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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Drought evolution characteristics and precipitation intensity changes during alternating dry-wet changes in the Huang-Huai-Hai River basin" *by* D. H. Yan et al.

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We would like to thank the referee for the helpful comments and suggestions concerning improvement to this paper. A point-by-point response to the comments is as follows:

Specific comments

No.1: Drought-flood abrupt change event caused by global warming is one of the extreme weather events. Drought-flood abrupt change is a natural phenomenon, which refers to a region or a river basin suffered from a long term drought, suddenly encounter

concentrated heavy rainfall, leading to torrential flood, water level steep rise, water invasion and waterlogging. The reason may be related with significant abnormal atmospheric circulation system caused by the El Nino and La Nina phenomena, water vapor transport and geographic location, etc. Since the late 1990s, the world entered a simultaneous occurrence phase of severe flood and drought disasters. The first example is the phenomenon of a sharp turn from drought to flood in the middle and lower reaches of Yangtze River. According to the statistic datum released by the state flood control and drought relief headquarters office, severe spring droughts in the middle and lower reaches of Yangtze River occurred in 1978, 1981, 1986, 1994 and 2000, and heavy rainfall with a wide scope ever occurred after drought period. However, the severe drought with a long time, wide scope and higher intensity occurred from April to May in 2011. Meanwhile, an abrupt heavy rainfall process occurred in June, a sharp turn from drought to flood is rare in history. The second example is the phenomenon of a sharp turn from drought to flood in the southwest China including five provinces of Guangxi, Yunnan, Guizhou, Sichuan and Chongqing. The severe drought from October, 2009 to March, 2010, accounting for 83% of the national drought area, occurred in the southwest China, especially in the stony desertification areas of the northwestern Guangxi, the most of Yunnan and the western Guizhou. Since wet season in summer (at the end of May), heavy rainfall process occurred in these areas, which lead to geological disasters such as torrential floods and debris flow, etc. Firstly, the sudden disasters from drought to flood can easily cause casualties. There is almost no attention to flood control due to illusion in drought prophase. Under the condition of an off-guard situations, the occurrence of concentrated heavy rainfall cause torrential floods, landslides and debris flows, etc., which pose a serious threat to the life security. Secondly, the sudden floods can easily cause great economic losses. After the occurrence of sharp turn from drought to flood, the water level steep rise, submerged farmland and urban waterlogging, etc. can cause great economic losses. From the perspective of flood control and drought resistance management, the managements of drought and flood in China are now a separate management mode, which is not suitable to deal with the

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frequent, sudden, and severe extreme events of drought-flood abrupt change. Therefore, traditional management idea needs to be changed. That is the transformation from separate management mode to uniform management on drought and flood (waterlogging), focusing on strengthening comprehensive response for the drought-flood abrupt change events in order to reduce the heavy losses of continuous disasters. The Huang-Huai-Hai River basin in this paper is the area with frequent occurrence of drought and flood. Seeing from the situations of drought and flood (waterlogging) in the study area, the drought more occurred in the Yellow River and Hai River basins, while both drought and flood more occurred in the Huai River basin. Furthermore, the Huang-Huai-Hai River basin is also a political, economic and cultural center in China, which has an important position in the layout of national development strategy. The aim of this study is to reveal the change laws of precipitation intensity after the drought occurrence with different magnitudes in various divisions of the river basin, and further research on the possible formation mechanism in order to better guide the overall layout of flood control and drought resistance, and the policies of disaster prevention and mitigation in the Huang-Huai-Hai River basin.

No.2: The translation for vocabulary is not correct in our paper, which may cause the referee misunderstand. We improperly translate “times” into “frequency” such as “occurrence frequencies” in Figure 4 and “drought frequency” in Table 6, while drought frequency calculation is not involved in our paper. The first precipitation intensity after a drought period is analyzed with the Pearson-III frequency curve, the example size is completely satisfied the statistic requirement.

No.3: At present, there are more drought assessment indexes (or indices) with specific applied scope and requirement. There is no uniform criterion for drought evaluation. The consecutive rainless days drought magnitudes standard was released by the Ministry of Water Resources of the People’s Republic of China in 2008. The standard is suitable to seasonal time scale drought assessment and monitoring. The criterions are determined in terms of main crops drought tolerance experiments for a long time in

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different rain-fed agriculture areas of north and south China. The consecutive rainless days drought standard with a wide application in the study area can better indicate agriculture drought situation in the region or river basin. Therefore, the research on agricultural drought magnitude is carried out by using the consecutive rainless days in view of the practicality, connotation and wide application on this index. We mentioned that the Hai River basin which is in "drought 9 years out of 10". It mainly reflects that the occurred frequency of drought is higher in Hai River basin. The Hai River basin is located in the East Asian monsoon climate region of the temperate zone, but it is not located in the dry region.

No.4: Agree with the referee's suggestion. We will add the major progress into the relevant portion of the paper and explain the result.

No.5: Agree with the referee's suggestion. According to the mentioned problems, we will carefully check and revise the abstract, references and figures in the paper. The detailed contents are seen in the revised manuscript.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 2665, 2013.