



Astronomers Will Observe Total Eclipse

Boulder, Colorado---A total solar eclipse, one of nature's most impressive spectacles, occurs when the moon comes between the sun and the earth, completely blocking off the light from the face of the sun. During the eclipse, the sky grows dark as the moon moves across the face of the sun. As the eclipse reaches totality, the sun disappears and a bright, irregular halo appears around the black disc of the moon. This halo is the solar corona--the thin, luminous outer atmosphere of the sun.

The corona is only about one-millionth as bright as the face of the sun. Thus it is clearly visible only during total eclipses, when the moon blocks the flood of light from the solar disc. Although the corona is observed regularly with an "eclipse-making" telescope known as the coronagraph, solar astronomers make their best observations of the fine structure of the corona during natural eclipses.

Total solar eclipses occur about once a year, but each total eclipse is visible only along a narrow strip on the face of the earth known as the "path of totality." Some eclipses, with paths of totality that begin and end over oceans or uninhabited land areas, almost certainly pass unobserved by human eyes. Others, in areas that are remote from centers of scientific research, may be observed by many residents of the region, but still may be inaccessible to the solar astronomers, who must make their observations under special conditions with instruments that are complex, delicate, and often difficult to transport to remote field sites.

Scientists at the High Altitude Observatory (HAO) of the National Center for Atmospheric Research (NCAR), in Boulder, Colorado, have specialized for many years in studies of the solar corona. HAO's solar studies, like NCAR's other programs, are supported by the National Science Foundation.

Since 1952, HAO scientists have made eight expeditions to observe eclipses, traveling to such varied locations as the Sudan, the Canary Islands, New Guinea, and Alaska. Although two of these expeditions were unable to observe the eclipses because of cloudy skies, others have made significant contributions to man's knowledge of the sun.

The next total eclipse of the sun will occur on March 7, 1970. The path of totality--about 85 miles wide--will begin far out in the Pacific Ocean. It will extend across Mexico, the Gulf of Mexico, and the southeastern United States, ending in the North Atlantic.

This eclipse is not likely to go unobserved unless cloudy skies are very general on March 7. Many scientific groups are planning to observe it, and an estimated 50 million residents of the United States live within a day's drive of the eclipse path. The eclipse will be partial, with the moon covering only part of the solar disc, over all of North America except the northern tip of Alaska.

To observe the 1970 eclipse, HAO scientists needed a spot where the chances for clear skies would be as good as possible and where the air is thin, clear, and dry. These requirements virtually eliminated all the potential observing sites along the path of totality in the United States.

After careful study and two field trips, HAO selected a site in the mountains of southern Mexico, in a remote area about 90 miles south of the city of Oaxaca. This area, at an elevation of 8000 to 9000 feet, is the highest region anywhere along the path of totality. Weather records and satellite photographs indicate that the chances are good for clear skies during the eclipse, and the thin, dry mountain air should provide excellent observing conditions.

The HAO eclipse team is headed by Dr. Gordon A. Newkirk, Jr., director of HAO. Other HAO staff members who are going on the expedition include Jacques Beckers, John Gosling, Roger Kopp, Leon Lacey, Robert Lee, Robert MacQueen, Kim Malville, and Einar Tandberg-Hanssen. They will conduct five separate experiments designed to gain knowledge about the magnetic field of the sun, the causes of heating in the corona, and other funda-

mental problems of solar research.

Some of the instruments that they will use were built for previous eclipses and only had to be reconditioned or modified for this expedition. But two of the experiments were designed and built from scratch during the last several months before the eclipse. One of these, the most complicated piece of equipment ever taken into the field by HAO scientists, is designed to measure heat from the F-corona, made up of tiny particles of interplanetary dust in orbit around the sun. Robert MacQueen, William Mankin, and Robert Lee, who are conducting the experiment, expect to use their measurements to determine the chemical composition of the interplanetary dust.

The eclipse team includes a total of 24 scientists, engineers, technicians, and support people from the HAO staff and the NCAR Field Observing Facility, which is supplying logistical support for the expedition. Under the direction of Keith Watson, assistant to the HAO director, the group began setting up camp late in January. As the camp must be almost entirely self-sufficient, NCAR had to supply its own trucks, tents, field kitchen, electric power generators, and other necessities. These supplies and equipment, as well as the scientific instruments and some of the people, are being airlifted to Mexico by Air National Guard units from Oklahoma, Tennessee, and Utah.

The delicate instruments have been carefully crated for the flight to Mexico and the rough trip by four-wheel-drive truck over rutted roads to the field site. They are being set up weeks before the eclipse date to allow time for calibration and testing, as well as to give the eclipse observers time to practice their operation. There will be no time for trial and error during the eclipse, which will have a period of totality of only $3\frac{1}{2}$ minutes.

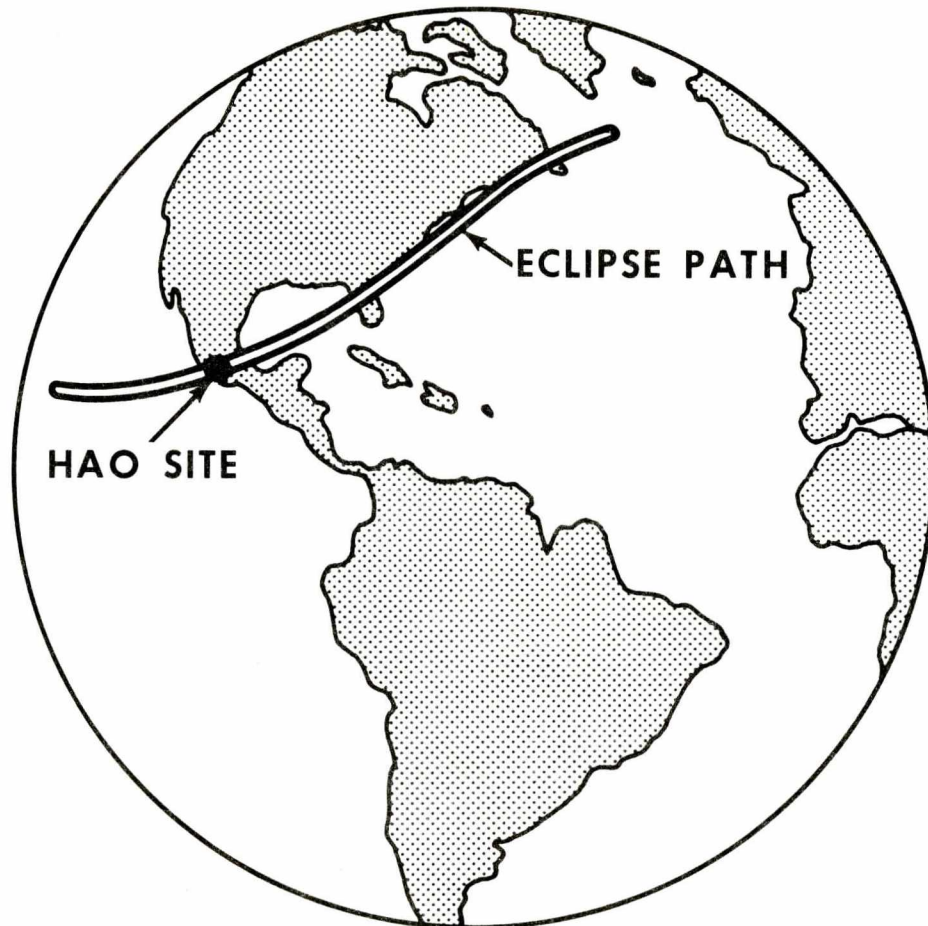
In addition to the HAO staff members, the expedition includes scientists from Sacramento Peak Observatory, in New Mexico, and from the Lamar, Colorado, Public Schools. Astronomers from many other institutions in the United States and other countries are planning to observe the eclipse from sites in the United States and Mexico, as well as from research aircraft.

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The scientists have warned that it is very dangerous to watch a solar eclipse with the naked eye. Looking directly at the sun can cause blindness or other permanent eye damage. The simplest and safest way to view an eclipse is to project its image on a sheet of paper with an ordinary pair of binoculars. This can be done by pointing the objective (large) lens toward the sun, placing the paper beyond the eyepiece (small) lens, and moving the paper or the binoculars in and out until the image of the sun is in clear focus on the paper.

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This map shows the path of totality of the solar eclipse that will occur on March 7, 1970. The eclipse will be partial over all of North America except the northern tip of Alaska. (Credit: National Center for Atmospheric Research)