ABSTRACT

The study of wave propagation in the atmosphere requires a knowledge of the vertical as well as the horizontal and time structure of the waves.

The problem of determining the height of the reflection point on a meteor trail from a short pulse meteor radar system was examined. It was found that the phase comparison method would provide the most accurate determination. The design, construction and calibration of such a system is described.

The methods of analysis of periodic phenomena are described and the results of such analysis on data collected in Sheffield with and without the use of height information, is discussed. It was found that some of the previously published average wind data was not statistically significant and it is concluded that this is due to the variable vertical structure of the winds.

The existence of periodic winds with periods greater than 24 hours, in particular about 50 hours, in correlation with ground pressure fluctuations of the same period, is established. It is shown that these are probably planetary waves and that their phase varies little with altitude, in agreement with theory.

A transmission coefficient of only 10^{-6} between the lower and upper atmosphere is required to account for the observed wind velocities in the meteor region.

A comparative study using laser radar, meteor radar and ionospheric radar was used to investigate the tidal structure of the atmosphere between 70 and 140 km over Jamaica. The tides were found to exhibit large day to day variations. Although some differences were observed, there was general agreement in the three methods.