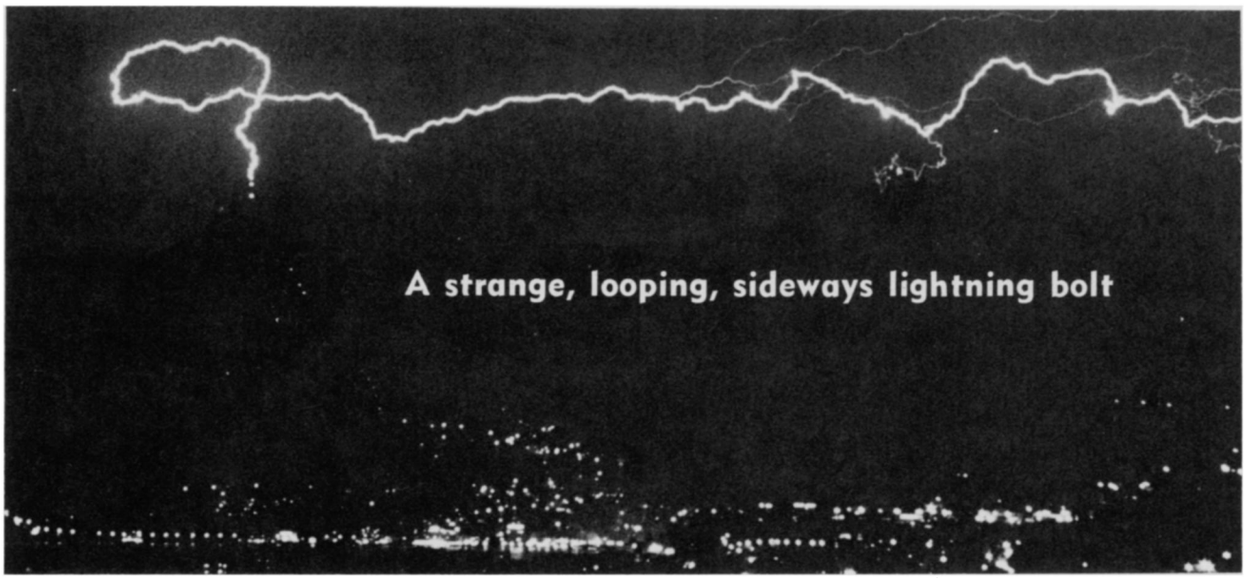


Orville and Berger/Journal of Geophysical Research

The entry in the laboratory's logbook begins: "22:30 —bright cloud flashes—clouds still below the summit of San Salvatore—cloud above mountain a little—can see tower lights. . . ." Five minutes later, the skies over Lugano, Switzerland, were split by a strange lightning bolt that is one of the most unusual ever recorded.

Lightning strikes downward, as everybody knows, and sometimes up. But there is now at least one authenticated record of a bolt that struck sideways.

Nor was this the only peculiar aspect of the freak flash. It took off upward, from a 92-meter-high television tower atop Mt. San Salvatore just south of Lugano, inscribed a complete loop in the sky and finally shot off to the west for about two kilometers. It also lasted an unusually long time—more than a tenth of a second, compared with most bolts which are measured in millionths of a second.

Fortunately, the flash could not have occurred at a better place. The tower from which it sprang is also instrumented as part of the Mt. San Salvatore Observatory, one of the handful of full-time lightning research facilities in the world. The Lugano area, says Richard E. Orville of the State University of New York at Albany, has the greatest concentration of lightning in a vast area stretching from Moscow to England and from Norway southward to Africa.

Thanks to the presence of the laboratory and its staff, the rare bolt was photographed from three locations, and its current, which never exceeded a relatively weak 1,600 amperes, was recorded.

The flash occurred on the night of July 7, 1969. Orville and the laboratory's founder, Karl Berger, who set up the facility some 30 years ago, have just published their data, but the intervening four years, during which they discussed the event at scientific meetings and elsewhere, have turned up no other known horizontal bolts. "I'm not aware that there are any," says Orville (who ironically missed the sight by a mere three days, having just returned to the United States), although he was sent a photo of a flash over Germany with a loop in it.

"We believe," Orville and Berger report in the July 20 JOURNAL OF GEOPHYSICAL RESEARCH, "that this unusual flash was probably caused by a primary flash outside the field of view of the camera, but do not wish to exclude the possibility of an upward discharge that was triggered by a high ambient electrostatic field." The reason for the horizontal path of the bolt is uncertain, but the likeliest clue seems to be the logbook's reference to low-hanging clouds, which could have provided the impending potential flash with an available target at almost the same height as its discharge point.

expeditions, bubble-like pockets were discovered in the core sampling tubes, meaning that the drill had, in fact, struck gas. The gas may have been formed by bacteria acting on the hundreds of meters of bottom sediments, the same process that creates marsh gas, but a preliminary analysis of the gas in the tubes indicated a relatively high ethane content, suggesting a natural gas deposit formed by heat, pressure and catalytic action. To evaluate such gas deposits, however, would require more time and funding than is usually available to a research expedition. Such deposits, says Oscar Weser of the Scripps Institution of Oceanography, which manages the Deep Sea Drilling Project, are "relatively common" in sites near land, due to their richness in land-based organic sediments.

Samples were also taken in and around the Nankai Trough south of Japan, which revealed that sediments from Japan stopped being deposited southeast of the trough about four million years ago. This probably means that the trough was formed about that time, thus trapping sediments from the land and representing the descent of the advancing edge of a piece of crust moving northwestward from the Philippine basin. The Challenger geologists believe that this area has been getting deeper since that time, until now it may be to blame for the large earthquakes which periodically rock southwestern Japan.

Leg 32 of the Glomar Challenger's journey began with departure from Japan Aug. 15 in the direction of Honolulu, where the vessel should arrive by about Oct. 10. A major goal of this part of the trip is to compare the ages of the seamounts (undersea mountains) to see if they are in sequence. This could add weight to the theory that there are relatively fixed "hotspots" in the earth's mantle, pushing up strings of seamounts in the overlying crustal plates as the plates slowly move. Another part of the mission is to see if there are any geological traces of localized changes in earth's magnetic field that are older than about 80 million years, the point before which most such traces have been worn away from most of earth's upper crust. □