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## CHINA'S ANTI-SEASON ICE CAVES AND THEIR MECHANISM

**ABSTRACT:** JIN S., SHU L., HUANG S., ZHANG Q., WU Z. & HU C., *China's anti-season ice caves and their mechanism*. (IT ISSN 0391-9838, 2015).

A dynamic ice cave (DIC) is a natural phenomenon: the ice in the caves freezes in midsummer or late spring rather than in winter. It is created by the unique local geological structure. DICs are important tourism resources; actually, during recent years, they have been developed in varying degrees. Due to tourism exploitation or other unknown factors, some DICs in China are suffering a recession. To reveal the mechanism of DICs' operation can help with their protection and save them from destructive exploitation. In this paper, the geographical distribution of China's DICs is given in the first part. Then the influencing factors of the nature ventilation of DIC, the transition mechanism between two seasons of DIC, the interesting relation between the temperatures of warm cave and outside air was analyzed.

**KEY WORDS:** Ice cave, Cave climate, Impact of tourism exploitation, China.

动力冰洞是一种自然现象：这种洞穴会在盛夏或暮春时结冰，是当地特殊的地质及气候条件形成的。动力冰洞是重要的旅游资源，近年来得到不同程度的开发。因为这些开发和其它未知因素，中国的一些动力冰洞处于衰退中。解开动力冰洞的形成机理，可以帮助它们的保护和免于破坏性的开发。本文首先介绍了中国反季节冰洞的分布，接着分析了影响动力冰洞自然通风的因素，两个不同周期的转换机制以及暖洞温度与外界空气温度之间的关系。

### INTRODUCTION

Dynamic ice cave was named by Luetscher based on their origin (Luetscher, 2004). A DIC usually has two or more entrances located at different elevation. The ones with higher altitude blow warm air in winter and usually be called

warm caves when the ones with lower altitude blow cold air in winter be called cold caves or ice caves. The cycles of DIC have two different links, cold-cave season and warm-cave season (Byun, 2004). The cold-cave season, usually extending from early April to late September, was named for the cold wind blowing out from cold caves. A warm-cave season locates between two cold-cave seasons. It was named for the characteristic warm air with white steam blowing out from warm caves. In previous works, beside Chimney-effect, many other theories have been proposed to explain DIC including evaporation effect, radiative cooling and the adiabatic expansion theory, the limitations of which were discussed by Byun (2011). In this paper, after a brief introduction of China's dynamic ice caves, the influencing factors of the nature ventilation of DIC were analyzed. The transition mechanism, which had almost not been mentioned in the previous references, was also discussed.

### DISTRIBUTION OF CHINA'S DYNAMIC ICE CAVE

China's DIC distribution is really concentrated: No. 1 to 3 are located in the great Changbai Mountains region, in the northeast of China, No. 4 in the Yan Mountains region and No. 5 in Taihang Mountains region, No. 6 to 9 in a small region beside the Yangtze river; the last one located beside Jinsha River (the name of Yangtze river's upper reaches, as shown in fig. 1 and their Latitudes and Longitudes were shown in table 1). Lack of space forbids the description of every DIC in detail, so only part of them will be introduced below.

Ren ice cave (Li Jinrong, 1992) is located in a slope near a Village Chuanyinggou in the eastern mountainous region of Liaoning Province. This area is about 1,000 meters by 20 meters. Early in the 20th century, a local family named Ren found this strange phenomenon when they built their own house. Taking advan-

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Many thanks to Prof. Hi-Ryong Byun for the sharing of original observational data of Ice Valley and Prof. Tanaka H.L, and Mrs. Lucy Serody for their selfless help.