



TORNADO'S ELECTRICAL DISCHARGES—Unusual illuminated vertical pillars, shown above were observed at the time of the Toledo tornado of April 11, 1965.

Science

METEOROLOGY

## Tornado Photos Needed

► AN URGENT CALL for the general public to take photographs of lightning and other visible light associated with tornadoes was made by a scientist and a professional photographer.

The existence of unusual luminous activity and electrical discharges in the tornado that slammed through Toledo on the evening of April 11, 1965, has been confirmed by a photograph, as well as by the testimony of eyewitnesses.

If the general public would take either still or moving pictures of tornadoes and the visible light sometimes accompanying them, scientists could analyze the photos to learn much more than they now know about a twister's circulation. Such photographs, which normally can be taken only at night, could yield "valuable qualitative and quantitative information" concerning the electrical activity of tornadoes.

This is the conclusion of Dr. B. Vonnegut of Arthur D. Little, Inc., Cambridge, Mass., and James R. Weyer of Weyer Studios, Toledo, Ohio.

The need for help from anyone who is near a tornado's path, is based on the fact that twisters devastate a very narrow belt across any given area. There are, therefore, few times when persons close to a tornado's path are able to take pictures of either the twister or the visible activity accompanying it.

While Mr. Weyer was photographing lightning associated with the Toledo tornado, he unknowingly took a picture showing unusual vertical pillars of light.

Analysis of the photograph and of

eyewitness accounts of the 1965 event, as well as records of visual luminous activity previously reported associated with tornadoes, verified the existence of this unusual phenomenon.

The questions now to be answered concern the origin, nature and role of unusual electrical activity in the birth and growth of twisters. Scientists would also like to know whether the electrical activity is an unimportant by-product of the storm or whether it is sometimes a source of energy necessary to establish or maintain the tornado's circulation.

Direction measurements of temperatures and electrical currents within the tornado would help answer some of these questions. Dr. Vonnegut and Mr. Weyer reported in *Science*, 153:1213, 1966.

TECHNOLOGY

## Satellite Observations Make Accurate Maps

► A SATELLITE system for making accurate maps of land and sea is being used by the U.S. Navy to fix positions of isolated islands and other geographic points. Accuracies of 25 meters or better are obtained, defining the earth's gravitational field to a degree not yet achieved by any other method.

First employed on a research and development basis, the system, known as the Satellite Geophysics Project, makes

it possible for the Navy to mark any accessible point on the globe on a world-wide basis. All measurements are made with reference to the center of mass of the earth.

The Satellite Geophysics Project was developed for the Naval Air Systems Command by the Johns Hopkins University Applied Physics Laboratory in Silver Spring, Md. This was accomplished in association with geodetic research conducted at APL in the development of the Navy Navigation Satellite System, now operational in the fleet. To determine a ship's position with accuracy it was necessary to know the earth's gravitational field and the shape of the earth around which the satellite orbited.

A broad picture of the humps and valleys in the earth's geoid was obtained by observing the influence of the pull of gravity on the satellite in orbit.

The scientists also were able to confirm by satellite that the earth's equator is elliptical rather than circular, which has been the popular belief.

There are 13 fixed stations in the TRANET (Navy tracking station network) in the United States, England, South Africa, Japan, Australia, Greenland and Brazil. Data from each station are relayed to the Navy Satellite Control Center at the Applied Physics Laboratory of the Johns Hopkins University in Howard County, Md.

AGRICULTURE

## Gamma Rays Stop Food-Destroying Insects

► GAMMA irradiation may be an effective weapon in protecting food supplies from harmful insects, the American Institute of Chemical Engineers was told at Atlantic City, N.J.

Annual loss of stored grain and grain products is estimated to be more than \$450 million in the United States alone, where the most efficient insect control programs are in effect.

"If this could be saved, it would feed many of the millions of undernourished people of the world," Hamilton Laudani and Elvin W. Tilton of the U.S. Department of Agriculture commented.

Some insects seem to be developing a resistance to ordinary chemical insecticides such as malathion, DDT and lindane. Treatment by gamma irradiation appears to be as effective as any now available, is less time consuming than fumigation and leaves no harmful after effects.

However, only preliminary studies have been completed. Studies will be continued at Savannah, Ga.

The studies conducted so far show that comparatively small doses of radiation kill insects in their early stages and that adults, though not killed, are sterilized and become a biological weapon against their own species.