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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Comparison of methods for separating flood frequency of reservoir by sub-seasons" *by* J. Li et al.

J. Li et al.

jqli6688@163.com

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Dear editor, Many thanks for your hard work with the manuscript -hess-2015-378. Please find the final response and the revised manuscript(revision shown with yellow words) of "Comparison of methods for separating flood frequency of reservoir by sub-seasons" with the attached files.

Best regards.

Jiqing LI

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 10431, 2015.

Final response of "Comparison of methods for separating flood frequency of reservoir by sub-seasons"

General comments:
In this paper, three methods are used to determine the frequency of flows in the flood prone period (i) during six month of a year, (ii) divided into ten day sub-periods, (iii) above a chosen set of thresholds into a reservoir. The three methods consist of: (i) a curve fitting method using the von Mises (circular normal) distribution, (ii) a conventional ranking method and (iii) a more complicated fractal method to find the self-similarity of the three largest floods in each sub-period.
Authors' response:
Thank you for these comments, which represent a good summary of the methodology presented in the paper. However, A POT (Peaks-Over-Threshold sampling) method was used to select samples for the mixed Von Mises distribution method, which achieves the independence of flood sample and makes up for short flood records. Therefore, results based on POT method can reflect the rules of flood occurrence.

General comments:
No time series analysis is performed and there is limited discussion of reservoir levels in conjunction with inflows.
Authors' response:
1) In this paper, we try to find out the pattern or the rule of the flood timing of the research reservoir, so we have recorded the first three largest daily inflows of each year in the 43-year research period and thus there are 43 groups of the three largest daily inflows.
2) Discussion of reservoir levels in conjunction with inflows is presented in section 3.2(Analysis on flood control levels of different sub-seasons for Hongfeng reservoir) and accordingly conducts flood regulation calculation (Table 4) under three different regulation strategies (open-discharge strategy, strategy for operating in 1987 and strategy for check in 1990). Based on the flood regulation calculation in sub-seasons, we obtain the different ranges of flood control level in each sub-season as upper limit, with the fixed flood control level of the original plan as the lower limit. Both upper limit and lower limit are presented by reservoir level. Actually, flood control function of reservoir is to regulate the process of reservoir outflow, with maximum discharge and highest water level to meet requirements for flood control during a flood flow.

General comments:
In my opinion, this paper is not about hydrology, but mathematicity. However, in mitigation, a re-read of the paper finds on page 10432, lines 22-26, that the methods of flood regulation are limited in China: "Regulation for calculating design flood of water resources and hydropower projects of China requires that flood season separation should consider the design requirements of projects, and have appropriate flood timing according to seasonal varying flood patterns. This means design floods of different sub-seasons should be calculated based on flood characteristics for project design for practical construction and

Fig. 1.

Comparison of methods for separating flood frequency of reservoir by sub-seasons

Jiqing Li[1], Kaijie Xie[1], Mingjiang Xie[1]and Rongbo Li[1]

[1]{School of Renewable Energy, North China Electric Power University, Beijing, China}

Correspondence to: Jiqing Li (jqli6688@163.com jqli6688@ncepu.edu.cn)

Abstract

The development of separate flood frequency distributions for different sub-seasons within a year can be useful for protection, storage and utilization of flood flows for the reservoir operation management. This paper applies conventional statistical method, fractal method and the mixed Von Mises distribution to the separation of flood sub-seasons for inflows to Hongfeng Reservoir in China. Design floods are found for different sub-seasons, along with flood control levels for flood regulation. The flood season is divided into four sub-seasons using the fractal method: the pre-rainy season (May), main-flood season (June and July), late-flood season I (August) and late-flood season II (September). The mixed Von Mises distribution method accounts for the general flood pattern and combines August and September as one late-flood season, for three sub-seasons with different frequency distributions. The flood regulation calculation results show little difference between the control water levels in August and September, so the two can be combined into one period. Due to flood regulation and generation caculation, varied sub-season flood limited water level are able to obtain more economic benefits without decreasing the original flood prevention standard. Therefore, flood season separation is significant in calculating design floods of different stages and determining flood control levels, allowing better reservoir operation within different flood sub-seasons.

1 Introduction

Increasing water demands have intensified water scarcity in China. Reservoirs have a significant role in resolving the tension between the water supply and demand. To fully use

Fig. 2.