Overestimated global warming in the past 20 years

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The current generation of climate models overestimate the observed global warming over the past 20 years, and do not reproduce the observed slowdown, or "hiatus", in global warming over the past 15 years. One possible explanation for this discrepancy is internal variability occurring differently in observations than in models. Statistical tests, however, indicate a low probability of this being the case. Another possible driver of the difference between observed and simulated global warming is increasing stratospheric aerosol concentrations. Other potential factors are a missing decrease in stratospheric water vapor (whose processes are not well represented in current climate models), errors in aerosol forcing in the CMIP5 models, a bias in the prescribed solar irradiance trend, and the possibility that the transient climate sensitivity of the CMIP5 models could be on average too high. Ultimately the causes of this inconsistency will only be understood after careful comparison of simulated internal climate variability and climate model forcings with observations from the past two decades, and by waiting to see how global temperature responds over the coming decades.