Box 2.3 Smoothing a graph to bring out a trend

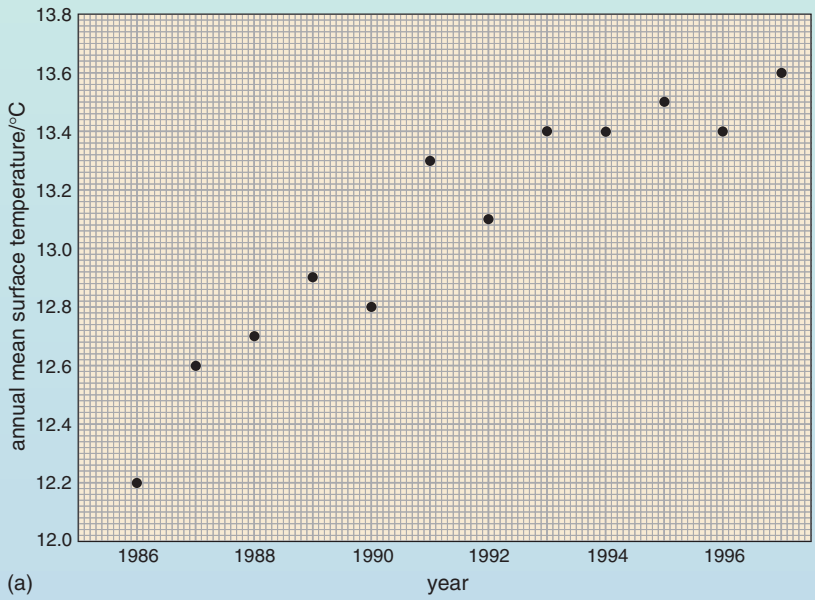

Figure 2.11 (a) Fictitious data showing a sequence of annual mean surface temperatures. (b) The data in (a) after smoothing.

Consider the sequence of annual mean surface temperatures in Figure 2.11a. For this invented record, the sequence from year to year is a bit ragged but the overall trend is clearly a general increase. In real data, it is usually not so easy to see the trend and this is where the technique known as smoothing is applied; its effect can be illustrated with the data in Figure 2.11a, as follows.

- Calculate the mean surface temperature for the years 1986–1988 inclusive.
- The three temperatures are found by reading horizontally across to the vertical (temperature) axis. They are 12.2 °C, 12.6 °C and 12.7 °C and their sum is 37.5 °C. The three-year mean is thus $\frac{37.5\ °C}{3}$, i.e. 12.5 °C.

This value is now plotted on Figure 2.11b at the central year of the set of three years — 1987. We then move on to the years 1987–1989 in Figure 2.11a, calculate the three-year mean, and plot it at 1988. This procedure is followed until we reach the end of the data. The result is shown in Figure 2.11b. The sequence is less ragged and the trend is even clearer. This can be emphasized by drawing a smooth curve through the newly calculated sequence of points.

If we take the years in larger groups, for example five at a time, the smoothing effect is greater.