

# Frequent occurrence of urban flash floods in North China: an urgent and attention getting issue

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## Abstract

*Flash floods have frequently occurred and resulted in severe flood disasters and damages in China, especially in the urban areas of China's modern cities, which are highly subjected to flood hazards. Moreover, the frequent occurrence of abnormal rainfalls in North China is likely to induce more flood hazards in urban regions which in turn have been threatening both livelihoods and infrastructure in these areas under the background of global climate change and with the rapid development of urbanization and civilization. So, frequent occurrence of urban flash floods in North China is an urgent issue.*

**Keywords:** Flash flood, Flood hazard, North China.

## Introduction

Flash flood is one of the most catastrophic natural hazards in the world and induces significant losses every year<sup>1</sup>. Flash floods have frequently occurred and resulted in severe flood disasters and damages in China, especially in the urban areas of China's modern cities, which are highly subjected to flood hazards<sup>2,3</sup>, such as the July 2007 flash floods in Chongqing city and Jinan city of China<sup>4</sup> and the July 2012 flash flood in Beijing city<sup>3</sup>.

However, under the background of global climate change and with the rapid development of urbanization and civilization, the frequent occurrence of abnormal rainfalls in North China is likely to induce more flood hazards in its urban regions which in turn have been threatening both livelihoods and infrastructure in these areas. For example, the August 2018 and the August 2019 flash flood disasters occurred in Weifang city of Shandong province in northern China (Fig. 1) and have caused severe economic losses and extensive damages.

Since China's reform and opening up in 1978, it is observed that its many modern cities have experienced rapid urbanization, thereby resulting in frequent occurrence of urban flood hazards in China<sup>5</sup>, especially in the northern region of China in recent years (<http://blog.sciencenet.cn/blog-1022150-1234693.html>).

This short communication here mainly shows that the urban regions in northern China could be more vulnerable to flash floods resulting from natural and/or human activities than other urban areas of South China with rapid urban expansion and are the urgent and attention-getting issues for future decades, although some attention and concerns have been received by the Chinese government and many scholars in the past five decades. Therefore, a top priority in flash floods prevention and city protection should be considered for future urban planning and management in North China.



**Fig. 1:** (a, b) The August 2018 and (c, d) the August 2019 flash floods in Weifang city of Shandong province in northern China (Visit (a) [http://k.sina.com.cn/article\\_1763864272\\_69226ed000100a904.html](http://k.sina.com.cn/article_1763864272_69226ed000100a904.html), (b) <https://baike.so.com/doc/28429957-29862028.html> and (c, d) <https://zhidao.baidu.com/question/687064888332910132.html> for details)

## Acknowledgment

This study was supported by the National Social Science Foundation of China (17BGL134).

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(Received 25<sup>th</sup> November 2020, accepted 14<sup>th</sup> February 2021)