

## ***Interactive comment on “Variability in snow cover phenology in China from 1952 to 2010” by C. Q. Ke et al.***

### **Anonymous Referee #2**

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This manuscript presents the spatio-temporal snowcover data of China on the timing (snowcover onset and end dates: SCOD and SCED) and duration (snowcover days: SCD) and analyses their relationships with air temperature and arctic oscillation. While substantial datasets were used, the data were not well interpreted and analysed, and no significant conclusions were drawn. The results and conclusions are even suspicious considering the way they treated the data. I suggest to reject and resubmit. Given this recommendation, I would only give some major comments.

1. The data. “According to the Specifications for Surface Meteorological Observations (China Meteorological Administration, 2003), an SCD is defined as a day when the snow cover in the area fulfils two requirements: at least half of the observation field is covered by snow, and the minimum snow depth is 1 cm. For any day with at least half of

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the observation field covered by snow but with snow depth of less than 1 cm, the snow depth is denoted as 0, i.e. a thin SCD.” (P4475: Lines 19-24). “. . .in western China, station density is low, and the observation history is relatively short... If all stations with short time series are eliminated, and thin SCDs are not taken into account, the spatial representativeness of the dataset would be a problem. Therefore, a time series of at least 30 years is included in this study, including those thin SCDs.” (P4476: Lines 3-8). In my opinion, however, including those thin SCDs is more problematic than excluding them. As far as I know, the snow cover observations are commonly conducted at 8:00 (Beijing time) in the morning, and most of the thin snow covers correspond to the snowing events in which snow exists only several hours. This is also the case for many SCDs with snowcover depths not less than 1 cm. Except for several small regions, there have been not much snow in China during recent three decades. In this sense, there have been very few snow covers, but several snowfalls per year in a considerably large area of China (south, central and north China, and even a large area of western China) in recent ~30 years. Therefore, for these areas, it may make more sense to conduct statistics of precipitation phase rather than the SCDs.

2. Some basic information on the spatio-temporal distributions of snowcover water equivalent or snowcover depth should be provided. Readers need these information for judgements.

3. Analysis. Analysis is lacking on the climatic and physical interpretations/processes of the statistical results throughout the manuscript.

4. Definition and analysis of heavy-snow and light-snow years (Sections 3.1.2 and 3.2.1). A heavy-snow year or a light-snow year was determined in terms of the relative time duration of SCDs of a region. This is logically problematic. Authors should know that, for a given station, a longer period of SCDs does not necessarily mean a year of more snowfall.

5. Consistency of data. As far as I know, for the Specifications for Surface Meteorolog-

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ical Observations of China, there have been several versions (1951?, 1980, 2003 and 2007?). There are some differences in the criteria between the versions (e.g. minimum snow depth of 0.5 cm in the 2007 version?). This should be addressed.

6. The tilte. Authors used the word “phenology”. However, except the SCDs, SCODs and SCEDs, they did not analyze any of the important snow properties such as density. I would suggest not to use the word.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 4471, 2015.

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