

METEOROLOGY

Sunlight and air pollution

Several recent studies have raised the possibility that human industry is adding enough particulate matter to the atmosphere to seriously reduce the amount of solar radiation that reaches the earth. If so, a worldwide cooling of climate could result.

Air pollution, however, is subject to temporal and spatial variations. To detect turbidity trends on a global scale it is necessary to measure radiation at spots far removed from the sources of pollution.

Howard T. Ellis and Dr. Rudolf F. Pueschel of the National Oceanic and Atmospheric Administration have evaluated data collected over a 13-year period at NOAA's Mauna Loa Observatory in Hawaii.

They report in the May 21 *SCIENCE* that the data show seasonal variations in solar radiation received by the earth, with lower atmospheric transmissions during summer months. This annual cycle is probably the result of worldwide increases in the volatile organic matter produced by living vegetation during summer months, the researchers suggest. This organic matter is photochemically oxidized to create a smog much like that produced by human industry.

The data, they conclude, support the hypothesis that on a global scale natural sources contribute more than man to the turbidity of the atmosphere.

AERODYNAMICS

Rotation of the upper atmosphere

The mean rotational speed of the earth's upper atmosphere at altitudes of about 200 kilometers to 400 kilometers is actually faster than that of the earth itself.

A possible explanation for this phenomenon, suggest Drs. D. H. Weinstein of the University of Houston and Joe Keeney of Superior Oil Co. in Houston, is the so-called Scott effect.

The Scott effect operates as follows: Suppose a gas is contained at low pressure in a hollow cylinder in which a smaller cylinder is suspended. If the walls of the two cylinders are kept at different temperatures and a weak magnetic field is applied, the suspended cylinder will tend to rotate. The magnitude and direction of rotation will depend on the temperature gradient, the magnetic field and the type of gas.

In the upper atmosphere of the earth, the scientists write in the May 14 *NATURE*, there are suitable gases, a temperature gradient (temperature increases with height), low pressure and a weak magnetic field. Under the conditions in the upper atmosphere, they conclude, the Scott effect would produce a west to east rotation, with maximum speed during daylight. This is consistent with observations.

SEA-FLOOR SPREADING

Creation of abyssal landscapes

Much of what is known about geological processes occurring on and below the ocean floors was gleaned through analysis of bottom topography. In order to learn how Pacific floor landscapes were formed, Dr. Roger L. Larson of Scripps Institution of Oceanography

conducted an intensive morphological survey of the East Pacific Rise at the mouth of the Gulf of California, where ocean crust is forming.

From his study he concludes that there are two processes by which bottom topography may be created at ridge crests. Relief may have been produced volcanically by the accumulation of lava erupting from fissures along the crest, or it may result from faulting and subsequent movement along the fault planes.

Volcanic processes sometimes seem to have buried relief instead of building it, he points out in the April *GEOLOGICAL SOCIETY OF AMERICA BULLETIN*. Volcanic construction, he postulates, may result from continuing eruptions from a fissure where a steady supply of lava cools rapidly and piles up. A more voluminous eruption that supplies large amounts of lava over a short period of time would cover previous landforms.

SEISMOLOGY

Monitoring earthquakes from space

To really understand the mechanics of earthquake generation and to predict the time and place they will occur, pertinent data must be collected on a massive scale over large areas and then be rapidly analyzed at a central facility.

This in turn, according to Drs. Wayne H. Jackson and Jerry P. Eaton of the U.S. Geological Survey's National Center for Earthquake Research, "demands a flexible, easily accessible, large-capacity long-range data transmission system." Such a system, they believe, might be based on a satellite.

In a paper presented at the International Workshop on Earth Resources Survey Systems May 10 at the University of Michigan, the scientists described the results of a two-year study of the feasibility of establishing a seismic data network by means of a satellite relay telemetry system. They see a number of advantages of a satellite system over commercial telephone or microwave systems: It would be less prone to failure during a major earthquake; it would extend readily into underdeveloped regions; it would provide flexible, uniform communications over large sections of the earth.

ARCHAEOLOGY

Weapons from the sky

In 1931, two ancient weapons, a broad ax and a dagger ax, were dug up in China's Honan Province. Engraved with designs of stylized dragons and inlaid with glass, the axes were dated as belonging to the early Chou dynasty (about 1,000 B.C.). But one thing puzzled archaeologists: The blades of the axes were made of iron, yet China's iron age didn't begin until 600 B.C.—400 years after the axes were made.

Now Rutherford J. Gettens and W. T. Chase of the Smithsonian Institution's Freer Gallery of Art and Roy S. Clarke Jr. of the National Museum of Natural History have established that the weapons were fashioned from iron meteorites.

The Chinese are not the only people to have used meteoric metal. Other cultures used it for amulets, beads and other ornaments. But the Chinese blades are among the oldest known objects made from meteoric iron.