METEOROLOGY

Spring Brings Tornadoes

Tornadoes, which usually reach their peak of destructive power in May, have this year already killed more than their average yearly quota of victims—By Barbara Tufty

See Front Cover

➤ OUT OF MOIST spring skies come some of the smallest yet most dangerous storms—tornadoes.

A barrage of spring tornadoes has already killed as many people in the United States as are killed in one year by these destructive storms on the average. At least 248 persons died in the wake of 37 of these twisting storms that hit six Midwest states from Wisconsin to Ohio on April 10.

These storms were unusually far north for this time of year, said an official of the U.S. Weather Bureau's emergency warning section. Most of these treacherous storms are formed in southeastern and southern states and states around the Mississippi Valley, he said.

Texas is the state most frequently hit by tornadoes, with an annual average of about 28 over a period of 46 years. Kansas comes next with about 26 tornadoes a year, and Oklahoma with about 24. Iowa, Nebraska, Missouri and Arkansas are the next hardest hit by tornadoes, which have battered all 50 states at one time or another.

The United States is the worst region in the world for twisters, but they can also occur in western Europe, Russia, and Poland as well as in India, Pakistan and southeast Asia.

Although U.S. tornadoes can strike during every month of the year, the dangerous season starts in March, increases in intensity and numbers through April and reaches its peak in May.

A tornado is a local storm with violently whirling winds forming a funnel that reaches from dark thunderclouds to touch the earth, where it can tear up buildings, overturn vehicles, derail trains, uproot large trees, and fling people and animals through the air.

The tornadoes that slam into the Midwest start to form several thousand feet above the earth's surface, under certain weather conditions in which there are air layers of contrasting temperature, moisture, density and wind flow. Low, moist air moving northward from the Gulf of Mexico can clash with a mass of dry colder air coming from the northwest or west.

As the rising warm air contacts the cold air, moisture in the air condenses rapidly into water drops to form a large turbulent thundercloud.

The conditions necessary to the birth of such turbulent air masses can be triggered by a high-level jet stream. As winds in the thunderstorm's dark clouds whip faster, the base of the cloud may start to dip down toward the ground in the shape of a funnel, and a tornado is born.

MOST ACCURATE TIME—Dr. Paul Davidovits holds the rubidium type maser, or atomic clock, he developed at Columbia University's Radiation Laboratory. The instrument can be used to make extremely accurate measurement of time and distance from satellites or high-flying airplanes.

This funnel-shaped whirling vortex can speed over the earth's surface at 10 to 40 miles an hour, cutting a path of destruction ranging in width from nine feet to a mile and in length from a few feet to 300 miles.

The destructive force lies not so much in the traveling speed of the funnel, but in the tremendous force of the rotating mass of air, which whirls counterclockwise at speeds so great they have not been clocked but are estimated to be as high as 500 miles an hour.

After tornadoes are spotted, warnings are sent out to areas that may lie in their paths. Many forecast stations operate in the Midwest, with their center at Kansas City, Mo.

Radar detection, as well as analysis of the weather pattern, is used by the U.S. Weather Bureau to pick up potential storm areas. Warnings are then sent to airports, police stations, Red Cross stations and to local radio and TV stations that broadcast the alerts.

Seen on this week's front cover is a radar picture of a tornado just beginning to form.

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METEOROLOGY

Tornadoes Funnel Radioactive Debris

➤ TORNADOES can funnel dangerous levels of radioactivity from the high atmosphere to form "hot spots" on the ground in the plains states of the United States.

The radioactive debris is funneled from a reservoir in the stratosphere to the earth's surface by the twisting circulation of the severe thunderstorms in which tornadoes are born. The radioactivity is made by man, hurled into the stratosphere by hundreds of nuclear bomb explosions.

Most of the radioactive materials sift slowly to the earth during a long period of time in an even blanket covering the Northern Hemisphere. However, some of the debris from test bombs is concentrated by the intense tornado-breeding storms that occur most frequently over the plains states from March to June.

Radioactive strontium 90 is highest where tornadoes are most frequent, a survey has shown. A new theory suggesting how tornadoes and the stratosphere are linked to form radioactive "hot spots" on earth's surface was reported in Washington, D.C., by Dr. A. Nelson Dingle of the University of Michigan.

Dr. Dingle declined to enter into the controversy concerning the source of the iodine 131 that has been found in milk from some midwestern states at levels exceeding those considered safe by the United Nations.

However, he did state that the ability of tornadoes to concentrate radioactivity in hot spots results in a health hazard, mainly in the plains states. The occurrence of strontium 90, which is known to be stored in the stratosphere, provides a better method for locating hot spots than the occurrence of iodine 131.

Possible hot spots might be located first by using radar to detect severe storms, Dr. Dingle reported in Science, 148:227, 1965.

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