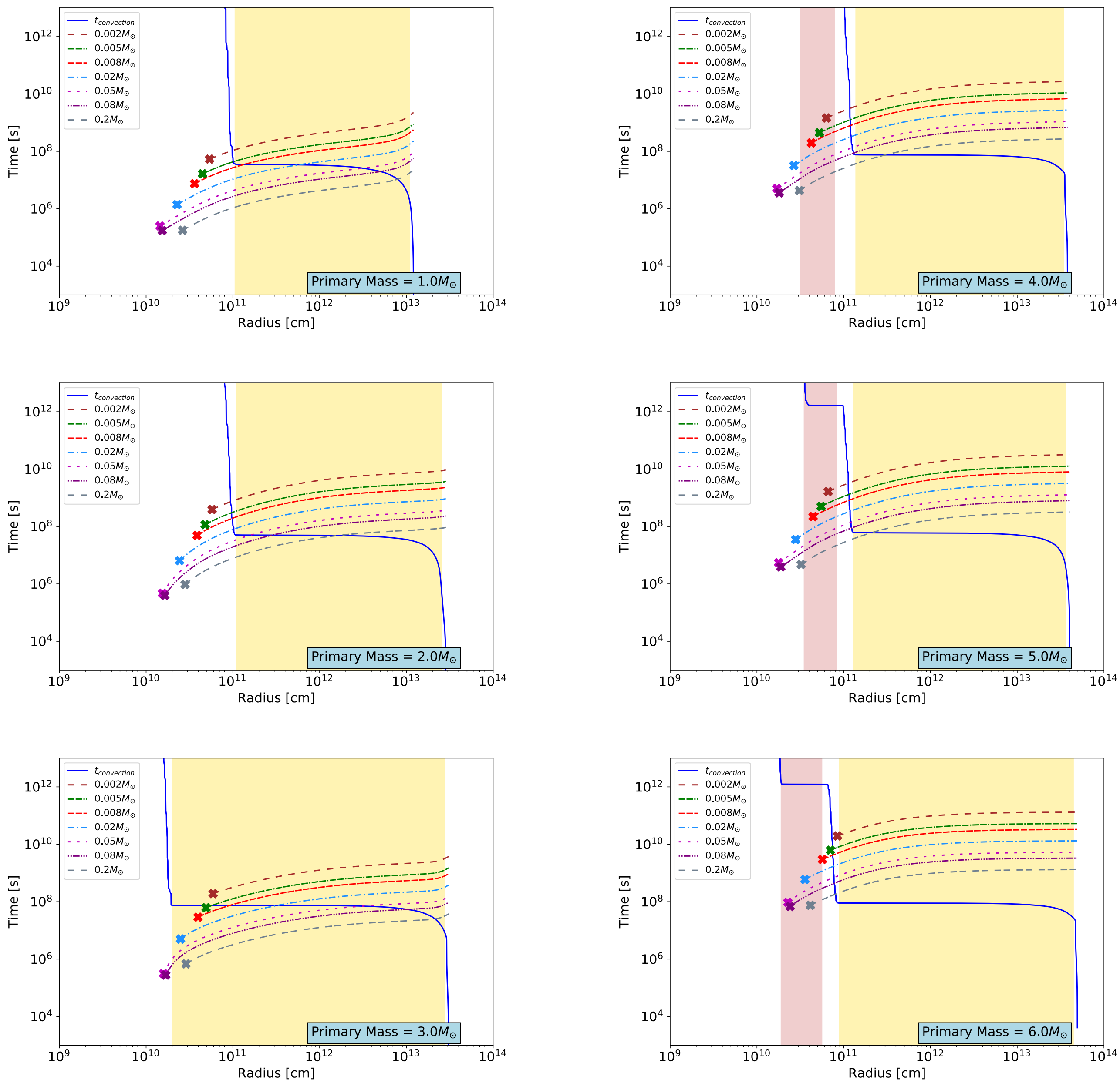

Figure 1. Comparative timescale plots for a sample of representative primary masses at their maximum radial extent and several test companion masses. The convective timescale profile of the primary star is shown in solid blue. The coloured, dashed lines show the inspiral timescale - the time it takes for the companion mass to spiral from its current radius to the centre of the primary star. The radius at which each companion mass shreds due to the gravity of the primary mass is marked with an X. The surface-contact convective regions (SCCRs) of the primary star that do not contribute to the unbinding of the envelope are shaded in yellow. Interior convective zones that do not extend to the primary's surface are shaded in pink.

2.1 Convective Regions

Post-main sequence stars host deep convective envelopes that can transport energy to optically thin surfaces where it is radiated away. As the companion inspirals, there may be interior regions where convection can effectively carry newly liberated orbital energy to the surface. The CE may then regulate itself with little-to-no orbital energy available for ejection until the companion reaches a region where the effects of convective transport no longer dominate.

To identify the convective regions of the primary star, we extract the calculated convective velocities ($v_{\rm conv}$) from our interior profiles when each star is at the maximum radial extent in its evolution. The convective timescale can then be found:

$$t_{\rm conv}[r] = \int_r^{R_\star} \frac{1}{v_{\rm conv}} {\rm d}r \qquad (2)$$

(Grichener et al. 2018). Similarly for each radius in the primary, we can determine the time required for the orbit to fully decay.