News of Science

IGY Whistler Observations

An informal meeting on whistlers and related audiofrequency wave phenomena was held at the Central Radio Propagation Laboratory of the National Bureau of Standards in Boulder, Colo., 14–16 Feb. The purpose was to discuss recent progress in this new field of research and to develop further the plans for the North American program of synoptic observations during the International Geophysical Year (1957–58).

The United States synoptic program will be under the joint direction of M. G. Morgan of Dartmouth College and R. A. Helliwell of Stanford University, chairman and member, respectively, of the Technical Panel on Ionospheric Physics, which is advisory to the U.S. National Committee for the IGY. These two men will be assisted by H. W. Curtis of Dartmouth, Harold Dinger of the Naval Research Laboratory, and A. Glenn Jean of the Central Radio Propagation Laboratory, who are consultants to the panel. The Canadian work in this field is under the direction of L. R. O. Storey of the Defense Research Board of Canada.

Whistlers are a special kind of natural radio signal in the audiofrequency range. They are believed to be caused principally by energy from lightning discharges that has traveled from one hemisphere to the other along lines of the earth's magnetic field in the little-explored longitudinal extraordinary mode of propagation. During propagation through the ionosphere, the energy from the causative lightning impulse is dispersed in such a way that the high frequencies usually (but not always) arrive ahead of the low frequencies and a signal of descending frequency is produced.

The reason for the considerable effort to be put forth in the study of these audiofrequency wave phenomena is twofold. First, they offer a new method for detecting the presence of ionization far beyond the reaches of the known ionosphere. This is because the paths of whistlers extend several earth radii above the earth's surface. Second, although the origins of certain related phenomena, such as the dawn chorus and hiss, are not yet known, they have been observed to be connected in some way with auroral and magnetic disturbance phenomena. Understanding in these areas, therefore, offers a potentially powerful new tool for the study of the mechanisms of aurorae and magnetic storms.

The main objective of the IGY synoptic program is the determination of the occurrence and characteristics of whistlers and related phenomena at regular intervals and at many locations on the earth's surface. Magnetic tape recordings will be made at each station during the observing periods. All useful data will be given a preliminary classification and preserved for later detailed analysis.

An important recent addition to the experimental program is the inclusion of direction-finding on atmospherics for the purpose of determining the geographic location of impulses that cause whistlers. Such information is required because very little is known about the effect of the location of the impulse on the measured characteristics of the resulting whistler.

An extensive discussion at the Boulder meeting of the requirements of recording equipment led to the following tentative specifications. Each station should be capable of recording on magnetic tape the amplitudes of all signals in the frequency range between 100 cycles and 30 kilocycles. The calibration should be given in terms of the electric or magnetic field components measured by the antenna.

Events on the magnetic tape should be timed to an accuracy of at least, ± 0.1 seconds. Each recording period should be not less than 2 minutes in length and should be repeated no less than once every hour. Special runs during World Days, periods of magnetic disturbance, rocket firings, and so forth, will be scheduled in accordance with the needs of the program.

A tentative list of stations contributing to the North American program on whistlers was developed. For convenience, these were divided into an Atlantic group, a Midcontinent group, and a Pacific group. The stations indicated as tentative are either above or below the geomagnetic latitude range 40°–65° in which maximum activity occurs. Stations marked with an asterisk are currently in operation.

Atlantic group: Thule, Greenland (tentative); Frobisher Bay, Northwest Territories (tentative); Knob Lake, Quebec*; Father Point, Quebec; Ottawa, Ontario; Halifax, Nova Scotia; Hanover, N.H.*; Washington, D.C.*; South Carolina; Bermuda*; Gainesville, Fla.*; Key West, Fla. (tentative); Huancayo, Peru (tentative), or Talara, or Trujillo; Falkland Islands (by cooperation of the United Kingdom); Port Lockroy, Antarctica (by cooperation of the United Kingdom).

Mid-continent group: Flinflon, Manitoba; Boulder, Colo.*; Battle Creek, Mich.

Pacific group: Fairbanks, Alaska*; Nome, Alaska; Anchorage, Alaska; Unalaska, Alaska*; Seattle, Wash.*; Stanford, Calif.*; Wellington, New Zealand (by cooperation of New Zealand)*; Dunedin, New Zealand (by cooperation of New Zealand)*; Macquarie Island (by cooperation of Australia).

In order to accelerate current research and obtain experience for the IGY program, it was agreed to commence at once an exchange of summaries of data between operating whistler laboratories.

R. A. Helliwell
Stanford University, Stanford, California
M. G. Morgan
Dartmouth College, Hanover, New Hampshire

International Atomic Energy Agency

A charter for the international atomic energy agency was approved on 18 Apr. after 2 months of negotiation by the 12 nations that were selected to frame the draft: Australia, Belgium, Brazil, Canada, Czechoslovakia, France, India, Portugal, the Union of South Africa, the Soviet Union, the United Kingdom, and the United States. At the same time plans were approved for an international conference next September at United Nations headquarters, when the charter will be submitted for ratification by the member nations.

The U.S. State Department issued n announcement of the outcome of the 12-power talks, but the text of the statute was not immediately made public. However, it has been reported that the agency will have a 23-man board of governors. Of these, five will represent the countries "most advanced" in nuclear technology—that is, the United States, the Soviet Union, Great Britain, France, and Canada.

Five other board members will be chosen from among eight regional