1 Appendix A: Sensitivity testing

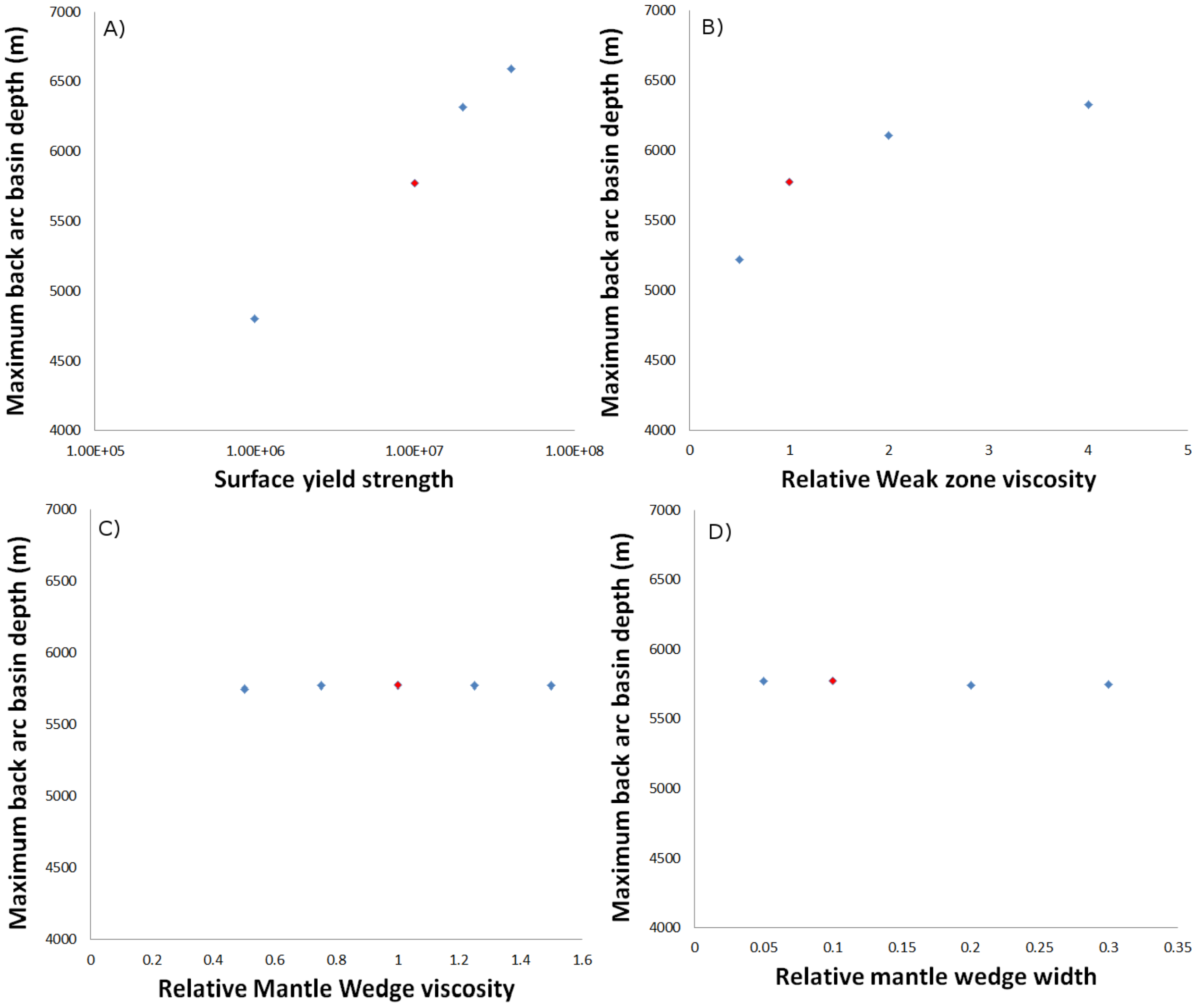

Figure A1 Graphs showing the sensitivity of the back arc basin depth before elastic filtering to four different model input parameters.

This Appendix discussed the sensitivity of modelling results to the choice of subduction model parameters. Figure A1 illustrates a suite of model runs with different input parameters. For each model the maximum depth of the back-arc depression after the onset of collision was picked in time and space. Here we can see how each input parameter has affected the depth of this depression before any elastic filtering, the value for our preferred model presented in this study is highlighted in red. All models share the initial set-up as described in the method section of this study. In Figure 1 A we show how a reduction in surface yield strength reduces the depth of the basin. This is due to a smaller surface yield strength allowing material at the boundary of the model to more easily deform and so reducing the stress at the surface used to calculate the topography. In Figure 1 B we show how an increase in the weak zone viscosity increases the depth of the basin. In our model the weak zone viscosity defines the coupling between the subducting and overriding plate. With higher viscosity this produces greater coupling and hence a deeper basin due to slab steepening. In Figure 1 C we show how the mantle wedge viscosity has little effect on the basin depth. This is due to the basin being due to slab steepening where the majority of the stress is transmitted to the surface through the weak zone the de-couples the two plate. It should be noted that the weak zone viscosity did affect the basin during ongoing subduction. In Figure 1 D we show how the width of the mantle wedge has little effect on the basin depth. This is for the same reason as the mantle wedge viscosity.

2 Appendix B: Elastic Thickness

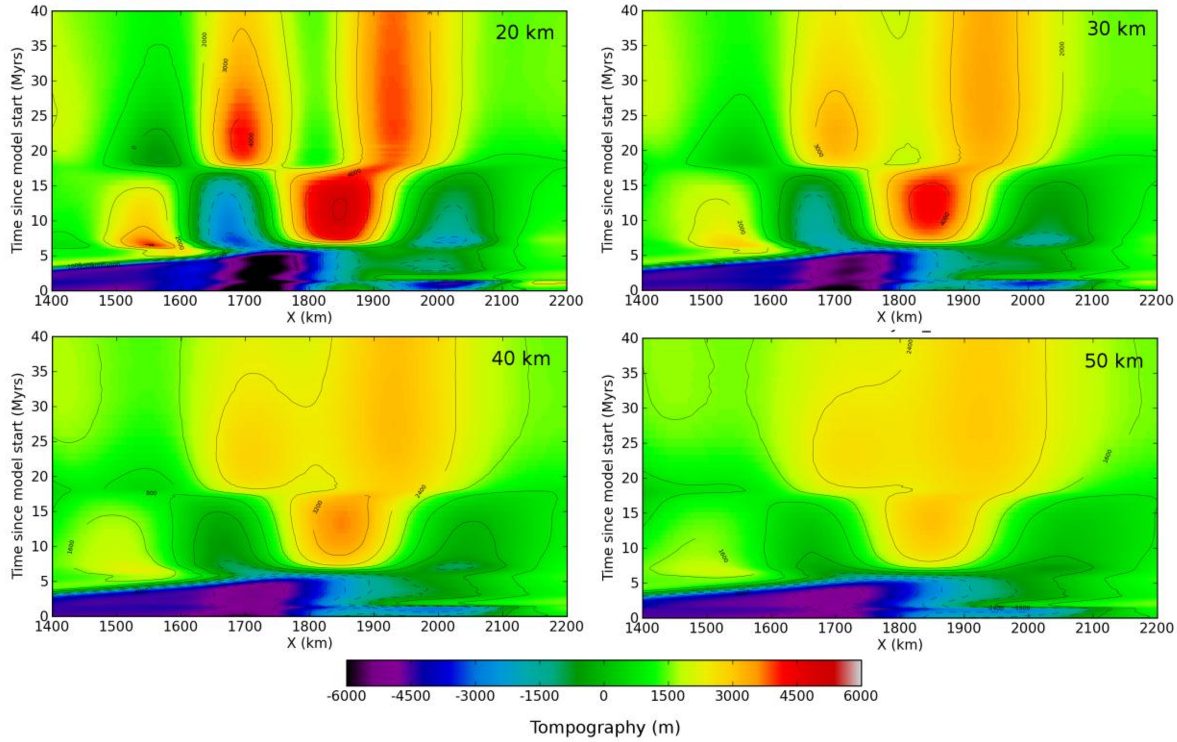

Figure A2 Topography time maps for our results with a 20 km, 30 km, 40 km and 50 km elastic filter applied.

The effective elastic thickness he of the lithosphere around the Arabia-Eurasia continental collision zone is relatively poorly defined given the uncertainty in plate thickness and the effect of the suture. This appendix discusses the influence of the effective elastic thickness of the lithosphere on the topography. For a range of elastic thicknesses, greater elastic thickness give topographic features a greater lateral extent as well as reducing their magnitude. Despite quantitative differences, the discussed topographic features of this work are present over a wide range of he (effective elastic thickness) values, and the exact he value representative of the collisional tectonics settings discussed here is not the focus of this study.