Atmos. Chem. Phys. Discuss., 13, C5338–C5340, 2013
www.atmos-chem-phys-discuss.net/13/C5338/2013/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Anthropogenic forcing of shift in precipitation in Eastern China in late 1970s" *by* T. Wang et al.

Anonymous Referee #1

Received and published: 30 July 2013

This study used a coupled AOGCM to decipher the causes of interdecadal summer precipitation shifts in Eastern China. The authors stated that the westward shift of the WPSH induced by rapidly increasing GHGs led to increasing precipitation in the YRV, while the reduced summer land-sea thermal contrast caused by aerosol cooling contributed to weakened EASM and drought in Northern China. Together, the effects of GHGs and aerosol led to the interdecadal shift in Eastern China in the 1970s. Overall, this paper contains some interesting parts, but the results/conclusions are not convincing. It seems that some statements in the manuscript were not based on the facts shown in the figures, but were based on the desire of the authors. Additionally, whether the interdecadal shift in Eastern China in the 1970s was caused by GHGs and aerosols or the internal climate variability was not clearly analyzed. I have some comments,

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

which the authors need to address adequately and faithfully, if they wish their paper to be considered for publication in ACP. Details of my comments are listed below:

1) Four sets of historical simulations (ALL150, ANT150, NAT150 and CTL150) covering 1850-1999 were carried out in this study. The effect of greenhouse gases (GHGs) and the tropospheric sulphate aerosol were considered together in ANT150. There were no specific simulations to isolate the impacts of GHGs and aerosols. Your Fig.10d clearly suggested an increasing land-sea thermal contrast (stronger warming in the land compared to the ocean), which does not support the dimming effect of the aerosols and reducing land-sea thermal contrast (see page 12007, last paragraph). The slightly cooling in land shown in ALL150 is actually caused by natural forcing (NAT150, see Figs. 10c and 10e). Therefore, your statements and conclusions that the cooling effect of the anthropogenic aerosols led to weakened EASM and drought in the Northern China is incorrect, or at least is not supported by your results.

2) Based on your reasoning, the drought in Northern China and the flood in the YRV should persist in recent 10 years given the rapid increases in GHGs and aerosols. However, the 'southern flood and northern drought pattern' was reversed in recent years. Similar precipitation shifts like the 1970s can be found in the early half of the twentieth century and the past 500 years (Qian and Zhu, 2001, Climatic Change, 50, 419-444; Zhu and Wang, 2002, GRL, 2001GL013997; Qian et al., 2003, Clim Dyn, 21, 77-89). Those shifts occurred when the impacts of GHGs and aerosols were weak. Therefore, the interdecadal shift in Eastern China in the 1970s may be caused by internal climate variability not the anthropogenic forcings.

3) The observations from 740 weather stations contain data from 1951 to nowadays and the CRU data was updated to 2010. Why you restrict your analysis to the period of 1958-1995? Can you obtain the same conclusions by including the data in recent 10 years?

4) Page 12005, 2nd paragraph. Did you calculate the correlations between observa-

ACPD

13, C5338–C5340, 2013

tions and the modeled precipitations after 3-yr running means (see the caption of your Fig. 6)? If so, you should consider the reducing degree of freedom in the observed and modeled precipitation time series when testing the significant level of their correlations.

5) Fig.11. You are analyzing the EASM and the anomalous temperature pattern in Eastern Asia. So it is more appropriate to analyze the surface air temperature anomalies averaged over Eastern Asia.

6) To better compare the land-sea thermal contrast, it might be better to include the observed SST changes in Figs. 10ab.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 11997, 2013.