

Volcanoes and ice ages: A link?

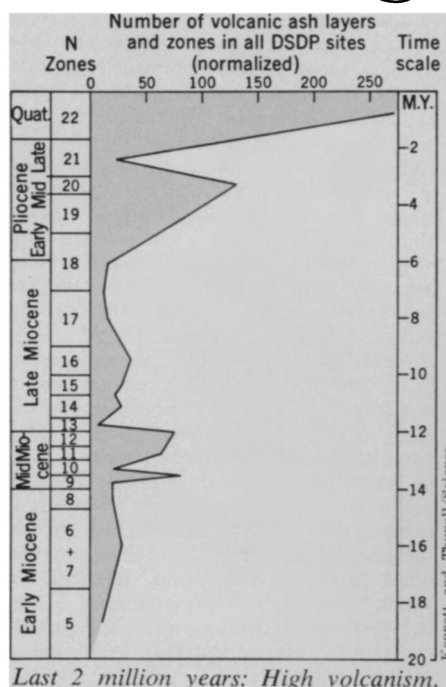
The longstanding but unproven hypothesis that there may be some cause-and-effect relationship between the great ice ages and periods of increased volcanic activity has been given strong new support. The evidence comes from analysis of deep-sea cores that indicate very high rates of explosive global volcanic activity during the past two million years. This time period, the Quaternary, is marked by major and rapid fluctuations of Northern Hemisphere ice sheets, global climates and sea level.

The idea that dust from periods of global volcanic activity might screen out enough solar radiation to bring on glaciation is hardly new. Benjamin Franklin was one of its early proponents. But hard evidence has been difficult to obtain. The record on land of patterns of volcanism over large areas is often obscured by younger volcanic sequences. In his textbook on physical geology published in 1965, Arthur Holmes stated that geologically no correlation had yet been demonstrated between times of glaciation and periods of prolonged or exceptionally intense volcanism.

The new evidence that contradicts this view is the result of the first attempt to evaluate global volcanic history by using the distribution of volcanic ash in deep-drilled core sequences obtained by the Deep Sea Drilling Project. University of Rhode Island oceanography professor James P. Kennett and graduate student Robert C. Thunell used the detailed descriptions published in the initial reports of 27 legs of the DSDP and the less detailed descriptions in the preliminary reports of 6 other legs to evaluate 320 deep-sea sections. The cores come from all oceans except the Arctic. The core sections span the last 20 million years.

The cores clearly show, Kennett and Thunell report in the Feb. 14 *SCIENCE*, a peak in Quaternary volcanism approximately four times higher than the average over the 20-million-year period and about twice as high as a peak in the Middle Pliocene, 12 to 14 million years ago. They grouped the sites into eight geographical areas, and all eight showed pronounced rates of volcanic activity during the past two million years.

"Our work shows that greatly increased volcanism during the last two million years closely coincides with that interval of earth history marked



by major and rapidly oscillating climatic conditions related to glacial-interglacial cycles in the Northern Hemisphere," the investigators say. Kennett and N. J. Shackleton have dated the initiation of continental glaciation at 2.4 million years ago.

"This general synchronism is almost certainly not coincidental," Kennett and Thunell say. But they emphasize that the data are too general to discriminate between any of the possible cause-and-effect relationships that have been suggested. Published calculations indicate that explosive volcanicity may need to be increased at least 40 percent within a period of a few thousand years for glaciation to be initiated by dust veil effects. Kennett and Thunell note that their data show a general increase in volcanism much greater than this. But their data are not fine enough to deal with small variations in volcanism.

The findings are probably the strongest evidence yet for an association between glaciation and global volcanism. But what is cause and what is effect is not distinguishable. They do not prove that volcanism played a role in triggering the ice ages, although they suggest that that may be the case.

Indeed the opposite might also be true. Kennett and Thunell refer to a hypothesis of R. K. Mathews, concerning a way in which climatic change could trigger global volcanism. There were large and relatively rapid changes

in sea level during the past two million years as water was successively locked up in and then liberated from continental ice sheets. The changing volume of the oceans would have caused the ocean basins to adjust to the loading and unloading. This might have created periodic large-scale movements within the mantle, causing stress release and increased volcanism. □

Task force to study ozone problem

Aerosol propellants have fallen from the status of "modern miracle" to "possible environmental menace" following reports that they may be breaking down the earth's protective ozone layer. A large research effort is under way to confirm and quantify the effect; the National Academy of Sciences is officially studying the problem, and a consumer law firm has asked the Consumer Product Safety Commission to ban aerosol products. Several Government agencies, all of which have some jurisdiction over the potential problem, have been under increasing Congressional and public pressure to do something. But what, how, when and by whom?

In an attempt to answer these questions, and with unusual speed and coordination, an *ad hoc* Federal interagency task force has been orga-