Exercise 4 Answers

Question 4.1 (a) It is a rimmed shelf carbonate platform because of the flat top and steep margin. Unusually, from time step 1 to 9 (39.5–35.5 Ma), the lagoon appears to be separated from the platform margin, but this may just be a result of the position of the cross-section. (b) Position of the reef crest facies (see *The Sedimentary Record of Sea-Level Change* Figure 11.12) because the sediments on the distal (right-hand side) are always inclined at a steep angle suggesting fore reef and redeposited beds (compare with *The Sedimentary Record of Sea-Level Change* Figure 11.18a).

Question 4.2 See Figure A4.1.



Figure A4.1 Part of the simulation movie '9. Repeated uniform cycles of sea-level and carbonate input', from Chris Kendall's website, with the systems tracts and key surfaces labelled.

Question 4.3 (a) The reef crest facies moves a large distance in a proximal direction between time steps 9 and 10 (35.5–35 Ma) due to the rate of increase in accommodation space being greater than the rate of carbonate sediment production. In other words, the carbonate platform has failed to totally keep up in order to maintain its position at the steep edge of the carbonate platform. It is thus behaving as a backstepping rimmed platform suggesting overall fairly low relief and low productivity and a low to moderate eustatic sea-level change (see *The Sedimentary Record of Sea-Level Change* Section 12.2, Figure 12.6a). Note however that from time steps 30 to 35 (25–22.5 Ma) it behaves as an aggrading to prograding rimmed platform (see *The Sedimentary Record of Sea-Level Change* Figure 12.6b) suggesting that the slight change to a higher relief (and narrower shelf area) causes a relatively high rate of productivity because the eustatic sea-level change and subsidence for each parasequence is the same.

(b) At time step 19 (30.5 Ma), the reef crest facies start to move in a distal direction and at time step 20 (30 Ma) it moves into an even more distal position; this is due to decreasing accommodation space during the eustatic sea-level fall.