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Evaluating attribution of annual runoff change: according to climate elasticity derived using Budyko hypothesis

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Climate elasticity of runoff is an important indicator for evaluating the effects of climate change on runoff. Consequently, we propose an analytical method to estimate climate elasticity according to the Budyko hypothesis. The procedure are: (1) based on the mean annual water-energy balance equation [Yang et al., 2008], deriving two dimensionless parameters (the elasticity of runoff to precipitation and potential evaporation); (2) combining the first-order differential of the Penman equation [Penman, 1948], deriving the elasticity of annual runoff to precipitation, net radiation, air temperature, wind speed, and relative humidity to separate the contributions of different climatic variables. According to this method, we calculate climate elasticity in hundreds of large basins across China and then evaluate runoff response to different climatic variables.