



Contribution of internal variability to SST trends and the impact of increased resolution

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The causes of the recent reduction in the global warming rate of the early 2000s can be related to external processes of the climate system, such as volcanic eruptions and aerosol emissions, or to internal processes, related to a rearrangement of the heat storage inside the system. Here, we explore the processes that control the internal variability and the impact of increased model resolution on the mechanisms involved. We use 100-year long HadGEM3-GC2 simulations with constant present day forcing and with high resolution ocean (~30km), coupled with (i) low (~120km) (ii) medium (~60km) and (iii) high (~30km) resolution atmosphere. We investigate the relationship between globally averaged SST trends and ocean heat uptake, ocean heat content changes at different depths, the top-of-the-atmosphere fluxes, as well as the different components of the surface heat fluxes. We explore the spatial patterns associated with positive and negative SST trends, the changes in ocean heat transports at different ocean depths, and the relative roles of each ocean basin in storing or removing heat. We finally identify and discuss the impact of increased model resolution on internal climate variability and the SST trends.