Supplement

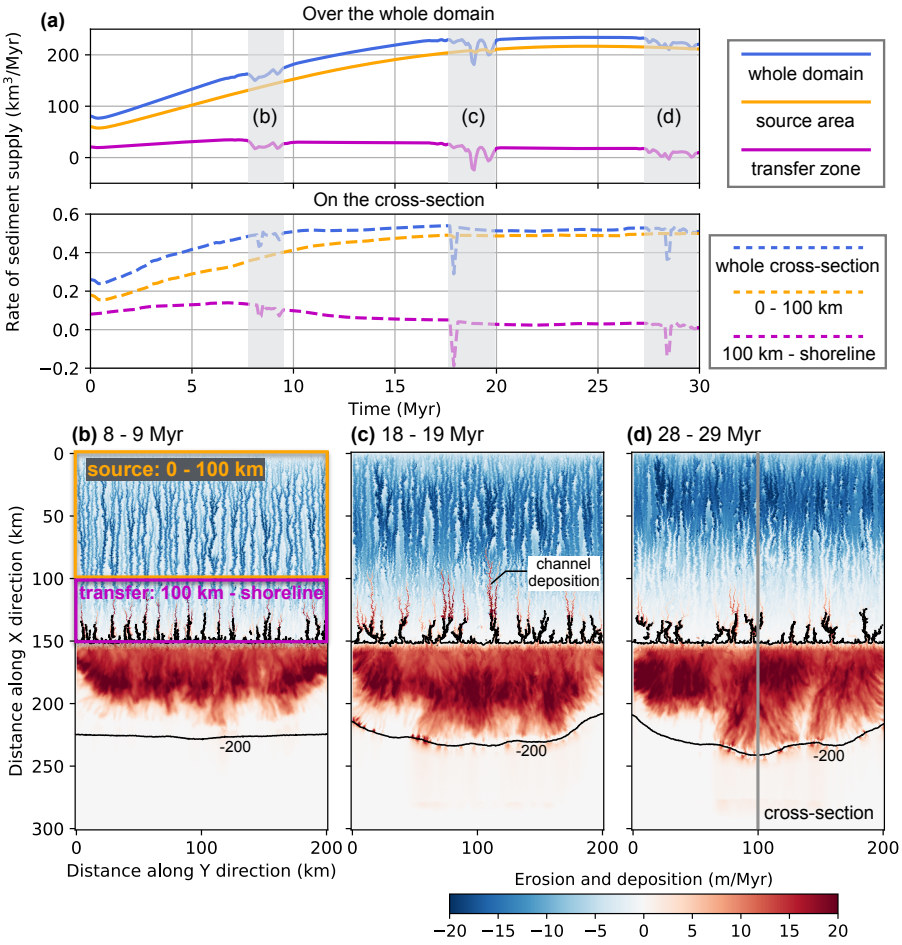

Figure 1: (a) Rate of sediment supply defined as the eroded volume calculated in 0.1 Myr increments over the entire domain, the source area and the transfer zone (top panel), as well as along the entire cross-section and the source and transfer areas along the cross-section (bottom panel). See Fig. 3f and (d) for the location of the cross-section. The light gray boxes in (a) highlight episodic decreases in eroded volume. The erosion and deposition from 8 Myr to 9 Myr, from 18 Myr to 19 Myr, and from 28 Myr to 29 Myr are presented in (b-d) shows that channel deposition in response to sea level rise occurs during the three episodic decreases in rate of sediment supply.

We calculated the total eroded volume at 0.1 Myr intervals over the whole domain (blue solid curve in Fig. 1a) and on the cross-section (blue dashed curve in Fig. 1a) to estimate the rate of sediment supply change (δS in km^3/Myr) through time. We find that the rate of sediment supply increases as the channel slope steepens (a direct consequence of the stream power law used in our study), then stabilises after 20 Myr. Three decreases in δS over the whole domain are recorded from 7.8 Myr to 9.5 Myr, 17.8 Myr to 20 Myr, and 27.5 Myr to 30 Myr (light gray boxes in Fig. 1a). Decreases in δS also occur on the cross-section but they are shorter lived. These events consistently occur during shoreline transgression which induces less exposed shelf area to be incised. Comparing the eroded volume for different zones (*e.g.* source area and transfer zone - Fig. 1a) shows that the source area exhibits an initial increase in eroded volume followed by a stabilisation period after 20 Myr (orange solid curve in Fig. 1a). The transfer zone presents similar coincidental patterns of decrease in sediment supply (purple solid curve with blue solid curve in Fig. 1a). Erosion and deposition rates from 8 Myr to 9 Myr (Fig. 1b), 18 Myr to 19 Myr (Fig. 1c) and 28 Myr to 29 Myr (Fig. 1d), reveal that this decrease in erosion volume is also related to downstream channel deposition across the transfer zone. We attribute this autogenic behaviour to the adjustment of river profiles to base level rise. Negative δS occurs at around 18 Myr and 28 Myr (Fig. 1a), which reflects greater deposition than erosion.