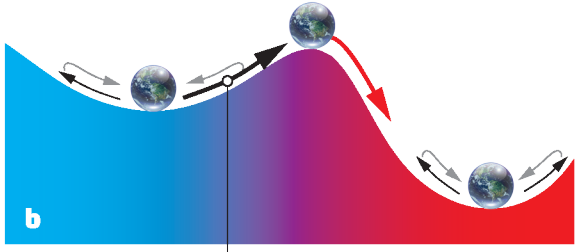
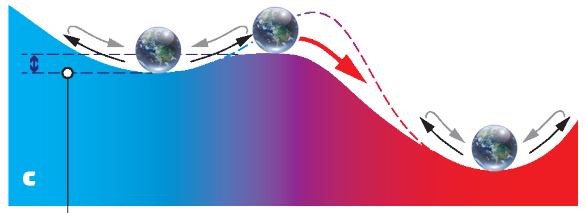


Change in Forcing
(a carbon-cycle perturbation driven by flood basalt volcanism)

Change in System Boundary Conditions
(resilience lowered due to a change in continental configuration and hence ocean circulation)



A greater perturbation to the system causes it to pass the tipping point



Change in stability lowers the resilience of the system such that the regulatory feedbacks no longer prevent the system passing the tipping point

Stability landscapes in which valleys represent stable states and the peaks between them represent tipping points. Regulating feedbacks that prevent perturbations from pushing the system beyond a tipping point keep the system in a stable state (a). In the climate system, changes in insolation are offset by changes in precipitation and carbon burial. The tipping point may be crossed if the system is perturbed even more, for example, it is subject to greater forcing as a result of internal amplifying feedbacks or an external driver (b), or if gradual changes in system parameters lead to a change in the stability landscape that lowers its resilience to perturbations (c). *Illustration by Rosalind Coggon*