Solar flares will be studied and correlated with changes in cosmic rays, ionospheric and auroral disturbances, and meteorological phenomena.

Measurements of temperatures, pressures, humidities, and winds during IGY will provide information about weather patterns from which better forecasts can be made. Emphasis has been placed on high-altitude meteorological observations (up to 100,000 feet) along three lines of stations (10° E, 75° W and 140° E) extending from the North to the South Pole. These observations will be particularly useful in studies of the movements of air masses around the world.

Water, in liquid or solid form, covers some four-fifths of the earth's surface and is an important factor in the global heat budget. Problems having to do with the nature of oceanic currents, temperature, composition, sea level fluctuations, and total water content will be studied by IGY oceanographers. Emphasis will also be given to glacier studies, particularly in the Arctic and at such U. S. Antarctic stations as Little America, on the 400-mile front of the Ross Ice Shelf; the coastal stations at Vahsel Bay and Knox Coast; the Pole Station on the high South Polar plateau; and Byrd Station, located 80° South and 120° West on the Rockefeller Plateau.

The ionosphere, a region of rarified, ionized gas between 50 and 250 miles above the surface of the earth, is a complex region of the atmosphere, fluctuating in height and depth and varying in ionization. It is affected by solar activity, geomagnetic disturbances, the aurora, and perhaps by meteors. Predicting its effect on radio transmission is one of the major problems in ionospheric physics. Investigations planned by the U. S. involve the relatively unknown Arctic and Antarctic regions as well as along a pole-to-pole chain of stations near the 75 West meridian in the Equatorial Pacific.

Both aurora and airglow, known to affect radio communications, are optical phenomena of the upper atmosphere and appear as light emitted by atoms and molecules of the atmosphere at about 60 km and higher. The aurora, which is the terminus of the path of ionized particles from the sun and the only visible portion of that path, enables theoretical geophysicists to learn a great deal about this stream of particles, its path through space, its capture in the equatorial ring, and its subsequent bombardment of the atmosphere in the auroral zones about 23° from the magnetic poles. Spectroscopic, visual, and photographic observations of the aurora will show its distribution. Radar will provide a record of the ionization associated with the aurora.

In addition to geomagnetism's own specific uses in surveying, navigation, and exploration of minerals and petroleum, this field has broad and basic implications in the study of the ionosphere, radio wave propagation, aurora, cosmic rays, as well as other fields of science. U. S. scientists will explore the physical mechanism causing geomagnetic storms, which frequently cause strong aurora displays and radio blackouts, and also the ionospheric disturbances. The geomagnetic program consists of a series of experiments mainly designed to yield facts about rapid magnetic field fluctuations. The U. S. will establish stations in Alaska, Antarctica, and the Equatorial Pacific. In the United