PHYSICS

Air a Hundred Miles Up May Be Warm as a Summer Day

World-Wide Investigation of Radio Signal Reflection Also Shows Wave Action in Upper Ionized Region

FURTHER proof that the layers of ionized atmosphere of the earth from 62 to 124 miles above sea level have a fairly constant temperature regardless of the time of day, night or season is presented in a report (*Physical Review, Nov.* 1) prepared by Dr. E. O. Hulburt of the Naval Research Laboratory.

Moreover, new data taken by many investigators scattered all over the world indicate that the temperature of the high altitude layer may be as great as that of an average summer's day at the earth's surface, about 80 degrees Fahrenheit.

"Best agreement between the radio facts and the theoretical calculations is found," Dr. Hulburt reports, "if the temperatures of these levels is taken to be rather warm, above 300 degrees Kelvin."

A degree Kelvin is the unit of the absolute temperature scale. A figure of 300 degrees Kelvin corresponds to 80.6 degrees Fahrenheit.

Dr. Hulburt's preliminary report was prepared from data forwarded to him by scientists working at the Department of Terrestrial Magnetism of the Carnegie Institution and the National Bureau of Standards, both of Washington.

Observations were obtained in such widely scattered places as Watheroo, Western Australia; Huancayo, Peru; Washington; Fairbanks, Alaska; and in New England and Nova Scotia during the solar eclipse.

145 Miles Up

Taking advantage of the reflection of radio signals from the ionized layers scientists have further investigated the characteristics of the layer known as F2. This layer of the ionosphere begins about 145 miles above sea level and continues up to 220 miles. Layer F2 is above the layers E and F1 whose temperature varies within 86 degrees Fahrenheit no matter what the time of day or season.

Radio studies of the ionization in the F2 regions for different times of day, Dr. Hulburt indicates, fit in with the belief that great waves of ionized atmosphere move about in this region. As the ionized air spreads out from a point directly below the sun in all directions, part of it moves with the rotation of the earth and part against the rotation. Eastward the ionized wave moves with the earth and should resemble water waves, having a smooth form, perhaps like ground swells.

The part of the wave going westward moves against the earth's rotation and, Dr. Hulbert postulates, "is checked and is caused to whitecap, as in a tide rip." That is, the top spills over the bottom of the wave.

Observations made on the magnetic equator substantiate this view and record a greatly disturbed and erratic layer of ionization in the morning hours, with a maximum at 10 a. m. A minimum occurs at noon and then there is a smoother, less disturbed ionization in the afternoon, with a broad maximum at from 6 to 8 p. m.

Science News Letter, November 17, 1934

ASTRONOMY

Astronomer Explains Star Going Two Ways at Once

THE mystery of stars which go two ways at once, the outer part expanding and the inner part contracting, is cleared up by the South African astronomer A. E. H. Bleksley of the University of Witwatersrand (*Nature, Oct.* 27).

The two-way stars are the pulsating stars known as the "Cepheid variables." They are relatively common. Their paradoxical action of expanding and contracting at the same time in different places was explained by Mr. Bleksley as the result of his calculations on the temperatures and luminosities of several of the stars, particularly the one known technically as RS Boötis.

It was assumed by scientists that such stars ought to be the hottest and brightest when they reached the greatest contraction. Astrophysicists were therefore puzzled to find that when the star was getting brighter and brighter its outer atmosphere was moving toward them, or away from the center.

The finding of this kind of star action threw doubts on the whole "pulsation" theory of the Cepheid variable type of star.

Astronomers will probably be glad Mr. Bleksley has explained away the paradox by showing that while the oscillations of stellar atmosphere exist, they differ in phase or time by approximately one quarter of the total period for one complete "pulsation" of the star. Taking this phase difference into account the time of maximum brightness, maximum temperature and minimum radius (most contraction) still coincide just as they should in a world that follows the laboratory findings of the physicist.

Science News Letter, November 17, 1934

TECHNOLOGY

Glass Tops on Tin Cans Made of Telescope Material

A NEW type glass top for tin cans enabling purchasers to see the contents has been developed by the Corning Glass Works. The glass is the same kind used in making great telescope mirrors such as the new 200-inch diameter instrument of the California Institute of Technology.

Because of the low expansion of the

FOR TIN AND TELESCOPE

The same material that allows the astronomer to gaze at the stars is now being placed in can tops to allow the housewife to see her vegetables.