Tipping elements and climate-economic shocks: Pathways toward integrated assessment

Supporting Information for "Tipping elements and climate-economic shocks: Pathways toward integrated assessment"

Robert E. Kopp,[1,2] Rachael Shwom,[2,3] Gernot Wagner,[4] and Jiacan Yuan[1]

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1. Text S1

Text S1. Supporting methods for Figure 2

The systems shown in Figure 2 are driven by the following equations:

$$y_{eq}(x) = A\Big(1 - 1/\Big[1 + \exp\Big(-\frac{x - x_0}{\sigma}\Big)\Big]\Big) - \beta x + c \quad (1)$$

$$x(y) = F(t) - \gamma(y - y_0) \quad (2)$$

$$\frac{dy}{dt} = \frac{y_{eq} - y}{\tau} \quad (3)$$

where $F(t)$ represents the exogenous forcing as a function of time (Figure 2a), y_{eq} represents the equilibrium response as a function of a state variable x related to forcing (Figure 2b), and y represents the realized response of the system. A scales the non-linear system response, σ scales the width of the sigmoidal equilibrium response, β is the linear response of the system to the state variable x, τ is the timescale over which the system approaches equilibrium, and γ represents the feedback of y onto x. In Figure 2c-d, $\gamma = 0$. In Figure 2e-f, $\tau \to 0$ so $y = y_{eq}$.

[1]Department of Earth & Planetary Sciences and Institute of Earth, Ocean & Atmospheric Sciences, Rutgers University, New Brunswick, NJ, USA

[2]Rutgers Energy Institute, Rutgers University, New Brunswick, NJ, USA

[3]Department of Human Ecology, Rutgers University, New Brunswick, NJ, USA

[4]Harvard John A. Paulson School of Engineering and Applied Sciences, Cambridge, MA, USA

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