

they have also been immensely useful in facilitating the progress of that minuter and more local geography which we call topography. Geodesy has furnished the absolute and relative positions of a very great number of important points on the globe, with a precision previously unknown. It is in this way we have obtained the greater part of the geographical data which are yearly inserted, for the use of navigators and astronomers, in the collection entitled, "Connaissance des Temps" (answering to our English "Nautical Almanac").

Longitudes are sometimes expressed *by time*. Let us explain this last peculiarity.

The Earth rotating upon its axis in four-and-twenty hours, all these meridians successively pass under the sun during that period. Their differences can therefore be computed by the time which elapses between the passage of two meridians before the sun (or between the passages of the sun at the two meridians, to employ the language of astronomers). Consequently, we may either say: two meridians differ by one hour, or (and this is better), they are fifteen degrees apart (one twenty-fourth of the circumference of the globe). An hour of longitude is equal to fifteen degrees; one minute of time to fifteen minutes ($15'$), of the arc; one degree to four minutes of time, and so on.

The difference of meridians or of longitudes may be determined astronomically by the observation of instantaneous phenomena which are reported at the solar hour. Signals effected by the ignition of gunpowder, or by the electric telegraph, are means of instantaneous observation; for the swiftness of light and electricity may be regarded as infinite. A signal given at Greenwich, by electric telegraph, is observed in Paris, despite of distance, at the very moment of its departure. Therefore, if we note at Paris the arrival of the telegraphic signal sent from Greenwich, we obtain by this means the desired longitude. If, for example, a signal despatched from Greenwich at noon should be observed at Paris at 9 min. 21 sec. past noon, it follows that the sun had already quitted the meridian of Paris nine minutes and twenty-one seconds, when it was on the meridian of Greenwich; or, in other words, Greenwich is nine minutes twenty-one seconds west from Paris.

It was by this method that Professor Airy, the Astronomer Royal, and M. Le Verrier, Director of the Imperial Observatory of Paris, determined, in 1858, the exact difference of longitude between Paris and Greenwich.

The further eastward any locality lies the earlier will it have the sun. Any place one degree east of London will have the sun four minutes earlier than will London; any place one degree west, four minutes later.

[Places situated at the extremities of the same diameter of the globe we call *Antipodes* (Greek, *avri*, over against, and *πους, ποδος*, a foot). They must necessarily be on one and the same meridional circle, but separated from each other by half the circumference. They must differ in longitude, therefore, exactly 180° ; but their