

Volcanic dust cloud sweeps the earth

Twilights tinged with brilliant orange and purple hues may grace horizons in the Northern Hemisphere in the next three to six months as the cloud of dust and gases emitted this spring by the El Chichón volcano in Mexico diffuses through the stratosphere.

Spectacular sunsets are likely, says Brian Toon of the National Aeronautics and Space Administration Ames Research Center in Moffett Field, Calif. Less certain is the prospect that the tremendous infusion of debris into the atmosphere will produce colored rings around the sun or that even rarer phenomenon, beloved by lyricists and lovers: a blue moon.

The cloud may have other, albeit less romantic, effects. Global temperatures may be slightly cooler than normal for a year or so. Ongoing studies of ozone and of the earth's radiation budget already show measurements that are skewed by the vast cloud. Toon estimates that the cloud carries as much as 10 million tons of sulfuric acid — 10 times the amount contained in the emissions from Mt. St. Helens in 1980.

The volcanic cloud may be the largest to spread over the Northern Hemisphere in this century. Apparently, it was expelled when the El Chichón volcano erupted on April 4, rather than in previous eruptions from March 28 to April 3. The Smithsonian Institution's Scientific Event Alert Network reports that these were the volcano's first eruptions in historic time.

The cloud first was detected on April 9 by the National Oceanic and Atmospheric Administration's Mauna Loa Observatory in Hawaii. Measurements showed that by April 23 the multi-layered cloud was suspended at altitudes between 18 and 27 kilometers and was traveling from east to west, carried by winds at 32 to 40 kilometers per hour. Other measurements, taken by two planes dispatched by NASA/Ames on May 5, indicate that the cloud is moving in two directions. The lower portion, between altitudes of 18 and 23 kilometers, is moving to the east; at about 23 kilometers, the wind shifts and carries the particles to the west. Eventually the cloud will mix over the entire Northern Hemisphere. At present, though, it is concentrated over lower latitudes, and at times is over areas in Asia where there are no observers to track its movements.

The El Chichón cloud is superimposed on a "mystery cloud" — so called because its volcanic origins are unknown — that first was detected in mid-January by the Mauna Loa observatory. The initial magnitude of the new cloud, says John De Luisi of the NOAA Environmental Research Laboratory in Boulder, Colo., is 100 times greater than the mystery cloud.

Scientists welcome the chance to study a single transient injection, which is rela-

tively easy to track compared with slow processes such as changes in ozone or atmospheric carbon dioxide. So far, they stress, estimates of the cloud's size and effects are tentative. However, if the cloud proves to be as large as early measurements indicate, it may have significant effects on weather. There is a slim likelihood that the cloud will cause a "year without a summer," like the one in New England in 1816 following the eruption of Mt. Tambora in Indonesia. Toon says there is about a 50 percent chance that the cloud will scatter enough light back to space that the average temperature in the Northern Hemisphere will be 3/10°C to 1/2°C cooler than normal. This change would be large enough to be detected by meteorologists but too small to affect life styles. There is a 25 percent chance that changes, such as shorter growing seasons or cooler mean temperatures in some locations, will be large enough for people to notice. There also is a 25 percent chance that temperatures will not change at all.

De Luisi explains that such clouds "act like a veil." Soil particles drop out quickly, leaving sulfur dioxide (SO₂) that also was injected into the atmosphere by the volcano. The SO₂ then is converted to sulfuric acid, which can remain in the atmosphere for longer periods. Depending on its thickness and composition, a cloud can reduce the amount of radiation reaching the earth, and can increase the radiation scattered back to space. "It is often argued that this is roughly equivalent to a reduction in the solar constant [SN: 5/1/82, p. 294]," he said. He and colleagues will be on the lookout for effects that may be related to the cloud, he said. "There are so many possible factors for variations in climate that we have to look at each one separately and try to iron out the facts as they come along."

—C. Simon

Alligators: Clue to dinosaurs' demise?



Ken Miyata, Smithsonian Institution

The native American alligator *A. mississippiensis* has become the eighth reptile (and only crocodilian) thus far shown to exhibit temperature-dependent sex determination. Mark Ferguson of The Queen's University of Belfast and Ted Joanen of the Louisiana Wildlife and Fisheries Commission report in the April 29 NATURE that the second to third week of this alligator's 65-day incubation is most critical: If the average temperature then is at or below 30°C, the hatchlings will be born exclusively female, at or above 34°C and the young will all be born male.

While the finding has implications for programs to incubate and rear hatchlings in captivity, it also provides the speculative basis for yet another theory to explain the relatively sudden extinction of dinosaurs roughly 65 million years ago. Ferguson and Joanen suggest that if incubation temperature determined the sex of prehistoric Archosaurs related to the alligator, then a sudden climate change — either warming or cooling — could have spelled the predominance of a single sex, eventually rendering species unable to reproduce. □

Spermicide effect on unborn in question

Spermicides do not increase the risk of major birth defects in children born to mothers who used spermicidal creams, foams and jellies at or near the time of conception, say researchers from Boston University, Harvard University and Finland in the May 7 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. But Hershel Jick, a Boston University epidemiologist who authored an earlier report in the same journal, stands by his finding of a doubling in the incidence of birth defects (SN: 4/11/81, p. 229).

The current study is a second look at data gathered on 50,282 pregnancies collected between 1958 and 1965 for a study of cerebral palsy. Five percent of 462 women who told researchers they used vaginal spermicides currently available on today's market just before or during the early months of pregnancy bore children with one or more malformations, while there was a 4.5 percent incidence of birth de-

fects in the control population — suggesting, say the researchers, that "spermicides currently in use do not cause an increase in the overall risk of malformations."

Jick and his colleagues looked at pregnancies among 4,692 women, 790 of whom purchased spermicides fewer than 600 days before giving birth. They found a 2.2 percent incidence of birth defects in children whose mothers had purchased spermicides, versus a 1.0 percent incidence of malformations in the children of those who had not.

Both groups of researchers agree on one thing: more work is needed before a final determination can be made. "Different studies using different types of data very often have apparently conflicting results," says Jick. "We'll have to wait for additional studies to finally determine if there is a relationship between the use of spermicides and certain congenital disorders." □