CHAPTER 1

# THE ATMOSPHERE

## INTRODUCTION

Meteorology is the scientific study of the atmosphere. The atmosphere is the envelope of gases surrounding the earth in which a number of processes varying in duration and dimension operate. These result in the *weather* experienced by an observer on the surface of the earth. *Climate* is the more general pattern of weather established by analysing, on an annual basis, the daily conditions at a particular point.

## STRUCTURE AND COMPOSITION

The atmosphere may be considered as having a number of distinctive layers which are defined by the variation of air temperature with increase in height. For the standard atmosphere (Fig. 1.1) the layers are:

(a) *Troposphere*—Surface of the earth to 12 km—the *tropopause*.
(b) *Stratosphere*—Tropopause to 47 km—the *stratopause*.
(c) *Mesosphere*—Stratopause to 80 km—the *mesopause*.

Above the mesopause lies the *thermosphere*, a layer with a negligible quantity of gas, whose temperature increases with increase in height. It should also be noted that other layers may be defined on different criteria. The *ionosphere* for example, where the gases ionized by solar radiation affect the propagation of radio waves, exists from 60 km upwards.

Below the mesopause the mixture of gases in the atmosphere is nearly constant:

| *Gas* | | *Percentage By Volume* |
|---|---|---|
| Nitrogen | ($N_2$) | 78.09 |
| Oxygen | ($O_2$) | 20.95 |
| Argon | (Ar) | 0.93 |
| Carbon dioxide | ($CO_2$) | 0.03 |

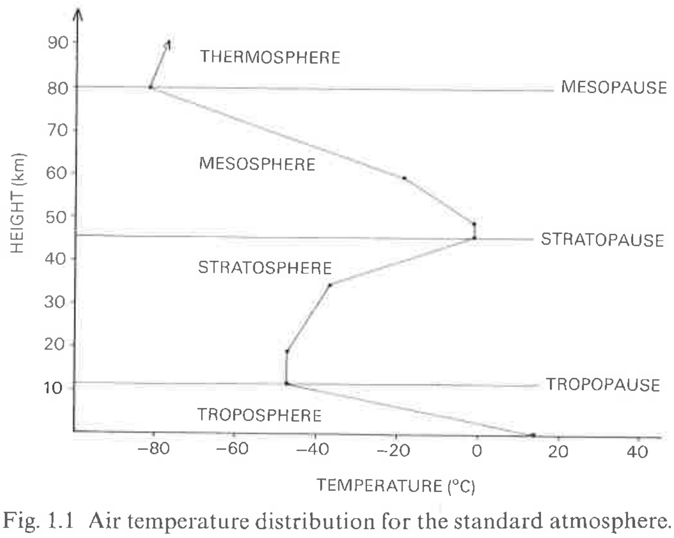


Fig. 1.1 Air temperature distribution for the standard atmosphere.