

## GEOPHYSICS

# International Year of Quiet Sun

Scientists around the world are again cooperating in an intensive look at the sun and effects of its radiations on earth and surrounding space, Ann Ewing reports.

► USING A NAME that sounds like a Chinese New Year—the International Year of the Quiet Sun—scientists around the world are preparing to give the sun the second most thorough going-over in its five-billion-year history.

The effort is a twin brother of the International Geophysical Year, or IGY, which actually lasted 18 months, from July 1, 1957. The upcoming program, however, is aimed at studying the sun and its effects on the "space ship" earth during a low point in the sun's 11-year cycle of activity.

Most people take the sun for granted. Actually it is the nearest star, stoked by reactions the same as those of the hydrogen bomb and by other nuclear fusions.

## Source of Life

The sun's vast outpouring of radiation is the source of all life on earth, from tiny plant and animal fossils that died millions of years ago and now form coal and oil deposits to the most complex of earthly creatures—man.

The amount of some of the sun's radiation is remarkably constant—visible light and infrared, for instance. However, at certain times, other kinds of radiation, such as X-rays and radio waves, are much more intense than at others.

Sunspots, whirling centers of hot gas cooler than the rest of the sun, have been used by scientists for about a hundred years as an index to the sun's activity. This activity varies from high to low and back to high again in a period of about 11 years. The reasons for the cycle are not known.

During a period of high activity, the sun's surface is never free from sunspots. However, at the time of sunspot minimum, days or even weeks go by when the sun's face is entirely unspotted.

When sunspot activity is low, the sun is said to be quiet. Hence the name, International Year of the Quiet Sun, or IQSY, in which scientists from 36 nations will participate. (The initials have been reversed to make "IQSY" easier to pronounce and also to be more related to IGY, or International Geophysical Year.)

The new international program was planned for a time of sunspot minimum because the eruptions of sunspots and other activities of the sun are then usually so far apart in time that their effects on earth and its atmosphere cannot be mistaken. This was not often the case during the IGY, which was scheduled for sunspot maximum, and hit the mark by being held during the most active sunspot period ever recorded.

Some of the IQSY studies can be made only at the time of a quiet sun.

One of the effects of the sun's outbursts on earth is deterioration or blackout of radio communications, resulting from disturbances in the earth's ionosphere caused by the solar radiation. The undisturbed ionosphere serves as the earth's radio reflecting roof, allowing worldwide communications by shortwave radio.

The radio disturbances are often followed by magnetic storms, in which the earth's magnetic field becomes very unsettled. Compass needles point erratically, and sometimes induced earth currents of electricity interfere with telegraph and telephone communications by wire.

At such times, brilliant auroral displays are seen in two zones several hundred miles away from each pole. As in IGY, all sky cameras will be used in these zones to take pictures of auroras. Volunteers will also send in their observations, for often the lack of an aurora can be as important as the presence of one.

During IGY, scientists around the world looked visually for the flares associated with sunspots. Several of these events were outstanding, and the patrol network that spotted them will be continued during IQSY, although flares are then expected to be rare and less intense.

Other effects of solar flare-ups are a

"rain" of particles, the ejection of huge masses of solar plasma, or gas, that envelop the earth and beyond, and a change in the cosmic rays coming from galactic space. Solar outbursts will also be looked for, using radio waves and satellites.

One possibility of great interest will be the prediction of times of a very quiet sun within the total IQSY period, which is scheduled to last two years from Jan. 1, 1964.

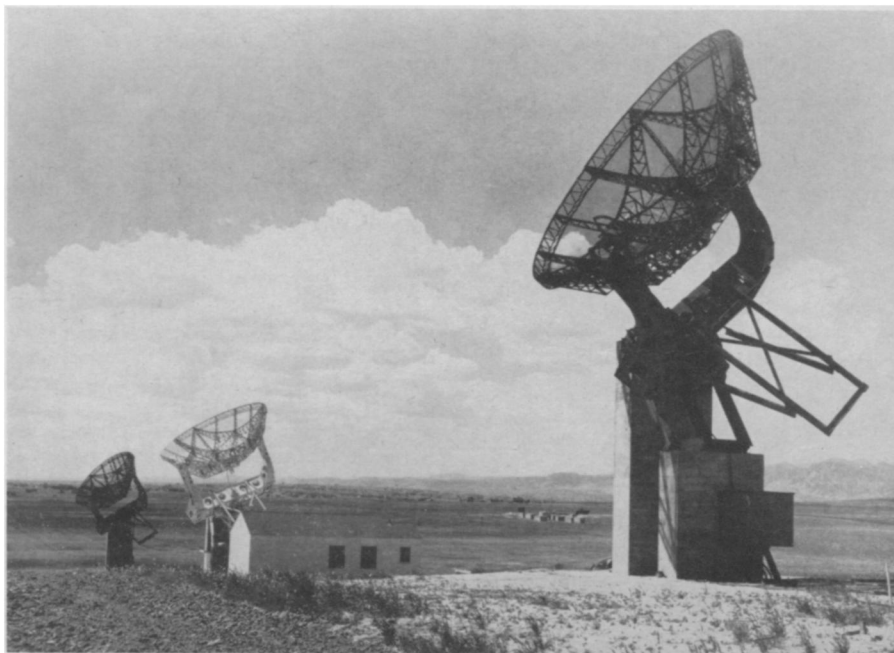
Some solar-terrestrial events take place directly, but there are others that are more indirect. Where and how the solar particles are trapped—near the sun or near the earth, for instance—is one of the problems to be studied during IQSY.

Discovery of the Van Allen region of charged particles in a great belt around the earth was one of the first results of U. S. satellite launchings. The radiation in the Van Allen belt could prove to be an extreme hazard to space travelers.

The earth's atmosphere from 50 to 180 or so miles is greatly influenced by solar ultraviolet and X-ray radiation. This input of solar energy results in the ionosphere, used for intercontinental communications by radio.

The atmosphere some 15 to 35 miles above the earth's surface will be regularly probed, using small rockets from which aluminum or other metallic foil, called confetti, is ejected. Agencies of the Army, Navy and Air Force are cooperating with the Weather Bureau in this program.

The ozone content of the atmosphere in



**OBSERVING SUN'S RADIO WAVES**—These three giant antennas are among the many being trained on the sun to detect its radio waves during the International Year of the Quiet Sun. The instruments, which automatically track the sun as it moves across the sky, are at Gun Barrel Hill, Colo., a field station of the National Bureau of Standards.

this region will also be determined, partly from satellites having instruments scanning earthward instead of spaceward.

All these programs and many more are aimed at giving man a better understanding of the earth and surrounding space.

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

These experiments are planned not only for scheduled "world days," but at times of special alerts, as when solar flares have been spotted.

The warnings will be broadcast by the National Bureau of Standards' World Warning Agency at Fort Belvoir, Va. They are based mainly on planetwide observations of the sun's surface and on soundings of the ionosphere.

Chairman of the international coordinating committee for IQSY is Prof. J. G. Beynon, head of the physics department at the University College of Wales. Planning for the U. S. program for IQSY is handled by a special panel set up by the National Academy of Sciences-National Research Council. Dr. M. A. Pomerantz of Franklin Institute's Bartol Research Foundation, Swarthmore, Pa., is chairman of the panel.

The established programs of such agencies

as the National Bureau of Standards, Weather Bureau, National Aeronautics and Space Administration and the U. S. Coast and Geodetic Survey and many others are considered in the planning.

The IQSY is the fourth international program aimed at a better understanding of earth.

The first was in 1882, when 11 nations sent expeditions to the Arctic for 13 months. The observations of weather, auroras, and sudden, strong changes in earth's magnetic field taken during that period provided a treasure store of Arctic knowledge.

Exactly 50 years after the first polar quest, 20 nations joined in a new Polar Year, again with main emphasis on Arctic studies. This time there were more stations, more observations, much improved instrumentation. One new program was exploration of the Arctic ionosphere.

The IGY program of 1957-58 was supported officially by 58 nations, unofficially by another 12. It was such a successful venture that it really did not end as scheduled but was replaced by a program called International Geophysical Cooperation-1959.

As in these previous international programs, studies made during IQSY are expected to reveal many fascinating new facts about the earth as well as disclose many new problems for further research.

• Science News Letter, 82:74 August 4, 1962

#### MEDICINE

## Doctors Are Reading —

### Boxing Rule Changes Urged

► CHANGES in boxing rules to give more points for skill and less for a knockout blow were urged by the American Medical Association's committee on medical aspects of sports.

In terms of persons killed annually, boxing is only seventh on the list of hazardous sports. Football is first, hockey, and even baseball are more dangerous.

However, recent deaths and serious injuries have dramatized the dangers of boxing. The Filipino flyweight who died recently in Manila was the sixth boxer to die in 1962.

The AMA committee recommended that less padding be allowed in gloves, so that the threat of damage to the hands would cut down the power of blows. For the same reason, they urged stopping the practice of wrapping hands under the gloves.

Reporting in the Journal of the American Medical Association, 181:242, 1962, the committee made eight recommendations to be followed for health and safety at all boxing contests. These include a thorough medical examination of each contestant before the bout, and the presence of a physician at all bouts, with authority to stop the fight for medical reasons.

### Tranquilizer for Airsickness

The mild tranquilizer, meproamate, affords significant protection against airsick-

ness. The drug was tested alone and with meclizine, an effective motion sickness preventive, in 441 Air Force volunteers. Meproamate was found to be as effective as meclizine, and the combination was no more effective than either drug alone.

The study was made by two physicians, Drs. John J. Franks and Elmer V. Dahl and by Dr. Lawrence J. Milch, all of Brooks Air Force Base, Texas (p. 263).

### Weak Smile Greets Newborns

The reaction of most mothers to the first sight of their baby is to smile weakly, study of 500 deliveries showed (p. 206).

The study was reported by a physician, Dr. Michael Newton, and by Dr. Niles Newton of the University of Mississippi School of Medicine.

More than half the mothers demonstrated a "weak accepting reaction" by smiling a little, they said. Another 30% were obviously "greatly pleased." Only 14% appeared indifferent or displeased, they found.

• Science News Letter, 82:75 August 4, 1962

When *cobalt* is made radioactive in an atomic pile it becomes a source of "gamma radiation," more powerful and more convenient for many purposes than better X-rays.

Milk products contain about 90% less *strontium-90* per gram of calcium than plant products.

#### ENGINEERING

## Machine to Help Design Recognition Devices

► A MACHINE is trying to "teach" engineers how to design devices that will recognize shapes and patterns and be useful in solving problems for satellites and for finding targets for missiles.

Joseph K. Hawkins, manager of self-organizing systems, Aeronutronic Division of Ford Motor Company in Newport Beach, Calif., told SCIENCE SERVICE that engineers do not at this time know how to design such devices. Therefore they have put to work a machine that can recognize a black letter on a white background.

By making simple choices such as "yes" or "no," the machine can determine what the letter is. Next the machine will do more complicated experiments similar to learning tasks given to animals such as recognizing that a certain shape has food hidden under it.

It will next be asked to make a decision and perhaps to identify whether a letter is white on black or black on white. It is hoped that some theories of learning will be demonstrated in the process of giving the machine more and more difficult problems.

The basic principle guiding the engineers in choosing problems is that if the machine does not give the right answer something in its mechanism must be changed. When the right answer is given, new, more difficult problems can be tried.

In deciding on a problem, a group of scientists and engineers postulate a certain type of behavior and make up a list of possible "yes" and "no" answers. They try to predict what will be the effect of a particular rule and try to predict what changes will have to be made as a result of using the list of answers. They then try out the experiment to see if the predicted changes have to be made.

The research was supported by the Office of Naval Research.

• Science News Letter, 82:75 August 4, 1962

#### SPACE

## Assembly Building for Advanced Saturn C-5

### See Front Cover

► AN ARTIST'S concept of the vertical assembly building for erection and checkout of the advanced Saturn C-5 launch vehicle is seen on this week's front cover. It will be in a rear area of launch complex 39 to be built in the new National Aeronautics and Space Administration area northwest of Cape Canaveral, Fla.

The building is 48 stories high, two blocks long and some 230 feet deep. It will completely enclose six 350-foot C-5's at once for prelaunch mating and checkout. A 2,500-ton crawler vehicle, shown leaving the bay at the right, then carries the launch-ready vehicle the two miles to its launch site.

• Science News Letter, 82:75 August 4, 1962