

Reassessment of natural forcing effects to global warming

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It is well recognized that the average surface temperature of Earth has increased since about 1900. According to the Forth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC), most of the warming since the mid-20th century is very likely due to the increase in anthropogenic greenhouse gas concentrations (IPCC, 2007). There is increasing evidence from paleoclimatic studies, however, that the Earth's surface temperature significantly fluctuated without anthropogenic effect over the last few millennia. In the AR4, the IPCC reviewed a number of studies reconstructing temperature variation over the last 1,300 years and referred to relatively warm conditions occurred in the medieval period, although the warmest is apparent in the 20th century.

If the current global warming is attributed not only to anthropogenic carbon dioxide emission but also to natural forcing effects, evaluating the contribution of the natural effects is very important to predicting future climate change. In this study, we reassess the natural forcing effects to the past and recent global warming, and estimate their impact on the future temperature change.