



## **Is there a relation between climate sensitivity and unforced variability in global mean surface temperature?**

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Simple stochastic models suggest that there is a relation between the statistical properties of unforced climate variability and the temperature response to radiative forcing. In the framework of stochastic linear response models there are general results that link the low-frequency limit in power spectral density of the climate noise to the equilibrium climate sensitivity (Rypdal et al. Climate 2018). More generally there are fluctuation-response relations that link scale-dependent climate sensitivity to the second-order statistics of the climate noise, and these results can in principle provide methods for constraining climate sensitivity. In this work we present analyses of the relation between unforced variability and the climate response using different types of experiments in the CMIP5 ensemble, and we discuss the challenges of constraining equilibrium climate sensitivity using data in the instrumental era. We also use simple models to analyze how “slowing down” associated with non-linear feedbacks and accelerated warming affect fluctuation-response relations.