**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Impact of the East Asian summer monsoon on long-term variations in the acidity of summer precipitation in Central China" by B. Z. Ge et al.

Anonymous Referee #1

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General comments: In this paper, the authors investigate the impact of East Asian summer monsoon on the variations of acidity in China. The target of this paper is quite interesting and appropriate to this journal. It seems this paper should be published in ACP, but I think the authors should do more analysis of data (especially model output) for the evidence of their results.

In addition, I am wondering why the authors use off-line model output for the analysis of relationship between precipitation and aerosol property. The concentration of aerosols might strongly affect to the cloud properties and precipitations via indi-

rect effects. On-line models such as WRF/Chem should be useful for the analysis of precipitation-aerosol interactions.

Detailed comments: 1. Page 19596, line 17 : Please write clearly the period for analysis. It seems the authors use data from June to August, because East Asian summer monsoon has been used for the analysis in section 3.2.1. Is it true?

2. Page 19597, section 2.2 : The authors should show the figure for model domains. Are Fugures 8, 11-12 from the output of domain 2?

3. Page 19597, section 2.2 : The latest version of CMAQ is 4.7.1. Why did the authors use version 4.4? It seems the concentration of nitrates is improved in the latest version by considering N2O5 reactions and NH3 emissions (cf. http://www.cmascenter.org/conference/2010/slides/bhave_simulating_annual_2010.ppt). Figure 1 shows that the concentration of nitrates calculated by the model tend to underestimate in summertime by the factor of 10 or higher. The deficit of nitrates clearly affects to pH, and the authors should explain the cause of this underestimation of nitrates, or focus on the concentration of sulfate, not pH.

4. Page 19600, section 3.1.1 : The authors should show how to make the spatial pattern of VWA pH from the observational data of 74 stations. Was the spatial pattern simply made by the distance from the stations?

5. Page 19602, section 3.2.1 : There might be a relationship between the pattern of pressure system in East Asia and EAMI, but it is not clear that there is a clear relationship between the precipitation in Central China region and EAMI. It seems there is a negative relationship between precipitation in Central China region and EAMI in June and August, and almost no correlation in July (cf. http://www.lasg.ac.cn/staff/ljp/data-monsoon/EASMI.htm). This negative correlation can explain the high precipitation in 1998, in spite of low EASM in that year. I wonder why the authors shows the relationship between EAMI and pH.

6. Page 19604, section 3.2.2 : The authors mentioned about 'teleconnection' between pH in Central China and rainfall in the MLYR, but it seems this result is not so surprising. In summertime, northerly wind is dominant in the Central China region. If the humidity is low in Central China region, ph can be higher because of low activity of wash out process. That air mass will be transported from the Central China to MLYR by the northerly, and finally, precipitation in MLYR might be low. Why you want to mention this 'teleconnection'?

7. Page 19616, Figure 1: The caption of figure 1 is insufficient. What does 'sulfate and 2000-2003' mean for?

8. Page 19617, Figure 2: There is no stations in Spratly islands. Why did you show these islands in the map? (also in Figure 3-5, 8-12)