dimensional activity. The weather men knew only what was happening at the surface of the earth. Now weather forecasting is three-dimensional and highly dynamic. Air masses as they rush over the surface of the earth are followed and pictured on the weather map hour by hour.

Temperature, humidity, barometric pressure, wind and precipitation of various sorts are still some of the basic physical factors that the meteorologist uses. Supplementing the conventional observations of the ground level, balloons carry automatic self-supporting weather stations aloft for many miles upward, radar follows thunder storms and airplanes make routine but astounding flights over areas such as the North Atlantic where permanent weather observation points are lacking. With a better picture of the circulation of the earth's atmosphere and the course of storms, the meteorologists have been able to extend their forecasts as to what will happen weatherwise in a given locality as far ahead as three or four days or a week.

For a broad area, such as a state or a section of the country, much more extended forecasts, looking forward to what will happen in the way of rainfall and temperature, are now being made public by the United States Weather Bureau. For example, this spring's unseasonably cold weather along the east coast was predicted a month in advance by this new service.

Some study is being directed toward intelligent guesses as to whether seasons will be normal or abnormal. Obviously, these must be experimental and hazardous because it takes so long in time to test the applicability of many complex factors.

The weather has so much to do with how

much food the farmers of the world will raise that our weather men may eventually even warn us of bad harvests ahead, or the probability of dangerous agricultural surpluses in our future.

For the sorrier business of a fighting war, weather forecasts could determine when bombers should fly, troops make their landing, and atomic weapons spray their death. For weather is a weapon.

Whether we can do anything about making our own weather, particularly rain, is still problematical. By spraying clouds with rain-promoting particles, it seems possible to give nature's processes a bit of a push at least under certain relatively infrequent conditions. There are threats already in some areas of legal action to protect the water resources of the upper atmosphere. Today some people spray for rain instead of pray for rain.

The energies involved in a large storm are so immense that any artificial methods of changing major air movements seem fantastic.

Predicting meteorology's future in the coming years:

A. Forecasts of general weather a month and more ahead will become bolder and more accurate with increasing experience and will be used more extensively for planning many human activities affected by the weather.

B. Watching the weather from hour to hour will become even more effective than today's high precision, with the possibility that even the swift and uncertain course of tornadoes may be determined by radar and other means in time to warn of the danger.

C. The cold years and the warm years that are brought by gradual cyclical shifts of climates may be determined in order to give us long-range notice of unusual heat, cold and drought.

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## ENGINEERING

## Oil Progress in Pipeline Controlled Automatically

➤ THE progress of petroleum products flowing through a 450-mile pipeline in the Midwest can be noted and controlled in New York with equipment in the offices of the Shell Oil Company. The progress is recorded on a 17-foot control board.

The pipeline extends from a Shell refinery near St. Louis to Lima and Columbus, Ohio. The secret is a series of stations

along the line in which pumps are equipped electrically so that they may be started or stopped and valves opened or shut, using remote control by wire from the central office.

Code numbers on a telephone dial attached to a teletype machine do the job. The equipment in the pumping stations automatically reports on operating conditions. A set of meters reports to New York by teletype the suction and discharge pressures and electrical load of each station whenever the New York operator dials particular numbers on his teletype.

This pipeline, unlike those that carry only one product, is equipped so that it can handle one after another as many as 22 different finished petroleum products. Such products as gasoline, naphtha, kerosene and fuel oil can be pumped into the line, following each other through. At convenient intervals, a portion of any product can be taken out and put in tanks for distribution to local customers.

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## ● RADIO

Saturday, August 12, 3:15 p.m. EDST

"Adventures in Science" with Watson Davis, director of Science Service over Columbia Broadcasting System.

Dr. William Menninger, general secretary, and Dr. Karl Menninger, director of education, Menninger Foundation, Topeka, Kans., will discuss "The Mind and Research".



**KEEPING TAB**—A 17-foot control board in Shell's New York office traces the progress of every gallon of oil product in the 450-mile pipe line in the midwest. Shell dispatchers set markers and adjust charts to show exactly where each product is, 24 hours a day. Products move through the line at about 4 miles an hour.