GEOGRAPHICAL POSITIONS.

WORLD LONGITUDE DETERMINATION

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At the 2nd Session of the International Astronomical Union, held at Cambridge, 14th - 22nd July, 1925, a scheme was drawn up for the determination of fundamental differences of longitude by means of wireless telegraphy.

The idea for this operation with reference to longitudes was supported by the Bureau des Longitudes, Paris, and had already been proposed by the International Geodetic and Geophysic Union at its Session in Rome in 1922.

The object is to determine, to a high degree of accuracy, the differences of longitude between 3 or 4 stations regularly distributed around the Earth. This world system of longitudes will permit: (1) the investigation of the maximum accuracy which may be obtained in determining longitudes by means of the most improved astronomical and wireless instruments; this accuracy will immediately appear from the error of the closing of the polygon, of which the summits will be the observation stations; (2) the verification of the fixity of continents with reference to each other, by noting whether the differences of longitude vary with time. The period chosen for these observations extended from 1st October 1926 to 1st December, 1926.

The principal stations of the so-called " fundamental polygon" will be at the Naval Operating Base, San Diego, at the Algiers Observatory, and at the Shanghai Observatory. These stations are at nearly the same latitude and are spaced approximately 8 hours apart in longitude.

The radio stations will be of the so-called rhythmic type, so spaced that there will be 61 signals per minute for 5 minutes, 306 in all. They will be sent at three periods of the day, as follows; Greenwich time:

ANNAPOLIS, 17,145 metres, 20 hrs. 10 min. to 20 hours 15 min.; 3 hrs. 10 min. to 3 hrs. 15 min.; 10 hrs 10 min. to 10 hrs 15 min.

ARLINGTON or BELLEVUE (near Washington) (74.7 and 24.9 metres, 20 hrs. 20 min. to 20 hrs. 25 min.; 3 hrs 20 min. to 3 hrs. 25 min.; 10 hrs 20 min. to 10 hrs. 25 min.

HONOLULU: 11,500 metres, 20 hrs. 30 min. to 20 hrs. 35 min.; 3 hrs. 30 min. to 3 hrs. 35 min.; 10 hrs. 30 min. to 10 hrs. 35 min.

HONOLULU: 36.8 metres, 20 hrs. 40 min. to 20 hrs. 45 min.; 3 hrs. 40 min. to 3 hrs, 45 min.; 10 hrs. 40 min. to 10 hrs. 45 min.

SAIGON: 17,000 metres and 25 metres, 11 hrs. 30 min. to 11 hrs 35 min.; 19 hrs. to 19 hrs. 5 min.

BORDEAUX: 18,900 metres, 8 hrs. 1 min. to 8 hrs, 6 min.

ISSY (near Paris), 32 metres, 20 hrs. 1 min. to 20 hrs. 6 min. 8 hrs. 1 min. to 8 hrs. 6 min.; 20 hrs. 1 min. to 20 hrs 6 min.

Other stations, among which there are about fifty observatories, will be attached to the preceding stations and will be of service for the determination of longitudes in different countries.

An extract from instructions given on this subject, which have been issued by the Bureau des Longitudes and the United States Naval Observatory, is reproduced below.

In order to determine longitudes, Mr. W. BOWIE, Chief of the Coast and Geodetic Survey of Washington, recommends the use of small transit telescopes fitted with an impersonal micrometer. With this type of instrument the Coast Survey ascertained the longitudes for a great number of stations in the United States and the error of the closing of a system of stations rarely exceeded 0.01 sec. According to Mr. BOWIE, when this accuracy is not reached, it is because the atmospheric conditions are bad. French astronomers also advocate transit telescopes fitted with impersonal micrometers, mechanically driven or not; they also recommend the use of the prismatic astrolabe to check the results obtained by means of the transit telescopes. Numerous observations made by the Observatory of Paris have shown that the two instruments mentioned above give equal results from the point of view of accuracy.

As regards the reception of time by wireless, the result obtained is always of greater accuracy than that by astronomical observations. It is recommended that signals be recorded automatically; nevertheless, the method of " coincidences " gives very precise results.

Short wave signals are sent as well as long wave signals, as some observers report better reception on the short waves, especially at very distant stations, when there is not much daylight between the stations.

It was a question of whether it were preferable to observe the same stars from two neighbouring stations, which would necessitate relying on the regularity of the rate of the time-keeper, or whether it were better to observe different stars almost simultaneously in which case it would be necessary to depend on the right ascensions provided by the astronomical ephemerides. At any rate, very good time-keepers are necessary, because they must maintain their rates between the reception of the wireless signal and the moment when the observations are made.

The International Astronomical Union recommends that in the reductions the places of the stars in the American Ephemeris be used as far as possible and that clock stars be confined to the region of 20 or 25 degrees north and south of the zenith.