Detecting unnatural global warming in the context of long-term persistence

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Various methods suggest that the current warming spell (observed in the instrumental record between 1850 and 2006) is well above levels of natural variability. However, recent analyses, using a background of long-term persistence (LTP), have come to a range of different conclusions. I use a statistical approach to resolve the various viewpoints. I estimate the significance of the rise in average global temperature through a $1/f^{\nu}$-noise model of global temperature ($0 \leq \nu \leq 2$), parameterized on the basis of paleo-climate reconstructions. A novel re-sampling procedure controls for inaccuracies of the spectral exponent (ν). The inclusion of non-stationary LTP significantly raises the probability of a natural explanation. Even so, natural variability alone cannot plausibly account for the current trend in global temperature, unless all current reconstructions are underestimating natural variance by at least a factor of four.