

GEOPHYSICS

Spotted Sun Sparks IGY

The sun is now reaching a peak in its 11-year cycle of activity. This is one of the reasons for the world-wide scientific treasure hunt known as the International Geophysical Year.

By ANN EWING

► THE SUN is soon to receive the most intensive scrutiny in its five-billion-year history. Often taken for granted, the sun is the nearest star, shining by its own fiery light.

As the solar system's center, around which all the planets revolve, the sun is the most important of all heavenly bodies. Its radiation supplies the energy to maintain life on earth. Besides light, the sun pours out all sorts of radiation, from radio waves to X-rays, to cosmic rays, all of which will be amply observed during the upcoming 18-month International Geophysical Year, or IGY.

Sunspots Indicate Activity

The reason for starting the IGY on July 1 this year is that the sun is now reaching a peak in its 11-year cycle of activity. One index to its activity are sunspots, whirling vortices of hot gases that march across the solar surface.

At the time of maximum activity, the sun's surface is never free from spots, sometimes a hundred or more being visible at once, while at times of minimum, often no sunspots appear for weeks or months. The current peak is expected to be one of the highest on record, and solar activity should continue at a high rate during the entire IGY.

Sunspots, however, are only one of the many items concerning the sun to be investigated during IGY. There is a definite relation between the number of sunspots and changes in the earth's magnetism. At high sunspot periods, many magnetic storms occur. They are often accompanied by serious disturbances of long-range radio transmission and frequently by displays of aurora and occasionally by earth-currents of electricity that interfere with ordinary telegraph lines.

Recently, in studies preparatory to the IGY, scientists for the first time pinned on the sun responsibility for cosmic rays associated with a tremendous flare occurring on Feb. 23, 1956. The cosmic rays had energies of about 30 billion electron volts.

Also following this same flare, scientists at the National Bureau of Standards spotted ionospheric effects, the first time a relation between ionospheric physics and cosmic rays had been found.

Many more "firsts" are certain to be discovered when the IGY, now in a practice month, is underway. From July 1 until

Dec. 31, 1958, thousands of scientists from 70 countries will take millions of scientific readings on the earth as a planet.

Their aim is a more complete understanding of the earth's shape, its seas and its atmosphere. Of the IGY's many programs, the one most likely to capture imaginations is man's first venture into space—the launching of earth satellites.

Equally important, however, are the other programs. They are divided into 12 fields: meteorology, geomagnetism, aurora and airglow, ionospheric physics, solar activity, cosmic rays, longitudes and latitudes, glaciology, oceanography, rockets and satellites, seismology, and gravity.

In addition, there will be four types of designated world days or series of days on which special observing programs will be conducted. These are planned for occasions when it is predicted that unusual magnetic, ionospheric or auroral activity will occur, and for days of solar eclipses and unusual meteor showers.

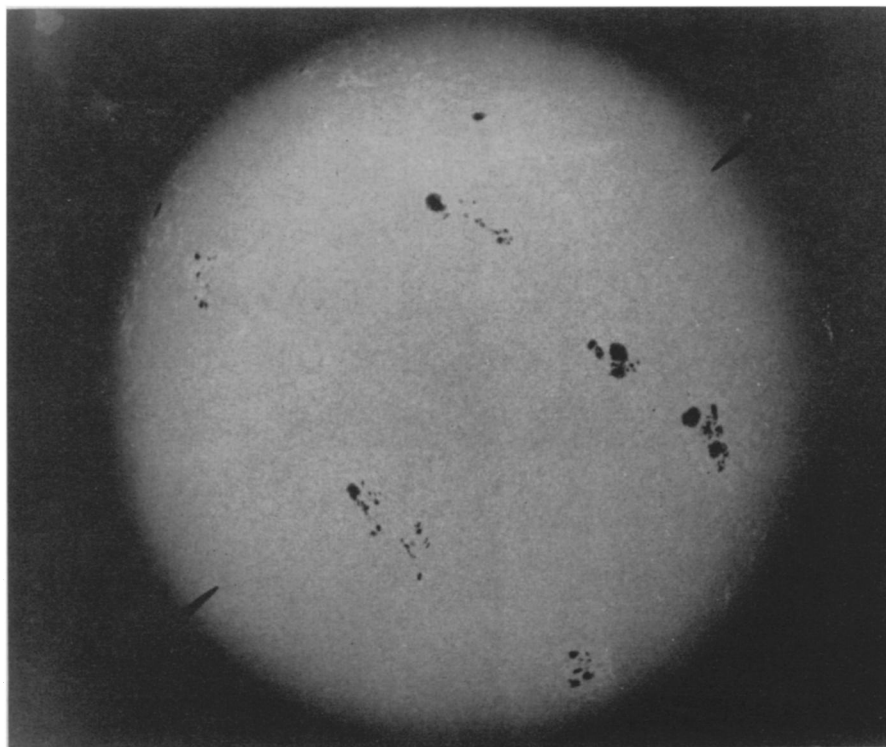
There are also plans for an expedition to the Pacific to observe the solar eclipse of Oct. 12, 1958. In the Antarctic this year, on Oct. 23, special attention will be paid to a rare kind of eclipse, one in which the axis of the moon's shadow does not touch the earth's surface, but skims its outer atmosphere at 21 miles.

Communications Network

No matter how remote the site where IGY scientists are working, from the Antarctic outposts to Pacific Islands, an elaborate and far-reaching communications network has been set up so special experiments at designated times can be conducted simultaneously.

These experiments are planned not only for the scheduled world days, but at times of special alerts. The warnings, broadcast by the National Bureau of Standards radio forecasting center at Fort Belvoir, Va., are based mainly on world-wide observations of the sun's surface and on soundings of the ionosphere, the electrically charged upper portion of the earth's atmosphere that reflects radio waves.

When the sun erupts, shooting out flames for hundreds of thousands of miles, the



RECORD SOLAR ACTIVITY—One of the highest peaks of activity ever recorded in the 11-year solar cycle is expected during the current maximum. Sunspots, index to solar activity, are shown on this photograph taken in visual light with the 60-foot tower telescope at Mt. Wilson Observatory. The sun's north and south poles are indicated by the two pointers.

earth's atmosphere is showered with vastly increased quantities of particles from outer space. This solar bombardment not only causes magnetic compasses to point to a false north pole, but also produces brilliant displays of northern and southern lights, or auroras, and causes changes in radio communications through its effect on the ionosphere.

Look for Simultaneous Auroras

One IGY experiment is aimed at discovering whether auroras occur simultaneously in both the Northern and Southern Hemispheres, using the earth's magnetic field as a giant lens.

Auroral observations are also one field in which the lone amateur who wants to do his part in the IGY can make a contribution to this world-wide scientific treasure hunt. Although standard band radio stations may broadcast the alerts telling of extra high solar activity, when auroras are most likely to occur, moving bars on a television screen or freak TV reception are also usually closely associated with auroras and can be used as indication for making auroral observations.

Everyone is asked to be a volunteer and send in at least a qualitative report whenever he sees an aurora.

Another field to which the lone volunteers can contribute is meteor counting.

Both of these programs are excellent opportunities for amateurs throughout the world, regardless of their experience and without using special equipment, to participate in IGY.

The volunteer observations are supplementary to programs for tracking both auroras and meteors by cameras and radar. Another night-sky phenomenon, the air glow, will be studied by special cameras. This glow is a very faint luminescence covering the entire sky due to chemical processes in the upper atmosphere of the earth.

Cosmic Rays Measured

Also found high in the atmosphere are the primary cosmic rays, consisting of streams of electrically charged particles, mostly protons, which are the cores of hydrogen atoms. IGY experiments on cosmic rays are aimed at finding changes in the mass, energy and intensity of these particles.

Pre-IGY tests of cosmic rays at high altitudes over the equator have shown that unusually strong magnetic fields exist far out in space, and that these fields displace the cosmic-ray magnetic equator, as it is observed from the ground, by a substantial distance.

Other tests showed magnetic fields thousands of miles in space may have an influence in the location of auroras, which occur at heights of about 60 miles.

Another pre-IGY experiment, the test firing of a rocket from a ship off the coast of southern California at the time of a solar flare, showed for the first time that solar X-rays smash into the ionosphere. At times of the world-wide alerts, special firings

of rockets will be made to learn more about the occurrence of this radiation.

Probing the Ionosphere

The probing of the earth's ionosphere by radio waves, conducted on a planetary basis, will improve scientists' ability to how well radio messages can be received over long distances. These improved maps should lead to much better prediction of draw radio "weather maps," showing how well radio messages can be received over long distances. These improved maps should lead to much better prediction of transmission conditions.

Of particular interest are the whistlers, a special kind of natural radio signal in the audio and very low frequency ranges. The noises are believed to be caused by energy from lightning discharges that has traveled from one hemisphere to the other along lines of the earth's magnetic field. Because this path extends many thousands of miles above the earth's surface, the study of whistlers offers a new method for detecting ionization far beyond the known ionosphere.

Radio Signals

Besides the man-made radio waves used to probe the ionosphere, scientists will also listen attentively to the radio signals being sent out by the sun and by other heavenly bodies, including the planets and other stars. The intensity of these waves and how the radio broadcasts change with time give clues to structure of the earth's outer atmosphere.

All these programs as well as the many others of the IGY in different fields are aimed at giving man a better understanding of the "space ship" on which we all reside, the planet earth.

Science News Letter, June 1, 1957

MEDICINE

Half of Lung Cancers Too Late for Surgery

➤ ABOUT half of all lung cancer patients are too far advanced for even explorative surgery by the time they first consult a doctor, a study by Stanford University Medical School, San Francisco, has shown.

The study, made by Drs. L. H. Garland, M. A. Sisson and R. N. Karlen of the department of radiology, showed the average patient waits five or six months before calling his symptoms to the attention of the doctor who diagnoses the case. After that, he may live six months without treatment or nine months with X-ray therapy. Some patients live as long as five years with X-ray therapy, they reported.

One surprising find was that patients with a long history of coughing, shortness of breath, chest pain and other symptoms before diagnosis lived longer than those whose symptoms were of short duration.

Lung cancer has been rapidly increasing and it is estimated that about 30,000 Americans will die from it this year.

Most victims are men between the ages of 50 and 70. The cure rates, even in presumably early cases, seldom rise above 10%.

Lung cancer can come at any age but the average patient is 61 or 62 years old. The disease was nine times as common in men as in women, the researchers found.

Although only 10% or less of lung cancer cases can be cured by surgery, X-ray therapy helps two-thirds of them, sometimes for as long as five years. In rare instances the X-rays can cure certain types of lung cancer.

The research was reported by the American Cancer Society which helps support the work.

Science News Letter, June 1, 1957

AMAZING PRECISION

Available
Sizes

#6 #8
#10 #12



6 in 1 DRILL
for WOODSCREWS

Now pre-drill precision woodcrew holes, counter-sinks and counter-bores all in one operation. Fits any hand or power drill with 1/4" chuck. Drills for screw thread and shank and countersinks heads of screws. Available in 4 most used screw sizes.

Post Paid
ONLY
\$1.95
each

Set of Four **\$6.95** ppd.

JOHN SURREY, LTD., 11 West 32nd Street, Dept. SN-4, New York, N. Y.

Please send _____ 6 in 1 Drills _____ #6 _____ #8 _____ #10 _____ #12 _____
NAME (print) _____
Address _____
Enclosed \$ _____