

GEOPHYSICS

The Frigid Ends of Earth

The Arctic, the Antarctic and the equatorial belt will receive particular emphasis in studies made during the International Geophysical Year.

By ANN EWING

See Front Cover

► THE EARTH'S two permanently cold areas, the Arctic and the Antarctic, and its steamy hot equatorial belt, plus three chains of pole-to-pole stations, will come in for particularly concentrated studies during the International Geophysical Year starting July 1.

The IGY is the world's most expensive experiment, an 18-month probe of the earth's land, air and seas by thousands of scientists from 70 nations. The effort is not only concentrated within 18 months and in certain days or series of days during that time, it is also concentrated in these six selected areas.

The studies being made at almost all IGY stations include most of the fields in these 12: world weather, the earth's magnetism, the aurora, the ionosphere, the sun, cosmic rays, glaciers, the oceans, earthquakes, gravity, latitude and longitude determinations, and rockets and satellites.

In these fields, there are certain observations that can be made only in the polar regions.

Although Arctic regions were the focal point of the two previous international looks at the earth, more will be known about the Antarctic by the end of IGY than is now known about the Arctic.

The "white continent," covering an area larger than the United States and Canada combined, will not ever again be without permanent inhabitants, penguins excepted. Parts of it yet unseen will be flown over and mapped. Some idea of its untapped resources will be gained. One British Commonwealth team will travel across the continent's icy wastes.

The device shown in the photograph on the cover of this week's SCIENCE NEWS LETTER is designed to detect crevasses hidden by surface snow. Developed by U. S. Navy scientists, it picks out a safe trail electronically.

Close-Up of the Auroras

One kind of observation that can be made continuously only near polar regions is of auroras. The so-called northern lights also occur in a zone around the South Pole, where they are known as the southern lights.

Both auroras will be seen from regions much closer to the equator during times

when solar activity is high. The IGY period was chosen because the sun is now about at a peak in its 11-year cycle of sunspot activity. (See SNL, June 22, p. 390.)

One fact scientists would like to determine is whether auroras occur at exactly the same time in both the Northern and Southern Hemispheres. By using the earth's magnetic field as a giant lens, the simultaneous appearance of auroras near both poles will either be shown or disproved during the next several months.

Because the lines of force of the earth's magnetic field are perpendicular to the earth's surface at the magnetic poles, more cosmic rays reach ground there than anywhere else. Thus observations from the 64 stations set up by 12 nations in the Antarctic and sub-Antarctic will show a greater variety of cosmic ray bombardment than can be recorded elsewhere.

Home of the World's Weather

The Arctic is known to be, and the Antarctic is believed to be, a breeding place for the world's weather. The U. S. is responsible for handling weather information for the South Pole area for all nations.

Indicative of international cooperation in IGY is the presence at the Little America weather central station of a Russian meteorologist as well as one from the Argentine. A U. S. meteorologist is working with the Russians at the Mirny base, one of three being established by the U. S. S. R.

Both the U. S. and Russia are establishing geophysical stations deep within the continent's interior over an extended period for the first time.

At Little America, daily weather forecasts are made based on information radioed from all permanent installations and any field parties, then relayed back by radio.

These daily weather maps, when consolidated with the world-wide ones, will for the first time allow scientists to study the effects of Antarctica's perpetually cold air mass on atmospheric circulation both north and south of the equator.

The Arctic will also be mapped in all of these 12 fields. Unique studies will be made from two floating ice islands manned by U. S. personnel and others manned by the Russians. These islands drift slowly with the quixotic Arctic circulation.

Studies made from all of them will help to determine whether the Arctic water is an ocean, like the Atlantic, or a sea, like the Mediterranean.

The IGY observations will also show the trends of long-term weather, indicating

whether the Arctic is actually warming up or not. There have been indications that in about 50 years, the Arctic waters may become navigable, at least in the summer time.

Helpful in these studies of a world-wide warming up will be the observations taken from some 18 stations involved in the U. S. equatorial Pacific program. These are centered principally in the Hawaiian Islands, in the Line Islands near both the geographic and geomagnetic equator, and in the Marianas and the Carolines.

At these often lonely Pacific islands, all of the observations to be made will come from the outlined fields of 12. Altogether in the Pacific, in cooperation with other countries, the U. S. is involved in 40 stations.

Special Observations

Although the IGY is concentrated within 18 months, there is a further concentration of time: certain special days or series of days are set aside for increased observations. Many of these are already designated, others are to be called under special conditions.

The four varieties are:

1. Regular world days, of which the first occurs on July 4. These consist of two consecutive days at new moon and others when the moon is near the quarter phase, and at times of expected prominent meteor showers.

2. Alerts, issued by the National Bureau of Standards radio forecasting center at Fort Belvoir, Va., after consultation with specialists in other countries. These are issued when there is an unusually active region on the solar disk indicating a high probability of ensuing solar flares and geomagnetic disturbances.

3. The alert will also serve as notice to scientists that a special world interval may be called in a few days. These are called when there is a strong possibility that a significant geomagnetic disturbance will begin within 24 hours after the interval's start.

4. World meteorological intervals. These are series of ten consecutive days each three months including the solstice and equinox days and three regular world days. Increased attention will be given to upper air soundings at these times, and almost all the scheduled rocket launchings fall within these intervals.

Programs in ionospheric physics, geomagnetism, solar activity, cosmic rays and auroras will be intensified during all of these four kinds of days or intervals. Some special cosmic ray balloon flights and rocket launchings, ready on a standby basis, will be made when the warning agency broadcasts that the special conditions are occurring.

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