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Fitting and extrapolation of transient behaviour in the presence of tipping points

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One of the key problems in climate science is to understand the asymptotic behaviour of a climate model, such as Equilibrium Climate Sensitivity (ECS), from finite time computations of transients of a model that may be complex and realistic. Typically, this is done by fitting to some simpler model and then extrapolating to an asymptotic state. But how do transients behave in the presence of tipping points? More precisely, how much warning can one get of an approaching tipping point? In this work we highlight an illustrative example showing how a good fit of a transient to a simpler model does not necessarily guarantee a good extrapolation, and discuss some other implicit assumptions that may arise when estimating quantities such as ECS.