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Supplement of

A numerical model for duricrust formation by laterisation

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S1 Supplementary Material

S1.1 Varying τ in percolation mode

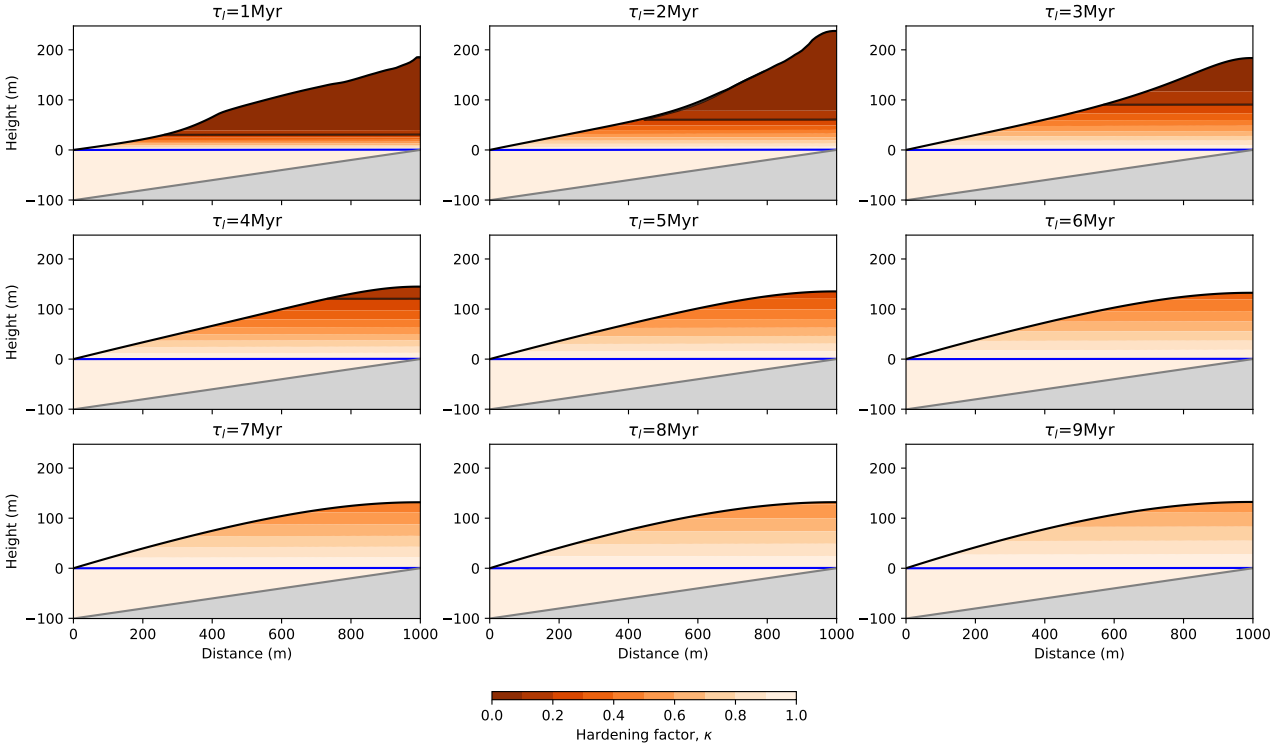

Figure S1. Model behavior with varying τ, the laterisation time scale, in the percolation mode ($C = -1$). Each panel corresponds to the model solution after 20 Myr of evolution with a different value of τ increasing from top left to bottom right.

S1.2 Varying U in percolation mode

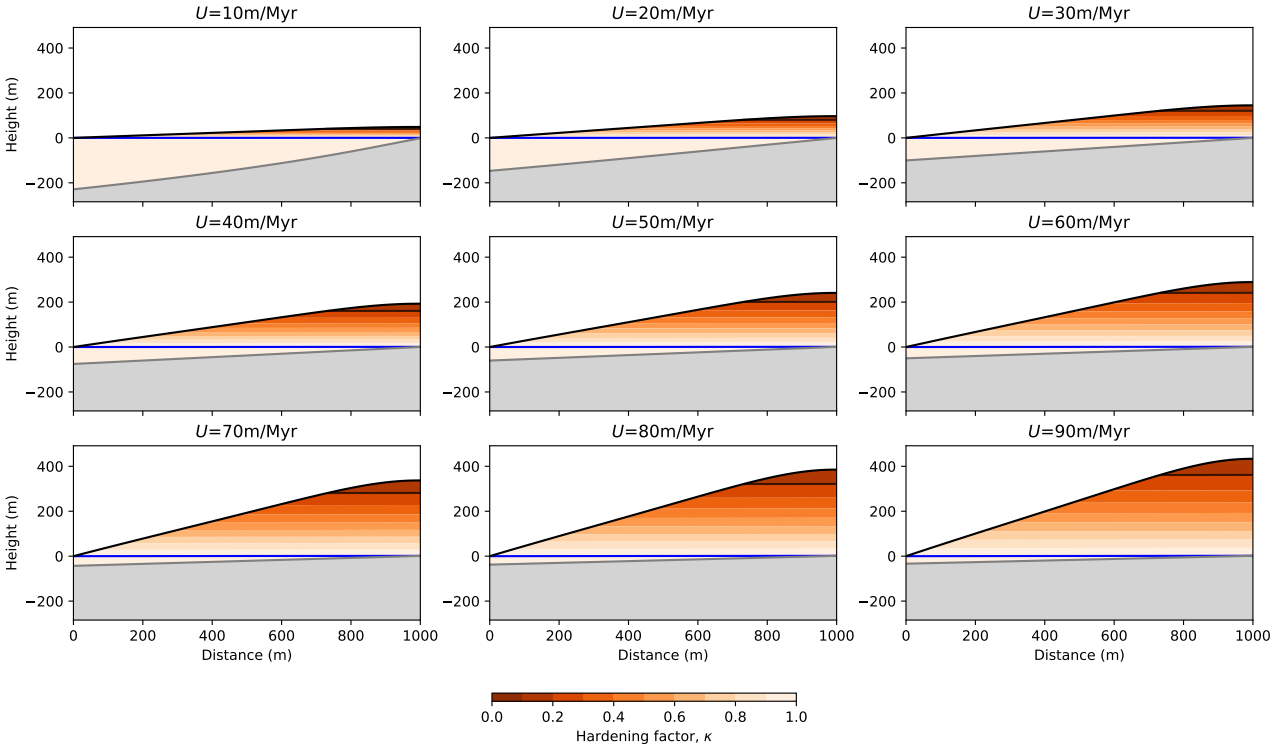

Figure S2. Model behavior with varying U, the uplift rate, in the percolation mode ($C = -1$). Each panel corresponds to the model solution after 20 Myr of evolution with a different value of U increasing from top left to bottom right.

S1.3 Varying U and K_D in percolation mode

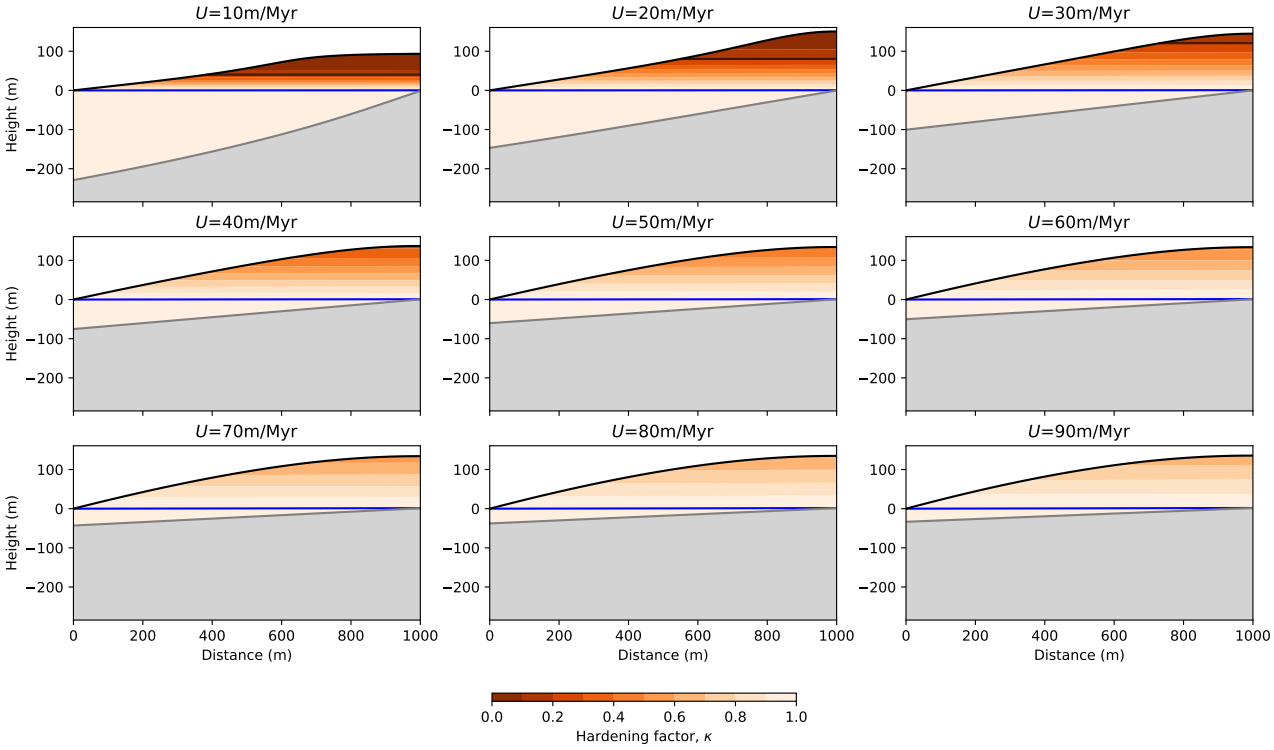

Figure S3. Model behavior with varying U, the uplift rate, and K_D, the surface transport coefficient in a constant ratio, in the percolation mode ($C = -1$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.4 Varying P in percolation mode

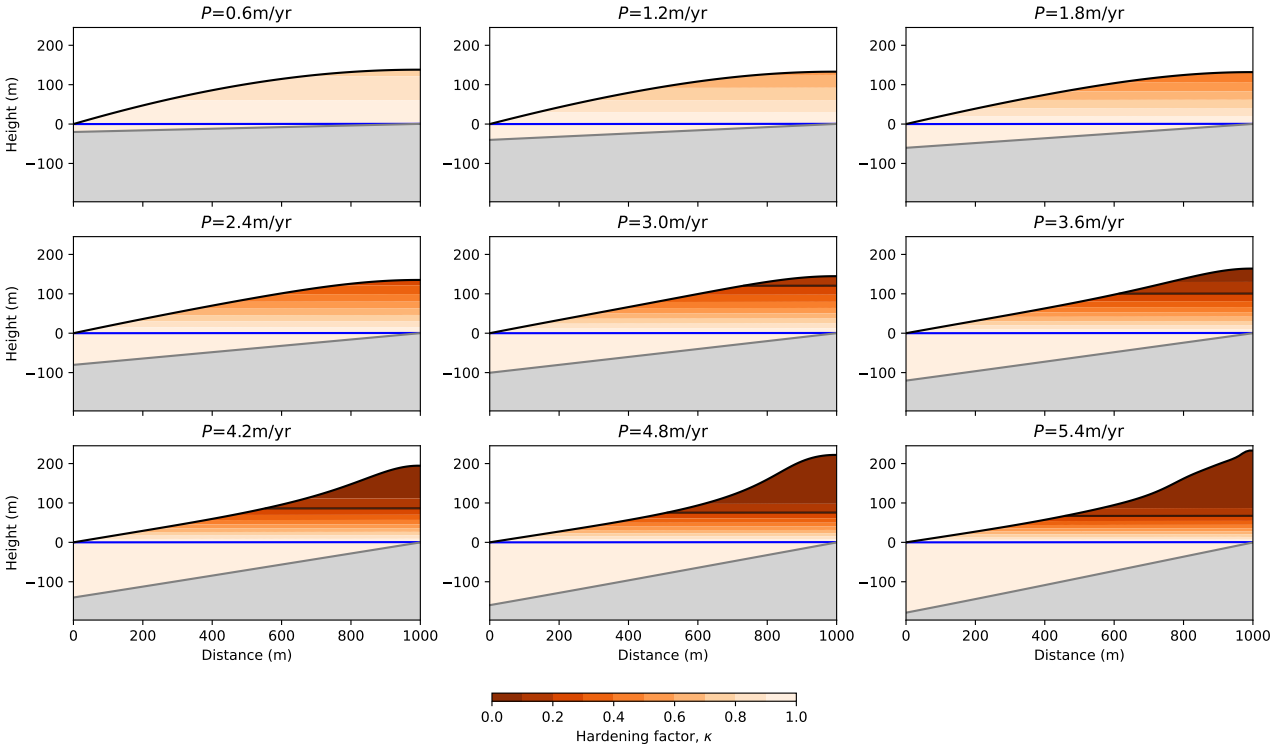

Figure S4. Model behavior with varying P, the precipitation or surface infiltration rate, in the percolation mode ($C = -1$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.5 Varying τ_m in percolation mode

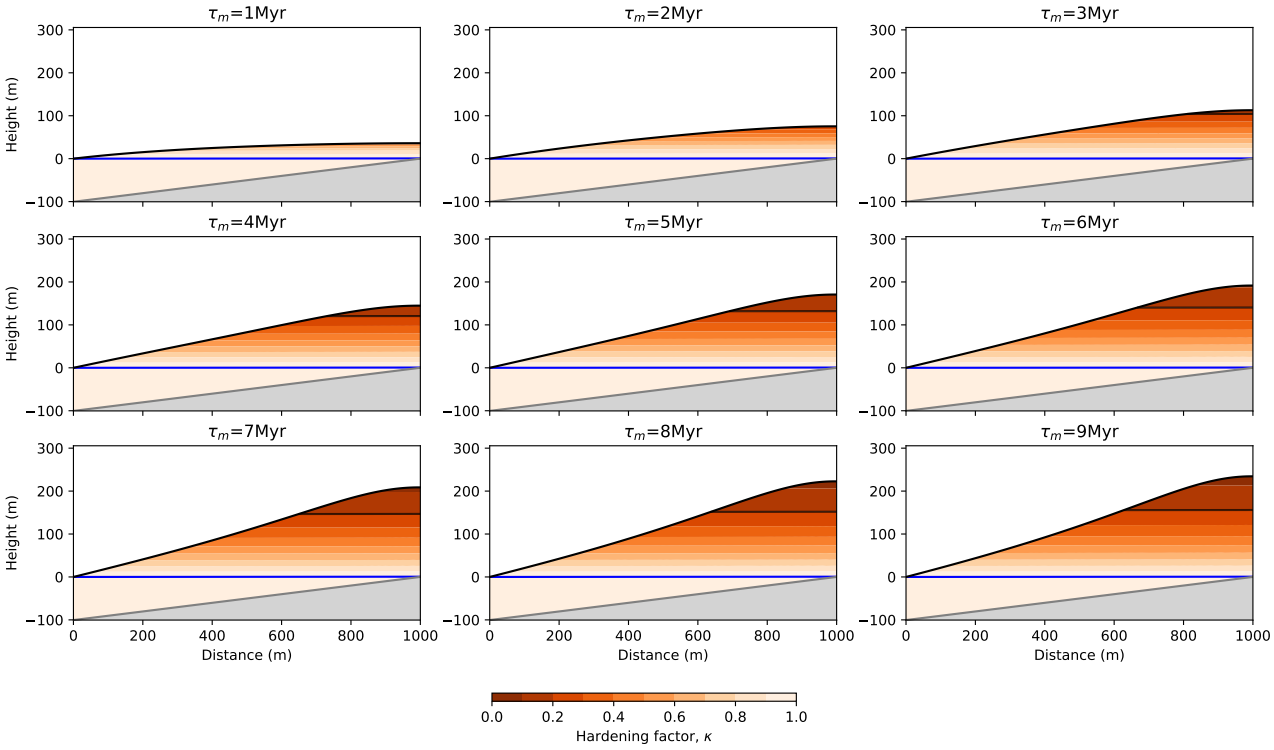

Figure S5. Model behavior with varying τ_m, the mass loss time scale, in the percolation mode ($C = -1$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.6 Varying τ in saturated mode

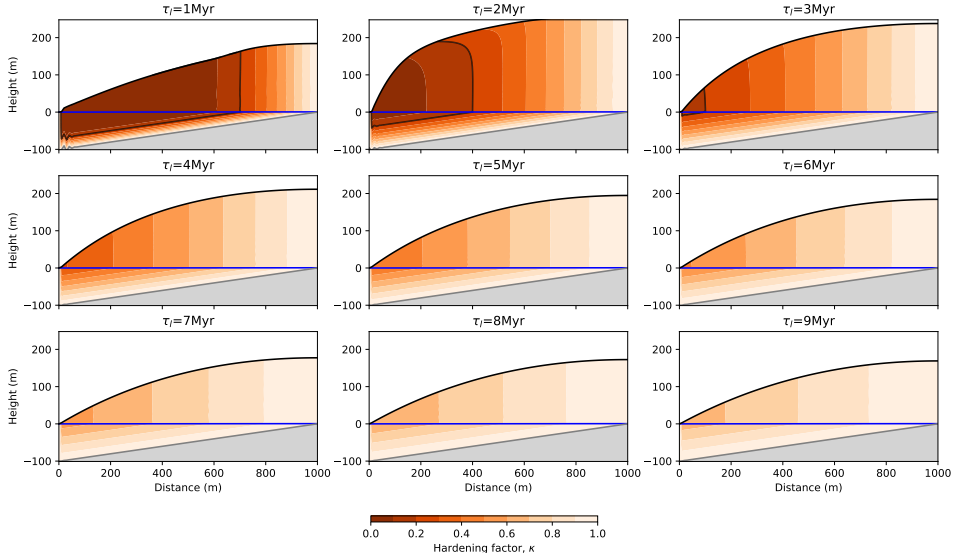

Figure S6. Model behavior with varying τ, the laterisation time scale, in the saturated mode ($C = 0$). Each panel corresponds to the model solution after 20 Myr of evolution with a different value of τ increasing from top left to bottom right.

S1.7 Varying U in saturated mode

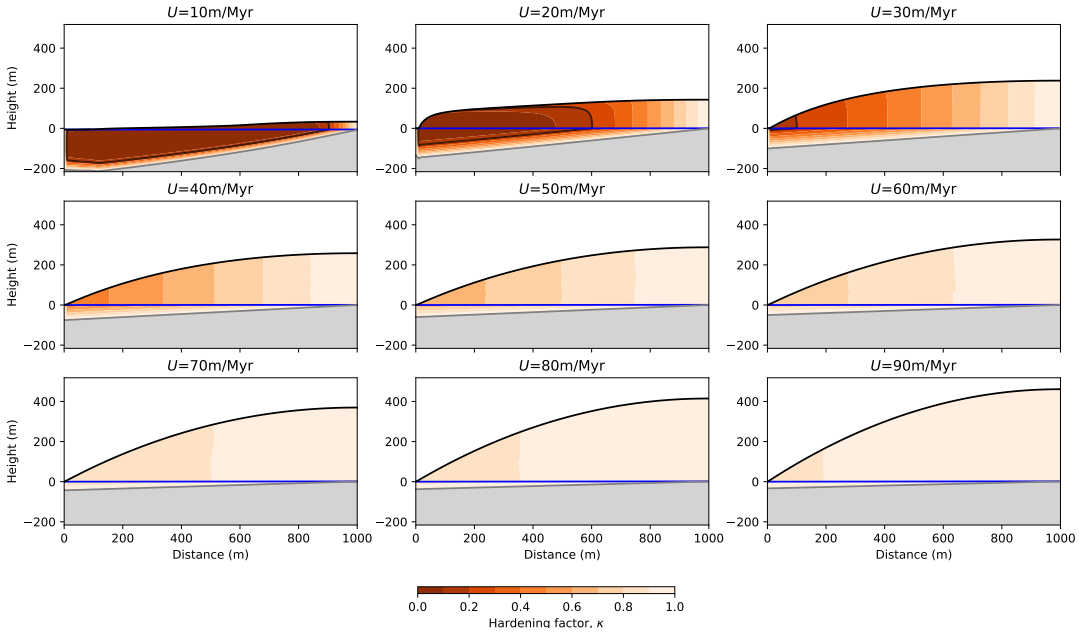

Figure S7. Model behavior with varying U, the uplift rate, in the saturated mode ($C = 0$). Each panel corresponds to the model solution after 20 Myr of evolution with a different value of U increasing from top left to bottom right.

S1.8 Varying U and K_D in saturated mode

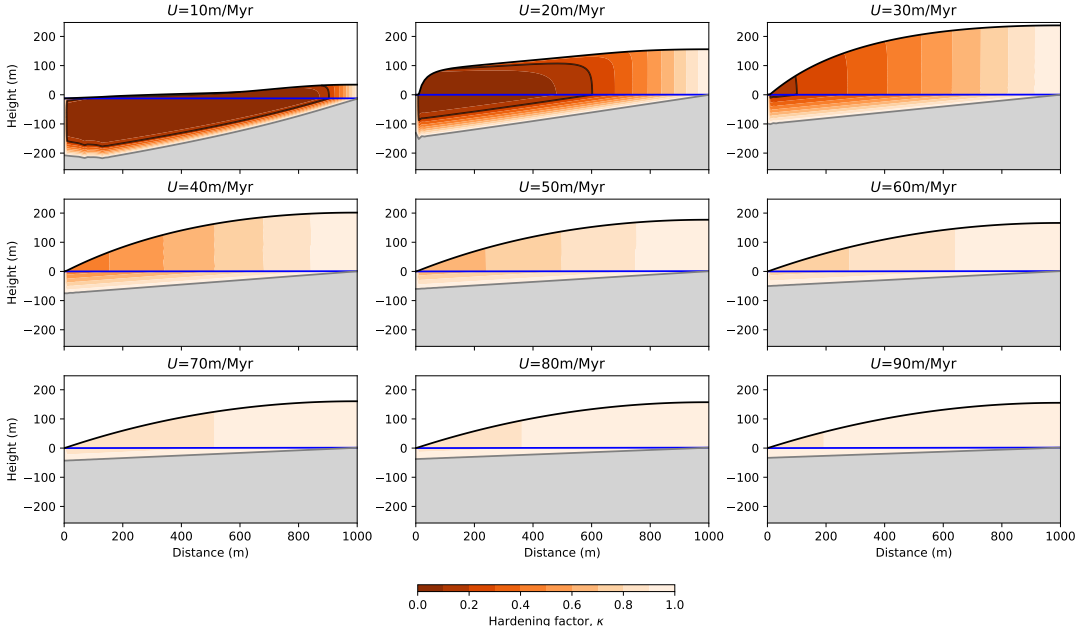

Figure S8. Model behavior with varying U, the uplift rate, and K_D, the surface transport coefficient in a constant ratio, in the saturated mode ($C = 0$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.9 Varying P in saturated mode

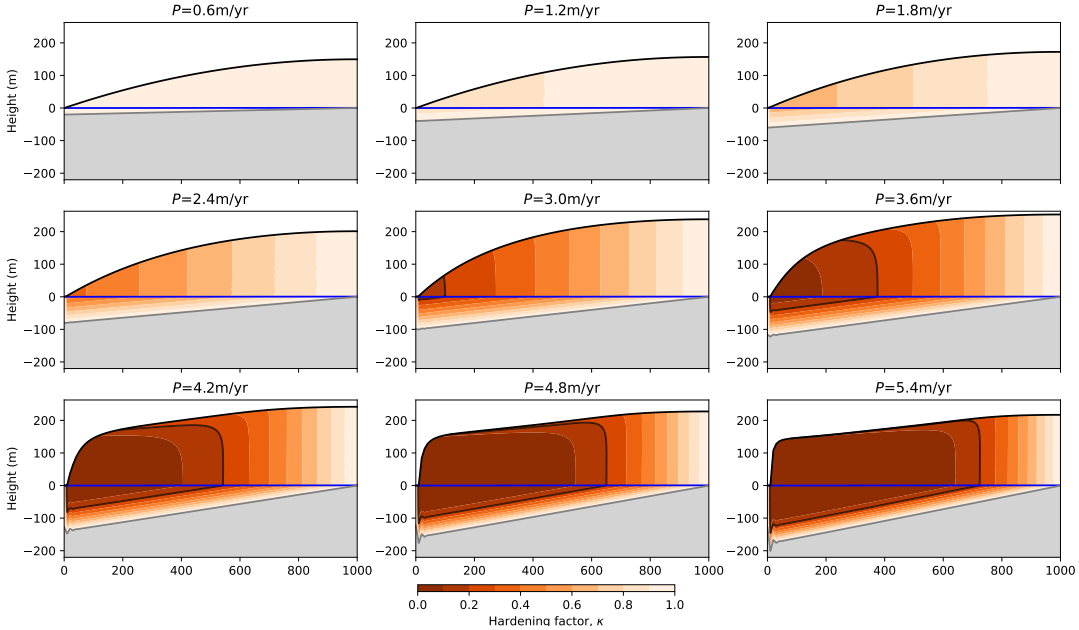

Figure S9. Model behavior with varying P, the precipitation or surface infiltration rate, in the saturated mode ($C = 0$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.10 Varying τ_m in saturated mode

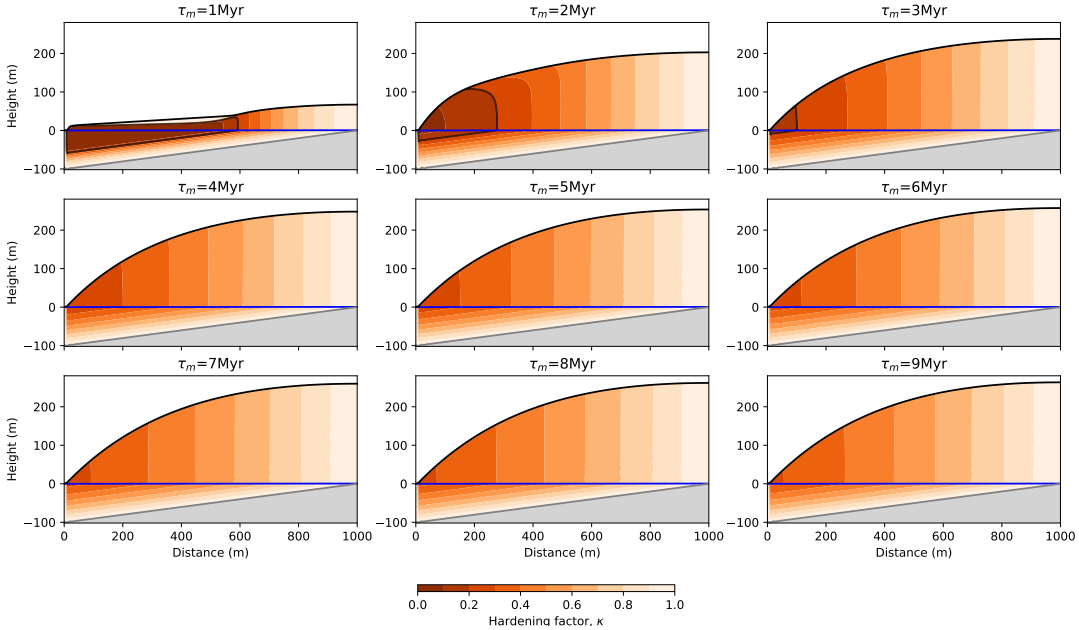

Figure S10. Model behavior with varying τ_m, the mass loss time scale, in the saturated mode ($C = 0$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.11 Varying τ in everywhere mode

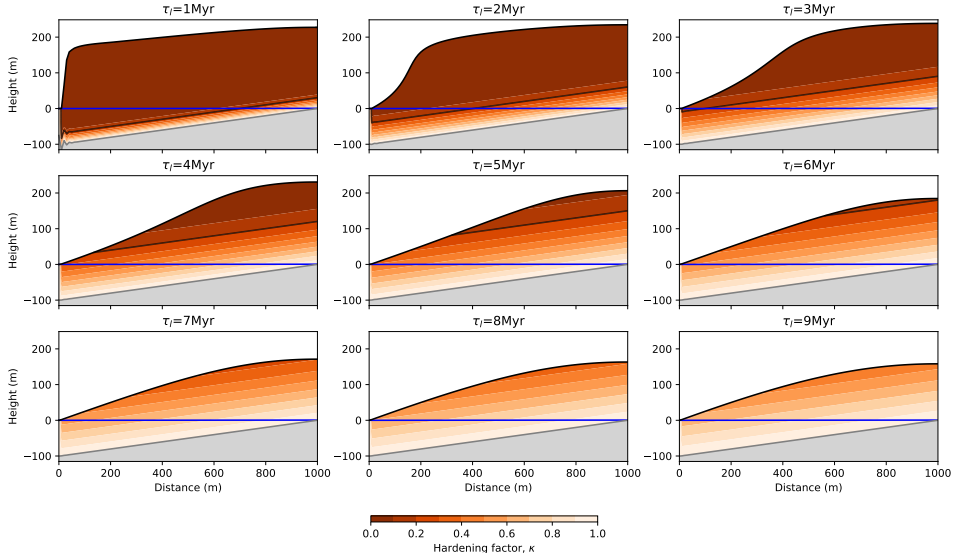

Figure S11. Model behavior with varying τ, the laterisation time scale, in the everywhere mode ($C = 1$). Each panel corresponds to the model solution after 20 Myr of evolution with a different value of τ increasing from top left to bottom right.

S1.12 Varying U in everywhere mode

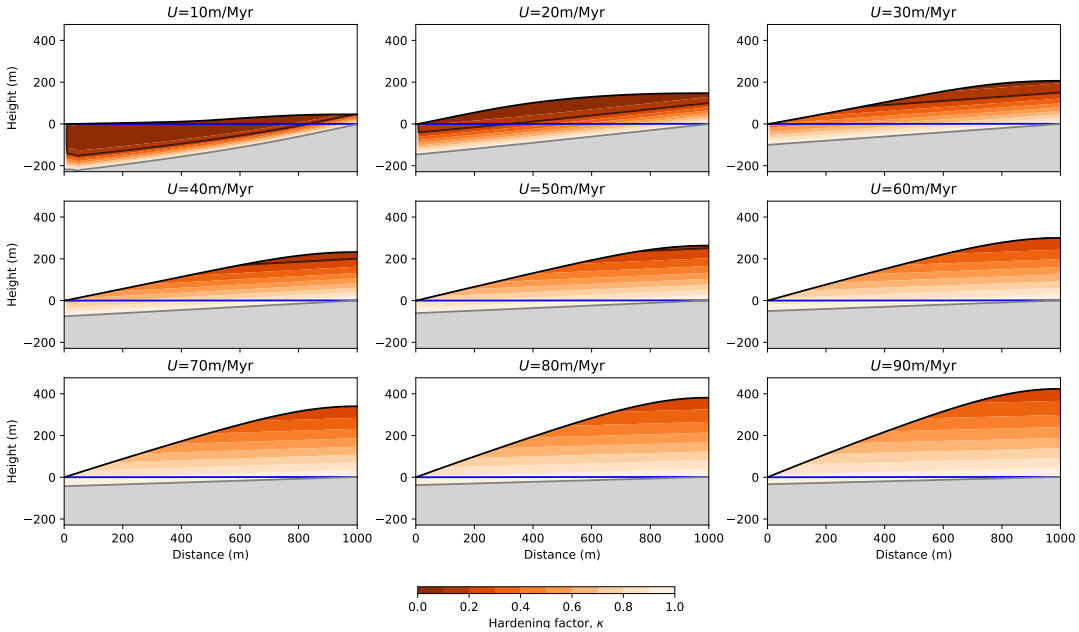

Figure S12. Model behavior with varying U, the uplift rate, in the everywhere mode ($C = 1$). Each panel corresponds to the model solution after 20 Myr of evolution with a different value of U increasing from top left to bottom right.

S1.13 Varying U and K_D in everywhere mode

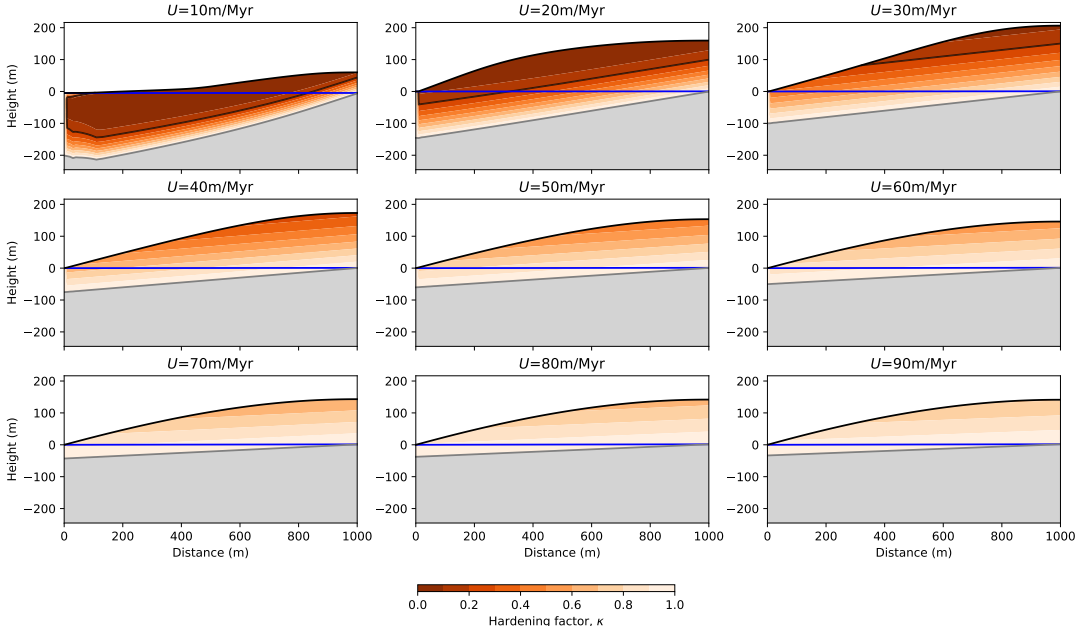

Figure S13. Model behavior with varying U, the uplift rate, and K_D, the surface transport coefficient in a constant ratio, in the everywhere mode ($C = -1$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.14 Varying P in everywhere mode

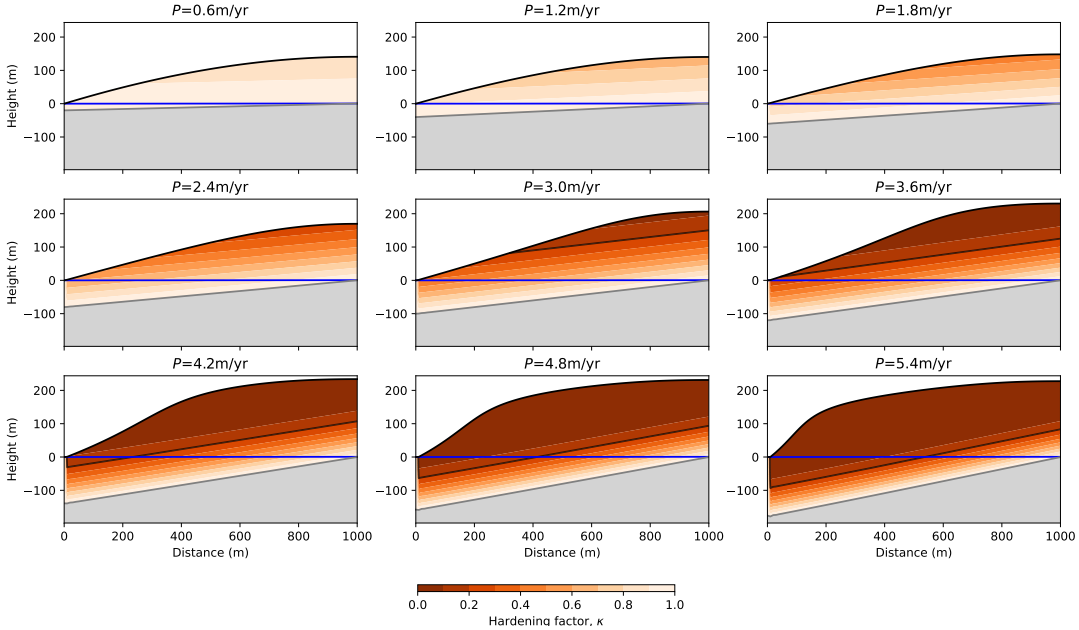

Figure S14. Model behavior with varying P, the precipitation or surface infiltration rate, in the everywhere mode ($C = 1$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.15 Varying τ_m in everywhere mode

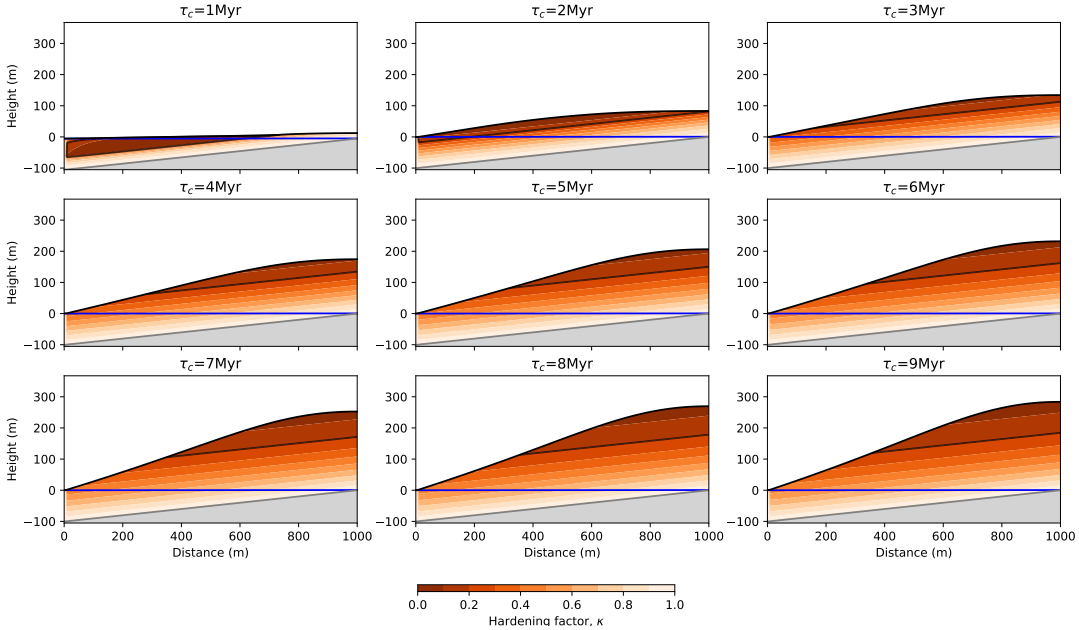

Figure S15. Model behavior with varying τ_m, the mass loss time scale, in the everywhere mode ($C = 1$). Each panel corresponds to the model solution after 20 Myr of evolution.

S1.16 Periodic variations in uplift rate in everywhere mode

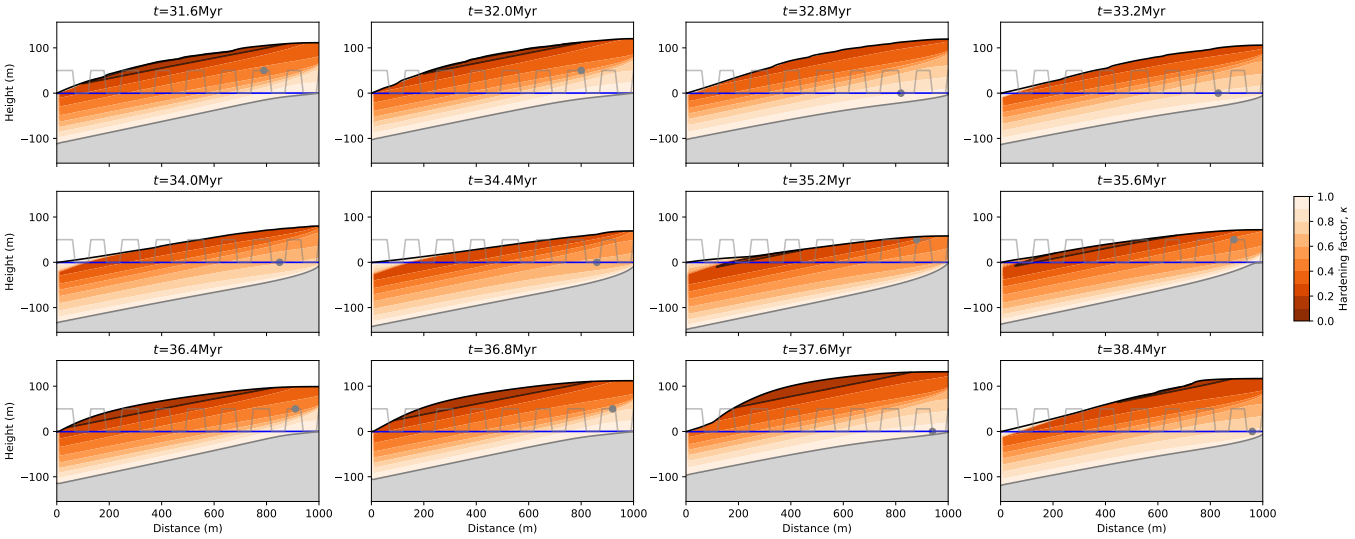

Figure S16. Varying the uplift rate by introducing periods of quiescence ($U = 0$) and active uplift ($U = 50$ m Myr^{-1}) of equal duration as in Figure 11 but with $C = 1$, i.e., in everywhere mode.

S1.17 Periodic variations in precipitation rate in everywhere mode

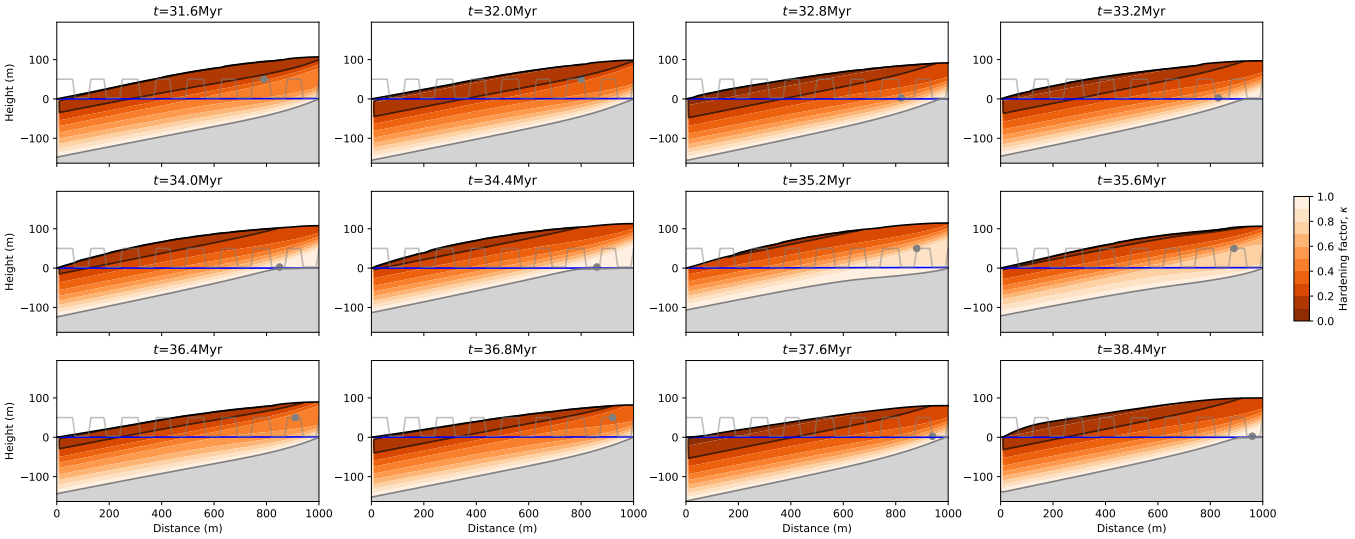

Figure S17. Varying the precipitation rate by introducing dry ($P = 0.5$ m yr^{-1}) and wet ($P = 7.5$ m yr^{-1}) periods of equal duration as in Figure 14 but with $C = 1$, i.e., in everywhere mode.

S1.18 Computed spectra

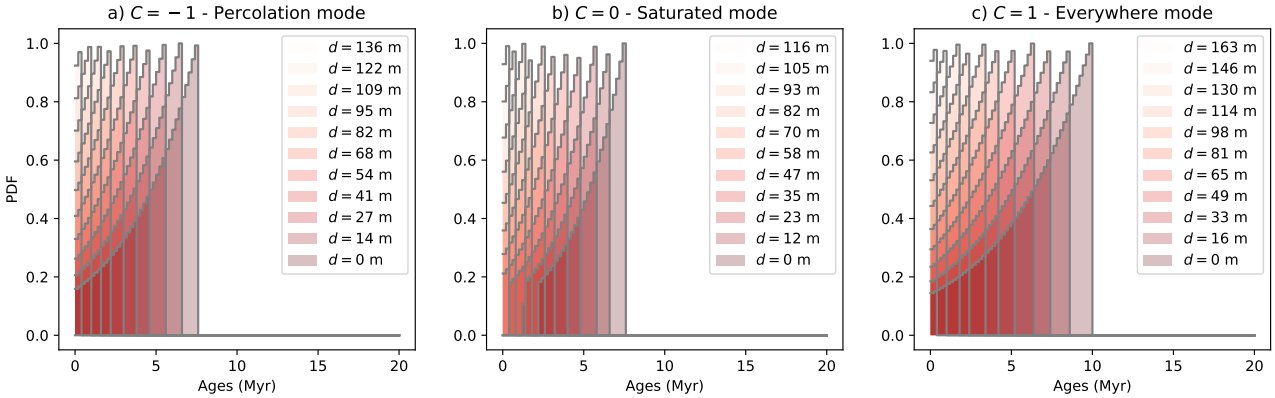

Figure S18. Computed age spectra along vertical profiles shown in Figure 16.

S1.19 Model evolution with LAT and WTF models combined

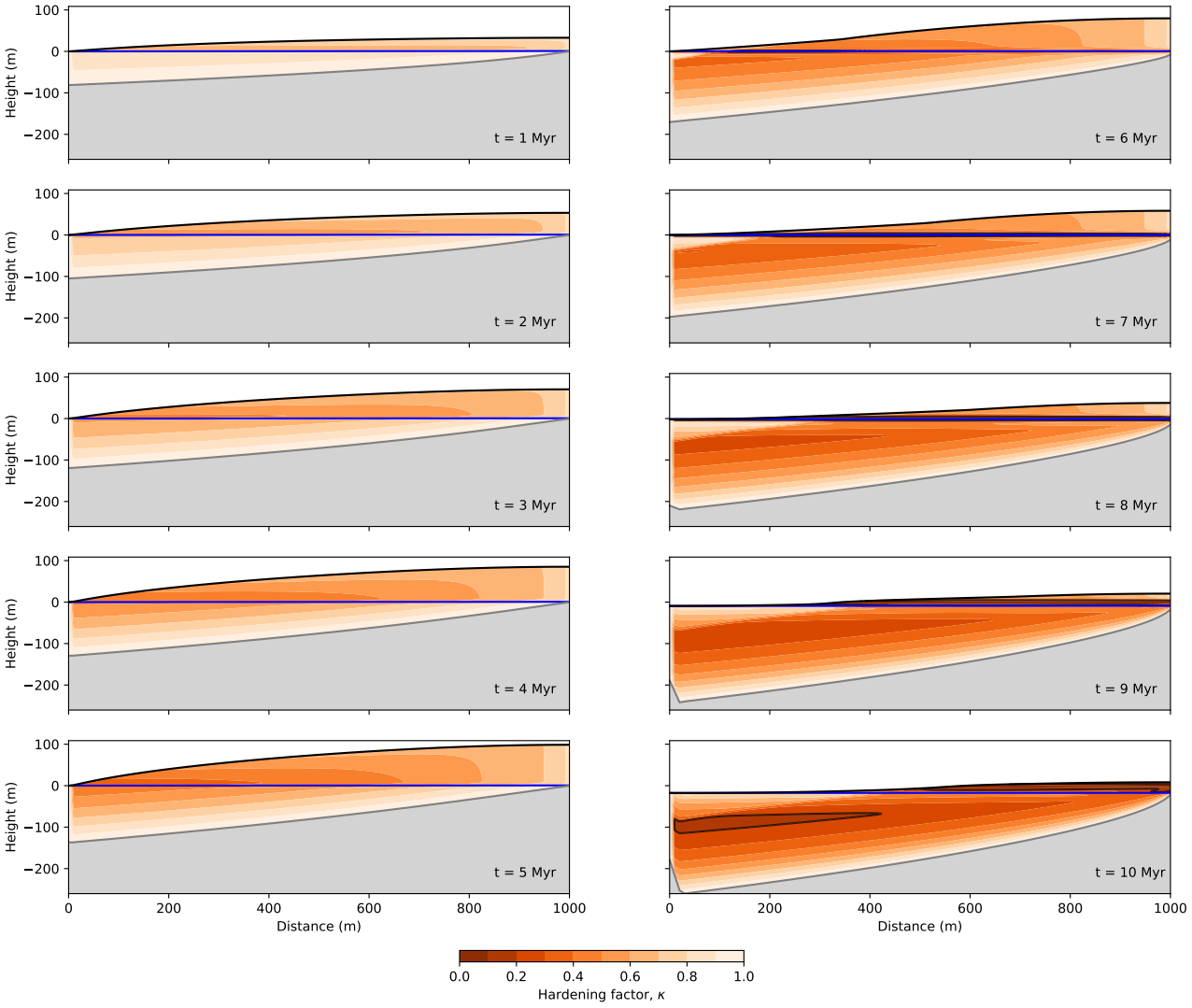

Figure S19. Evolution of a model experiment in which the LAT and WTF models have been combined. $U = 30$ m Myr^{-1} during the first half of the experiment and $U = 0$ m Myr^{-1} in the second half.