

and the availability of high-speed electronic computers are being examined and both developed and developing countries are co-operating fully so that all member states of the WMO will derive full benefits from modern technology and improved meteorological services.

### 1.3.3 Standard time and time zones

The rotation of the earth on its axis was considered at one time to be entirely uniform and the unit of time, which is the second, was defined as  $1/86400$  of the mean solar day. Improvements in clocks and in the methods of making astronomical observations demonstrated conclusively that there are irregularities in earth rotation too large to be neglected. So, in 1956 the International Committee on Weights and Measures defined the second in terms of the annual motion of the earth about the sun, called ephemeris time. In 1957 the first cesium atomic clock was calibrated with respect to ephemeris time, but not until 1967 was the cesium second adopted as the international standard. The second today is defined as 9,192,631,770 cycles of a transition of the cesium atom.

Based on atomic clocks, Canada's time is established by the National Research Council with a precision of one ten-millionth of a second per day, and co-ordination with other countries is maintained to the same precision through the *Bureau international de l'Heure* in Paris. Irregularities in the rotation of the earth give rise to a difference between mean solar time and atomic time, and leap seconds are introduced to ensure that this difference, called DUTI, does not exceed  $\pm 0.7$  seconds. At present DUTI is decreasing by about one tenth of a second per month, and positive leap seconds were necessary on June 30 and December 31, 1972.

A continuous broadcast of Canadian time is made on station CHU, Ottawa (3330 kHz, 7335 kHz, 14670 kHz), with a bilingual voice announcement each minute, and with a split pulse code to give the value of DUTI. Once a day the time signals are broadcast across Canada on the CBC networks.

