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Multi-model detection and attribution of extreme temperature changes

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Recently an increasing number of studies have detected anthropogenic influences on extreme temperature changes during the latter half of the 20th century at global and regional scales. Most studies were, however, based on a limited number of climate models. A very recent study has used multi-models but temporal coverage was relatively short as 1961-2000. Here we conduct a more comprehensive analysis by using daily datasets from 12 climate models and considering a longer period of 1951-2000. We compare area averaged long-term changes in annual extreme indices for warmest day and night (TXx and TNx) and coldest day and night (TXn and TNn) obtained from HadEX observations with those from multi-model simulations integrated under anthropogenic-only or natural plus anthropogenic forcings. Results show that anthropogenic signal is detected for TNx, TXn, and TNn at both global and continental scales but less robustly for TXx, well consistent with previous findings. The detected anthropogenic signals are also found separable from natural forcing influence (solar and volcanic activities) at global scales and more limitedly at continental scales.