

Scientists summarize hydrological basis and discipline system of cryohydrology

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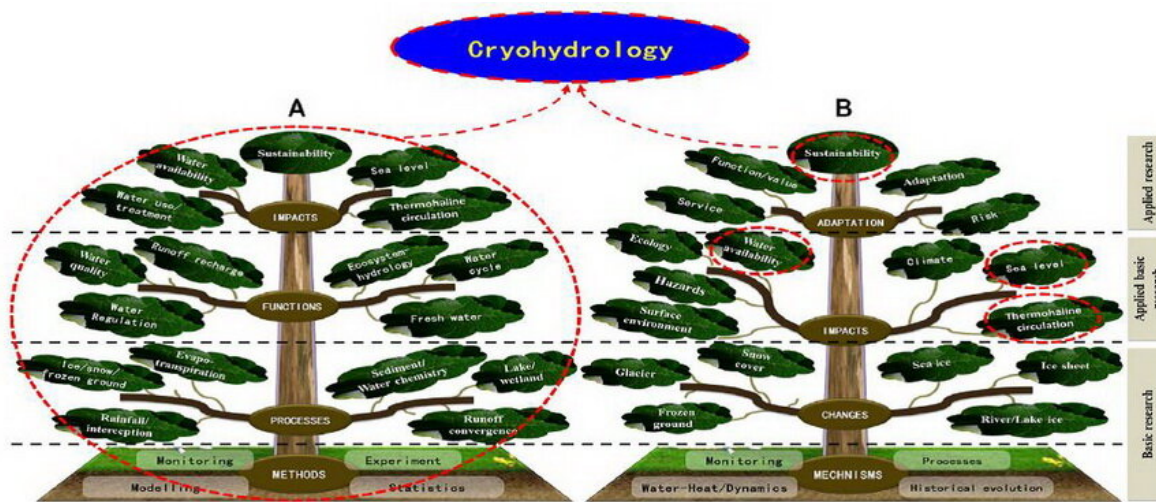


Fig. 1. Research content tree of Hydrology (a) and (b) Cryospheric Science as well as and the relationship between Hydrology, Cryohydrology and Cryospheric Science. Note that Cryohydrology focuses on the water cycle and water availability, and the intersection between Cryospheric Science and Hydrology. Credit: DING Yongjian

Cryohydrology has been defined as hydrology involving low temperatures, which has broadened with the development of cryospheric science and now involves hydrological processes of various cryosphere elements systematically coupled with river basin hydrological processes. However, limited studies have introduced the characteristics and

discipline comprising cryohydrology from the perspective of cryospheric science.

Recently, Prof. Ding Yongjian from the Northwest Institute of Eco-Environment and Resources (NIEER) of the Chinese Academy of Sciences (CAS), together with his team, presented an overview on the evolution of the cryohydrology and analyzed its hydrological basis and discipline system to accurately understand the hydrological effects of different cryosphere elements and the overall hydrological process of the basin under the influence of climate change.

In this study, by condensing the core academic thought behind cryohydrology, the researchers attempted to comprehensively construct its research framework from the succession of the discipline, the common hydrological characteristics of the cryosphere, the research content and the discipline's constituents.

They also pointed out that cryohydrology was developed based on traditional hydrology for a single element of the cryosphere and focused on the hydrological functions of the cryosphere and its impact on the [water cycle](#) and water supply to other spheres.

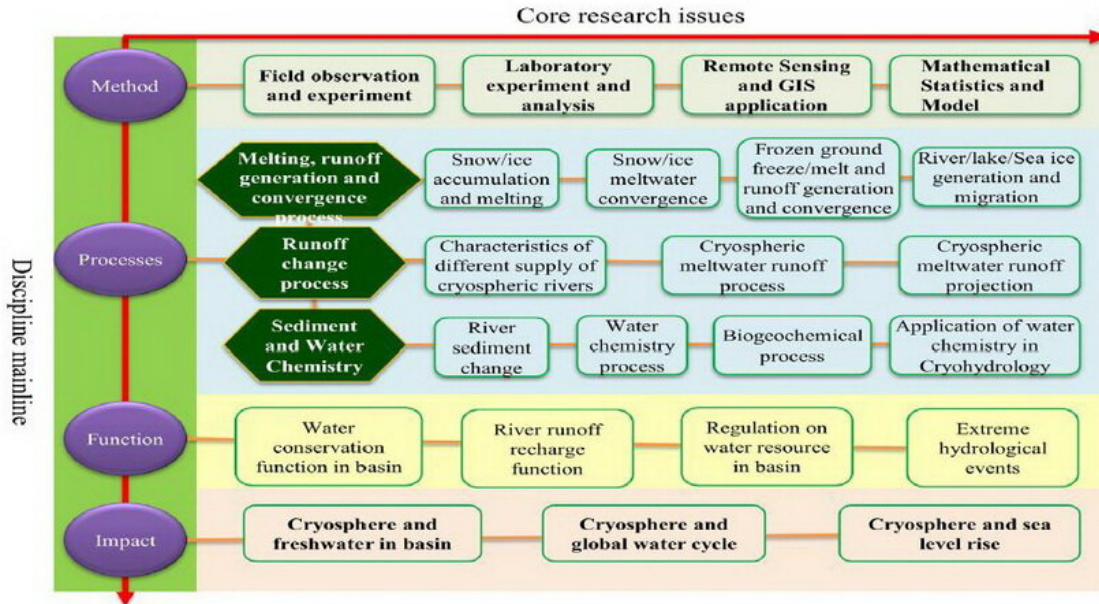


Fig. 2. The core research issues of Cryohydrology along the discipline mainline which primarily include method, processes, function and impact. Credit: DING Yongjian

The hydrological basis of cryohydrology can be summarized as water conservation, runoff recharge, and hydrological regulation. In detail, the [water conservation](#) function is primarily expressed as the 'source of freshwater and 'cold and wet islands;'' the runoff recharge function is concerned with water supply, and the regulation function is effective at intra- and inter-annual scales. The core research issues of cryohydrology are research methods, hydrological processes, watershed functions, and regional impact.

Cryohydrology aims to deepen the understanding of the theoretical and cognitive levels of its mechanisms and processes, accurately quantify the hydrological functions of the basin, and promote understanding of the ecological and environmental impacts of the cryosphere. This study will

contribute to understanding the integrated [hydrological](#) functions of the different elements of the [cryosphere](#) at the regional or global scale.

This work has been published in *Frontiers in Earth Science*, titled "Hydrological basis and discipline system of Cryohydrology: from a perspective of Cryospheric Science."

More information: Yongjian Ding et al. Hydrological Basis and Discipline System of Cryohydrology: From a Perspective of Cryospheric Science, *Frontiers in Earth Science* (2020). [DOI: 10.3389/feart.2020.574707](#)

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