Exercise 3 Construction of a chronostratigraphical diagram

You should allow about 1½ hours to complete this Exercise. You will need a sharp pencil, eraser, ruler and some coloured pencils.

The idea of this Exercise is to construct a chronostratigraphical diagram from the stratigraphical crosssection in Figure 3.1a similar to those shown in Chapter 4 of *The Sedimentary Record of Sea-Level Change*.

Question 3.1 On the grid provided in Figure 3.1b, construct a chronostratigraphical diagram of Figure 3.1a using the information given below:

The chronostratigraphical diagram should be drawn at the same horizontal scale (representing distance in both cases) as the cross-section. The numbers on the cross-section (Figure 3.1a) refer to the **age** of the parasequence boundaries or flooding surfaces back from the present (rather than the time, as shown in *The Sedimentary Record of Sea-Level Change*). Note that these lines will be isochronous and are therefore the same as the horizontal time lines on the chronostratigraphical diagram. The top of some parasequences have been eroded (wiggly lines, Figure 3.1a); over these distances, the top of these parasequences are **not** isochronous.

The oldest parasequence (capped by flooding surface age 20, denoted A20 in the text and 20 on Figure 3.1) has been plotted for you on Figure 3.1b by marking with crosses on the A20 line the lateral extent of the sediments underlying A20. You can do this very simply by placing a ruler parallel to the vertical axis with the edge at the point on the cross-section where the A20 line ends, and following this down to mark the point on the A20 line on the chronostratigraphical diagram (the ends of the A20 flooding surface are shown by two faint long dashed lines). The extent of the facies within the parasequence underlying A20 have been marked off in the same way (the guide lines are shown by two faint short dashed lines). The shape of the package under the A20 line has been estimated from the cross-section; it is clear that the sediments do not extend as far as they do at A20 and they must all be younger than A21 as this is not shown. For most of the subsequent younger parasequences, this is not a problem as you can simply join the marked point on A19 to those on A20 etc.

Transfer the lateral extent of each parasequence and its facies to the chronostratigraphical diagram. Take care when you come to the submarine fan deposits or any parasequences with eroded tops, but follow the same principles.

Question 3.2 (a) Using the stacking pattern of the parasequences and position of the sediment packages along the depositional slope in Figure 3.1a, together with the chronostratigraphical relationships in Figure 3.1b, identify and label the different systems tracts and key surfaces in Figures 3.1a and b. The clearest way to show the different systems tracts is to colour each of them in a different colour.

Question 3.3 Label the types of truncation (i.e. onlap and downlap) on Figure 3.1a (see Section 4.5 of *The Sedimentary Record of Sea-Level Change*).

Question 3.4 The space on Figure 3.1b with no sediment represents the sequence boundary or maximum flooding surface; annotate these areas appropriately.

Figure 3.1 (a) Stratigraphical cross-section and (b) chronostratigraphical framework for use with Exercise 3.

