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Climate change effects on mercury cycling in a high-altitude watershed: insights and perspectives from the Nam Co basin on the Tibetan Plateau

LI Mingyue, ZHANG Qianggong et al



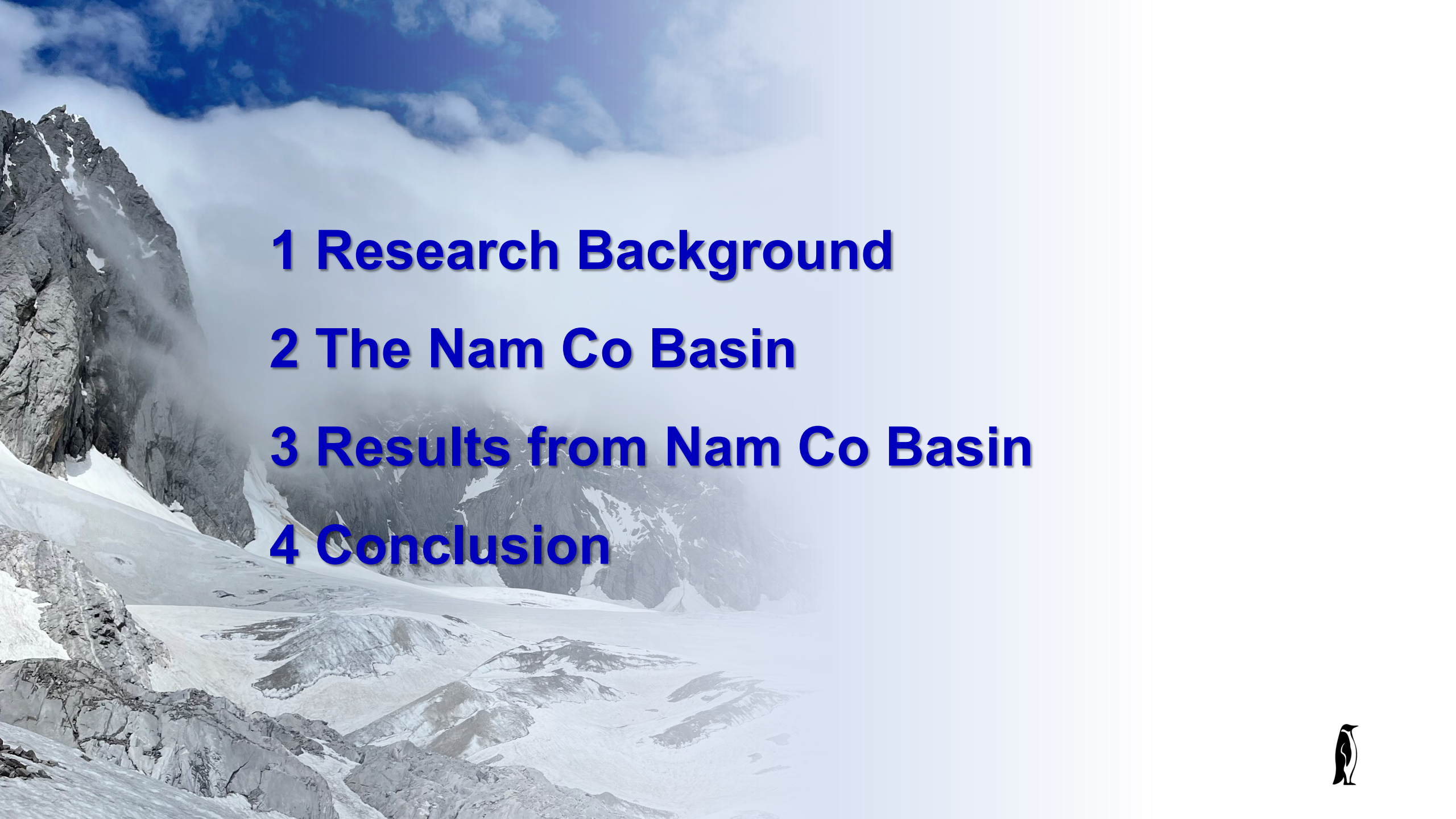
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Institute of Tibetan Plateau Research
Chinese Academy of Sciences



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Key Laboratory of Tibetan Plateau Earth System, Environment and Resources



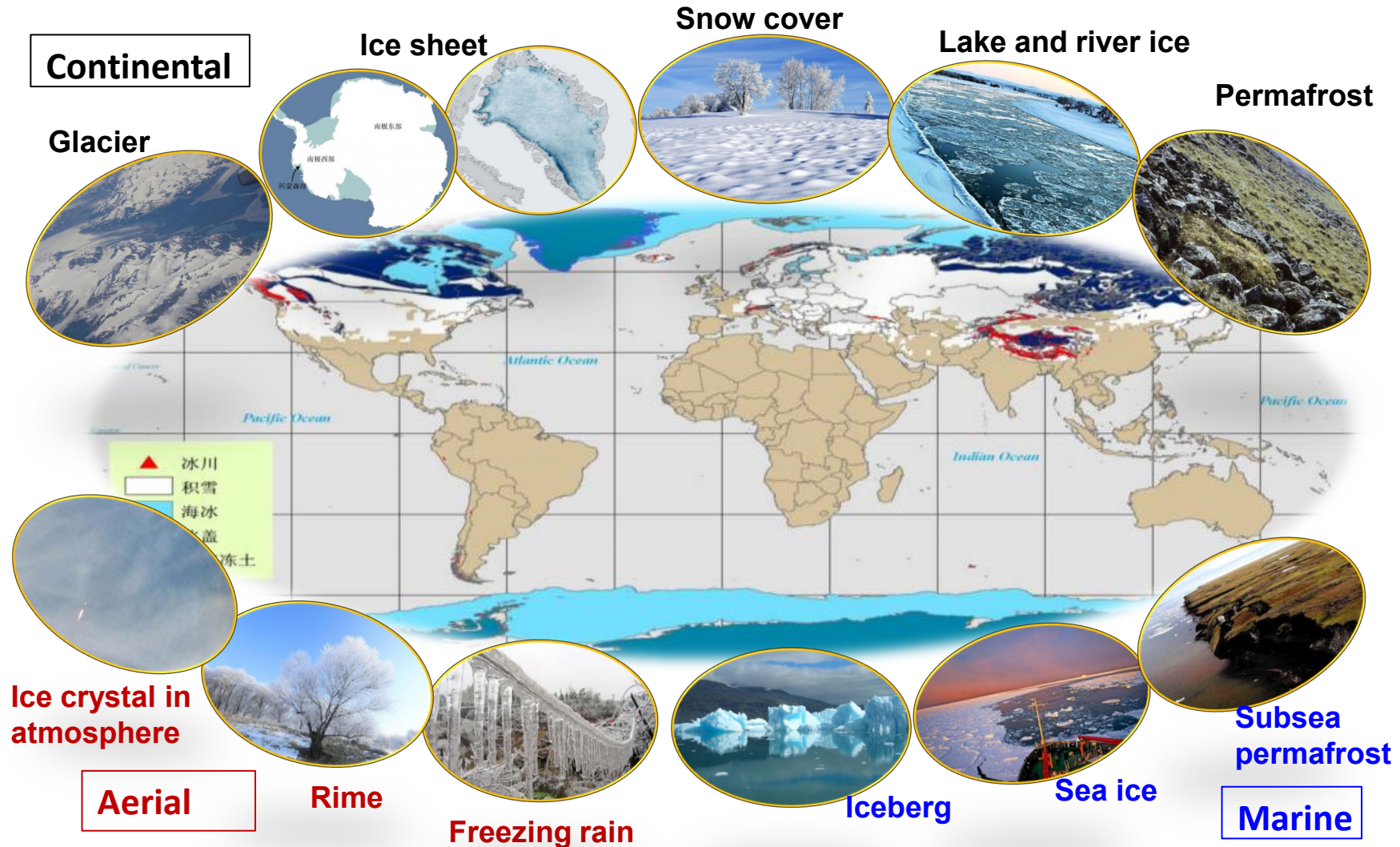
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- 1 Research Background**
 - 2 The Nam Co Basin**
 - 3 Results from Nam Co Basin**
 - 4 Conclusion**

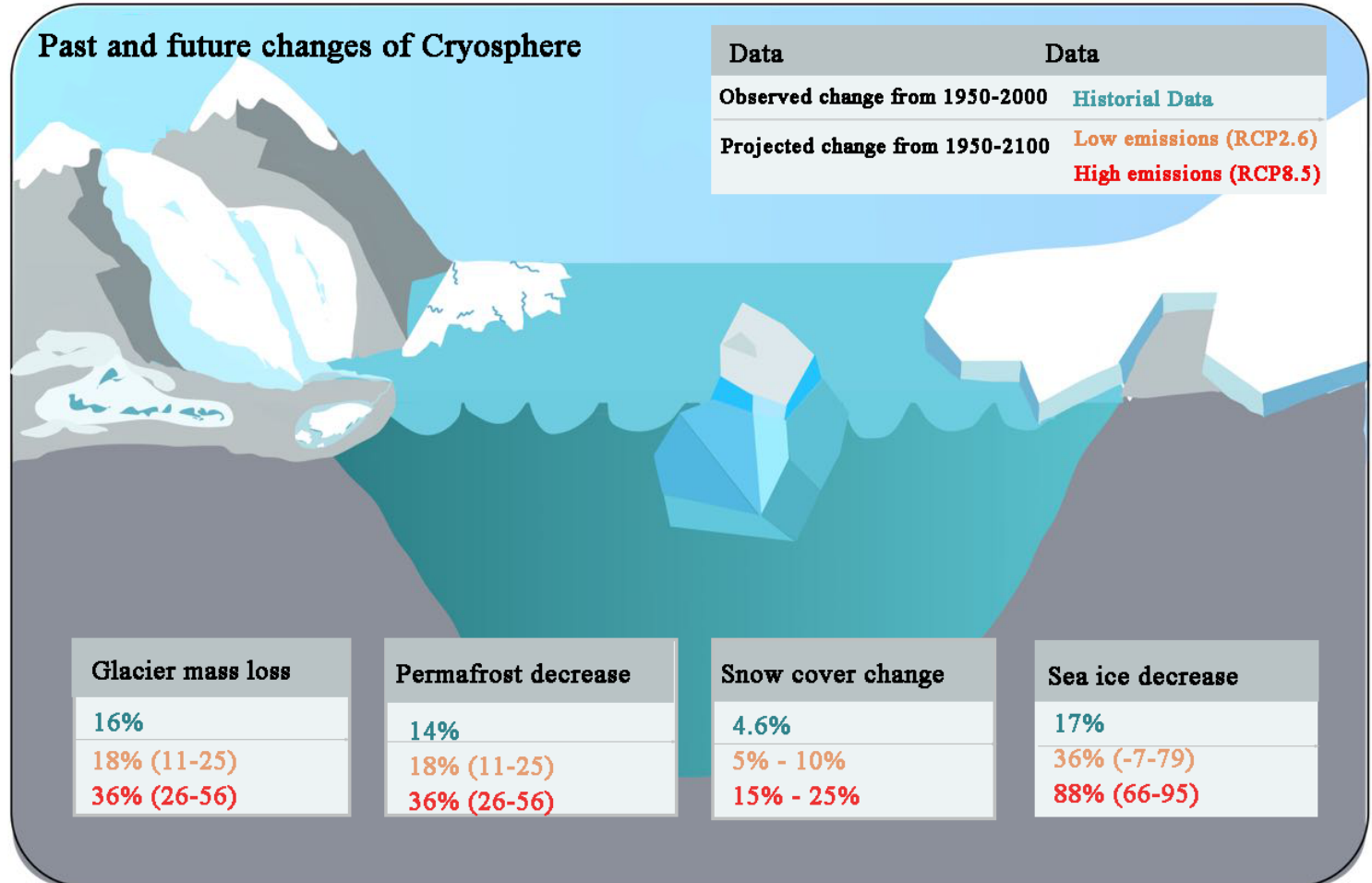
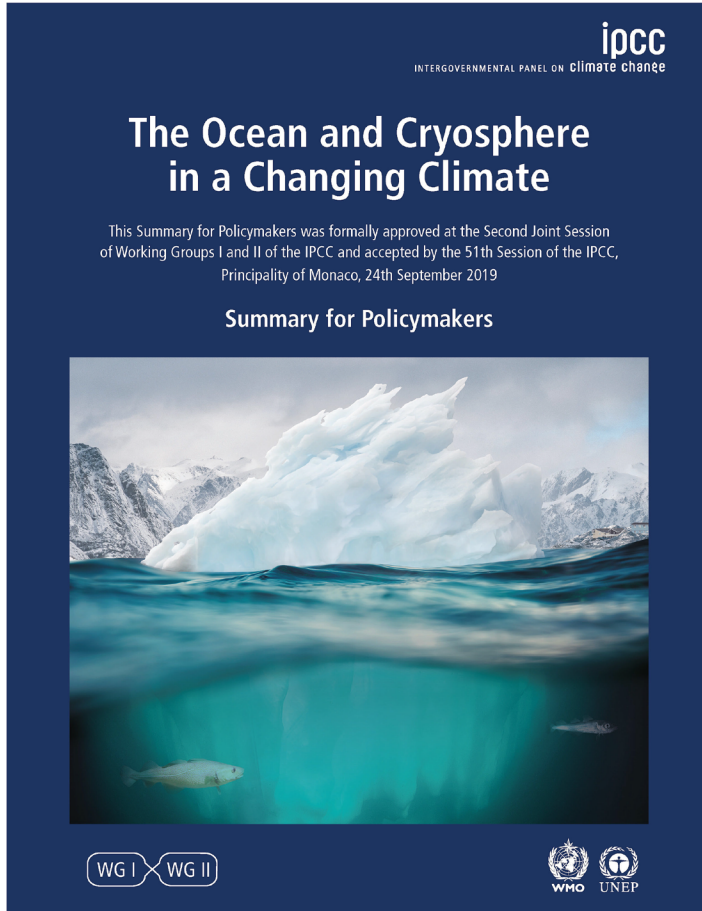


Cryosphere

Cryosphere: A Negative-temperature layer that is continuously distributed in the Earth's surface with a certain thickness



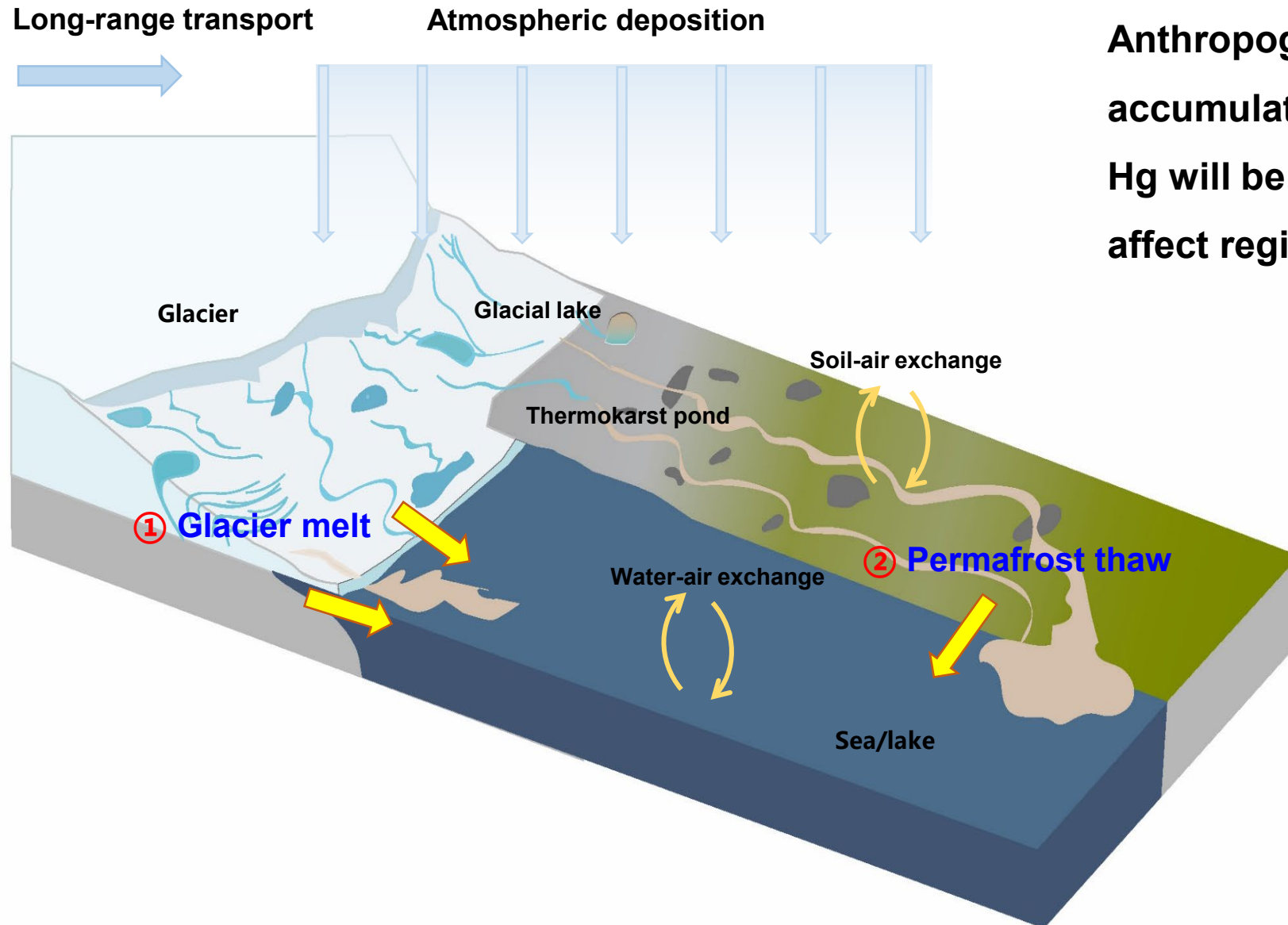
Climate change drives cryosphere retreat



IPCC Special Report on the Ocean and Cryosphere in the Changing Climate, 2019



Hg cycling impacted by cryosphere change



Anthropogenic and natural sources of Hg accumulate in cryospheric environments. These Hg will be remobilized as cryosphere meltdown, affect regional and global Hg cycles.



Cryosphere of high altitude areas in China

Snow

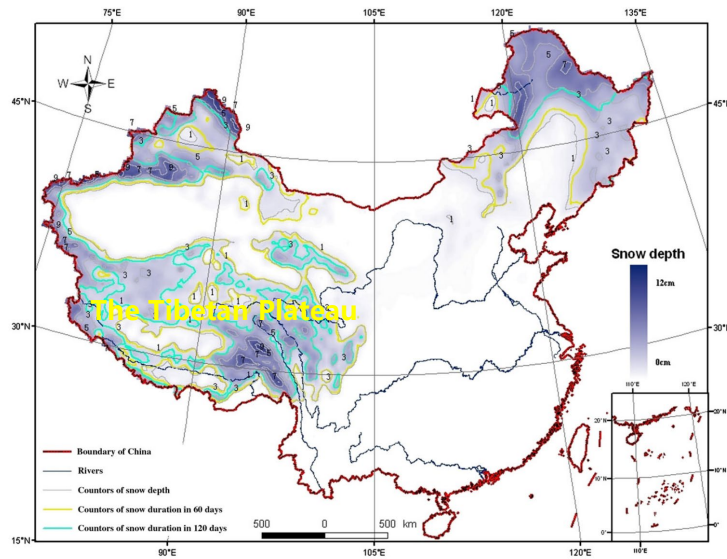


Fig. 2. Distribution of snow in China.

Permafrost

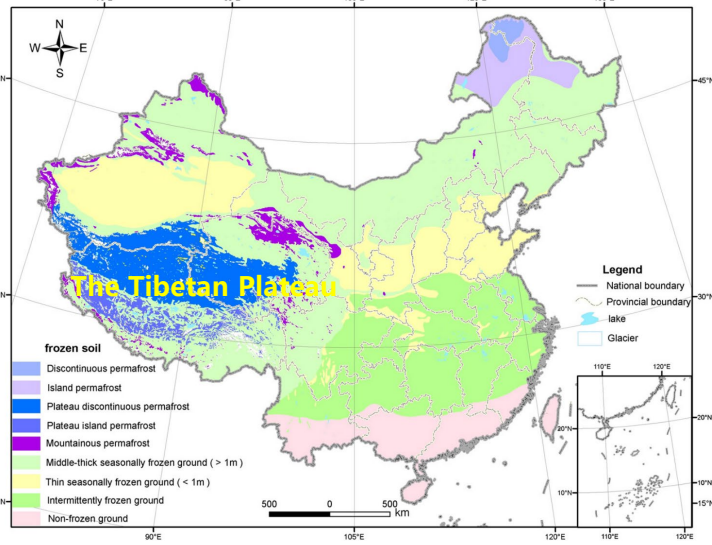
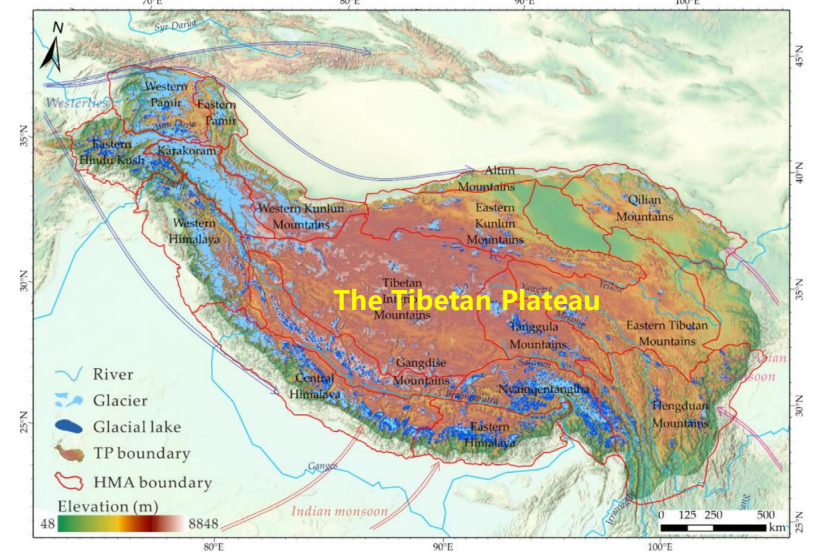


Fig. 3. Distribution of permafrost and seasonally frozen ground in China.

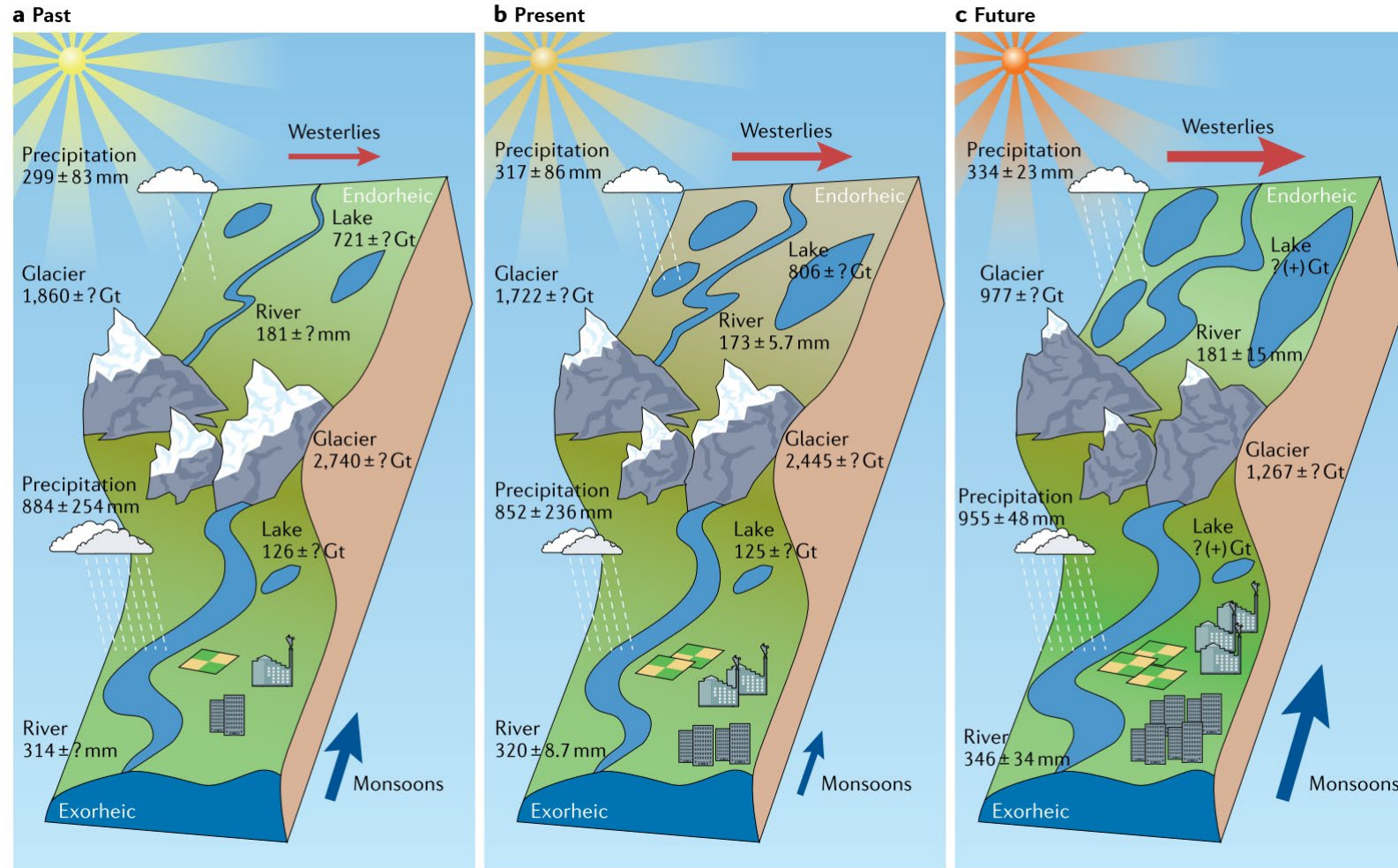
Glacier



X. Li et al. 2008, Global and Planetary Change

Dou X. et al. 2023, Remote sensing

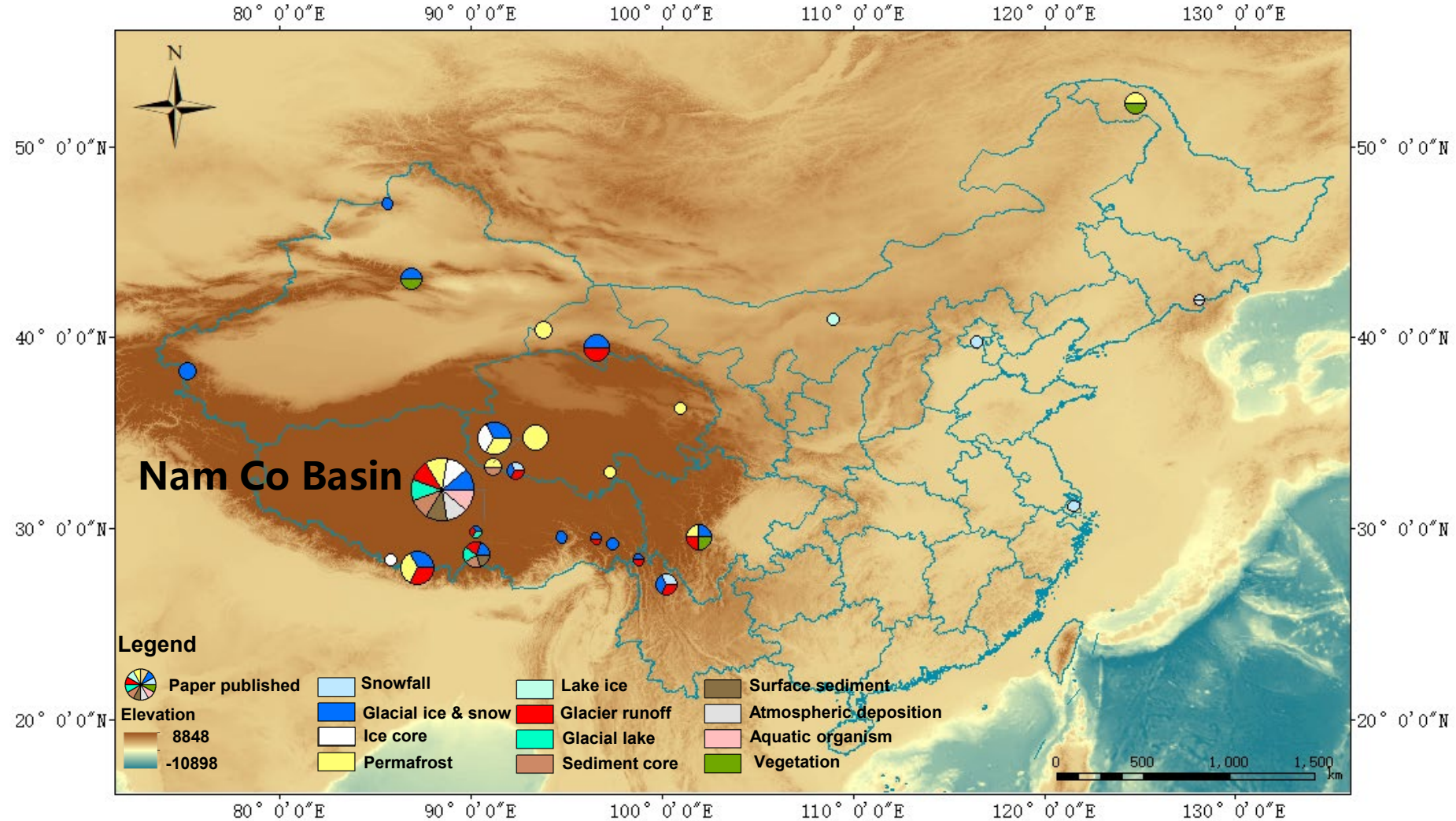
Rapid cryosphere change influence the hydrology



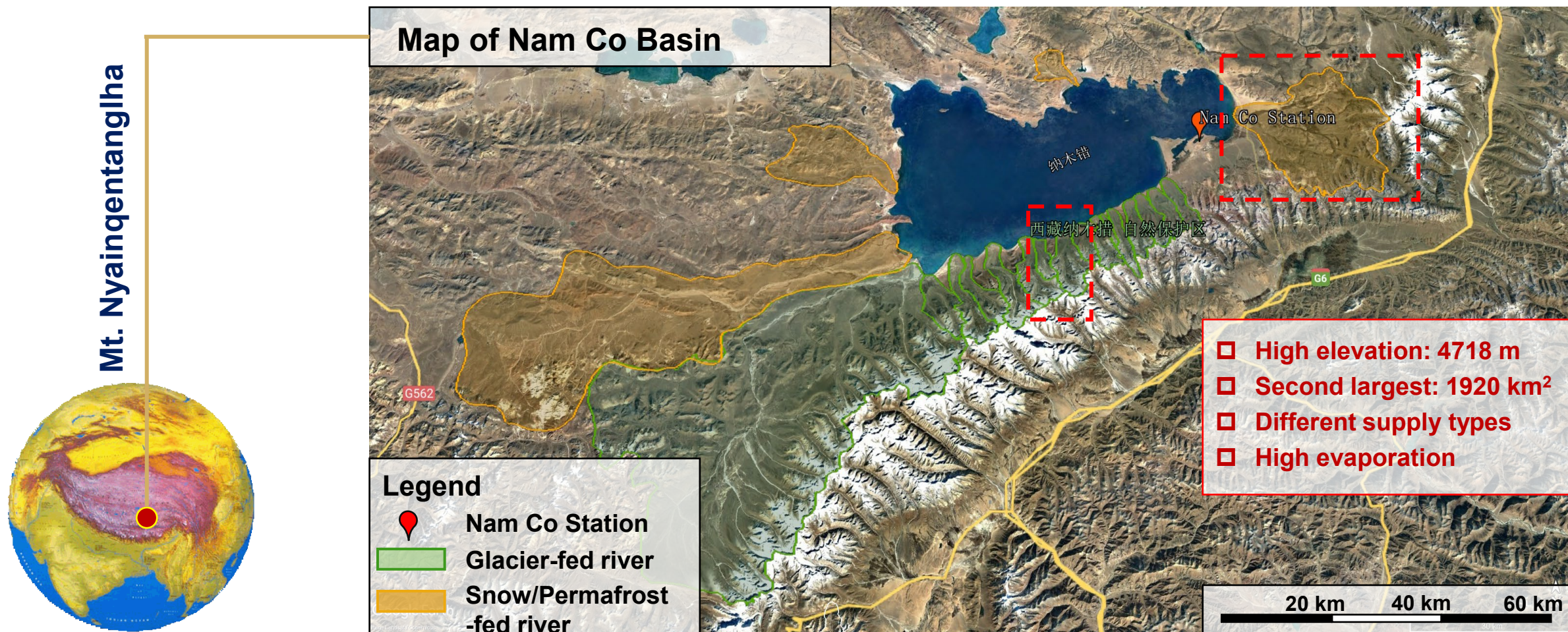
Yao et al., 2022, *Nature Reviews Earth & Environment*



Studies of mercury in the cryosphere environment in China

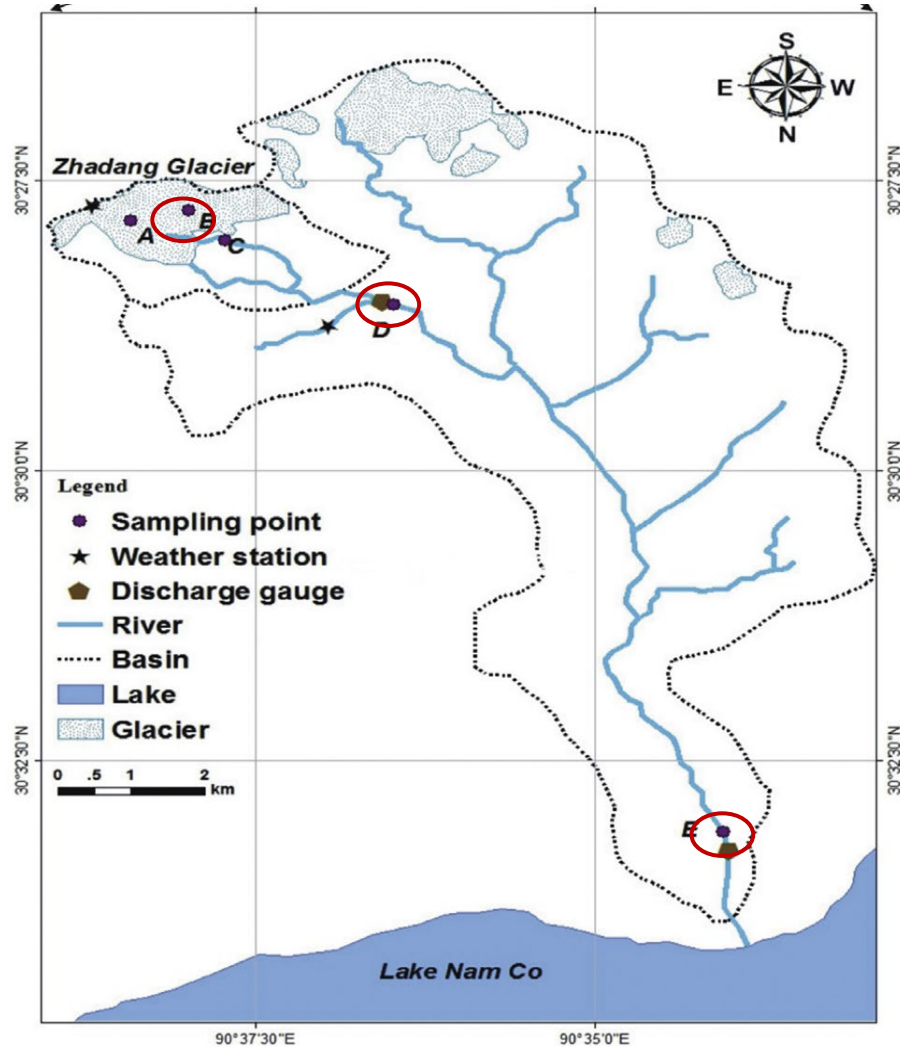


The Nam Co Basin

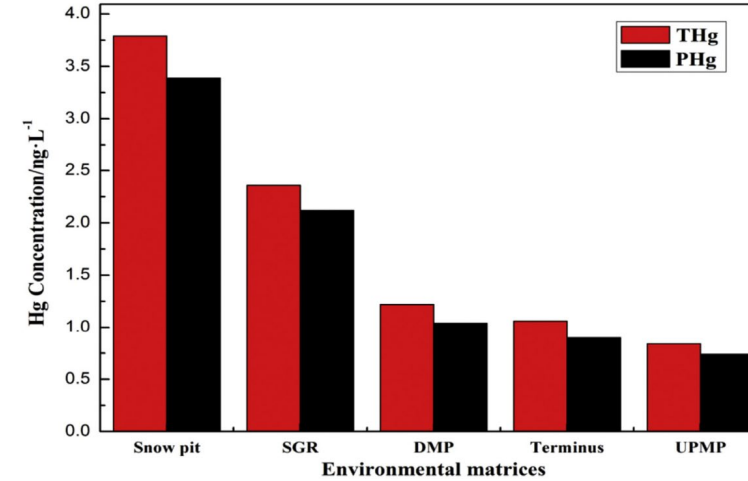


Spatial and temporal trends of Hg in river water

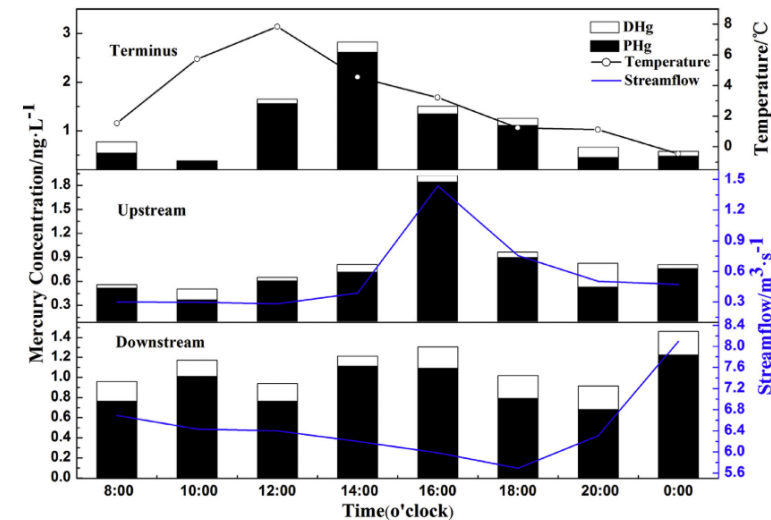
Glacier-fed river



Decreasing Hg concentration from upstream to downstream

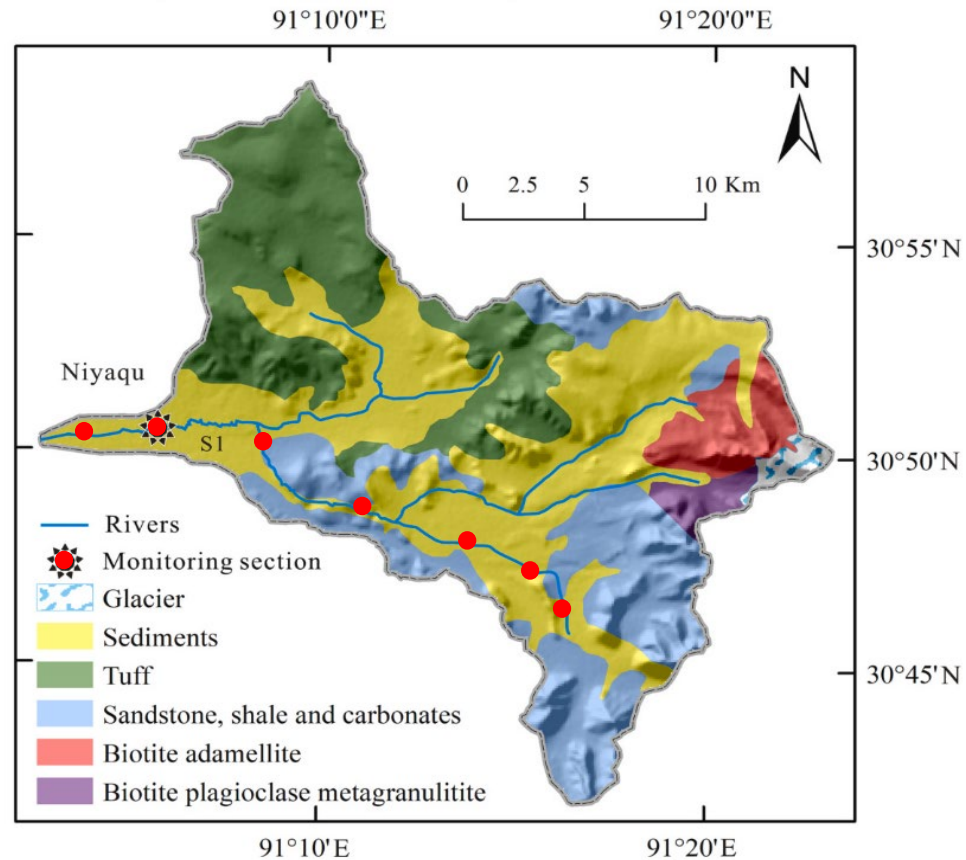


Hg concentration regulated by runoff

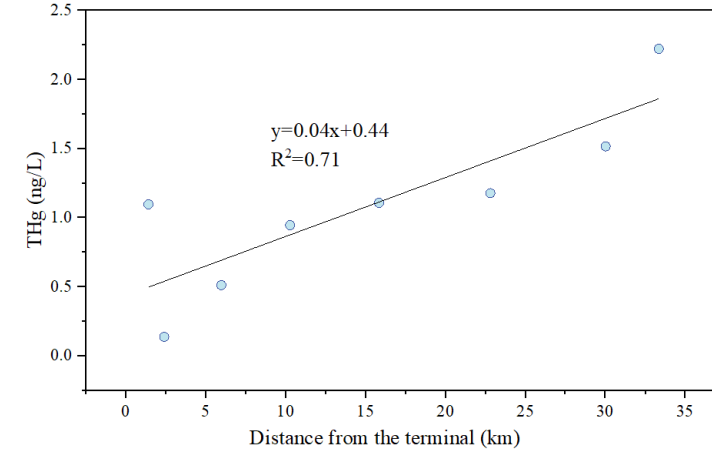


Spatial and temporal trends of Hg in river water

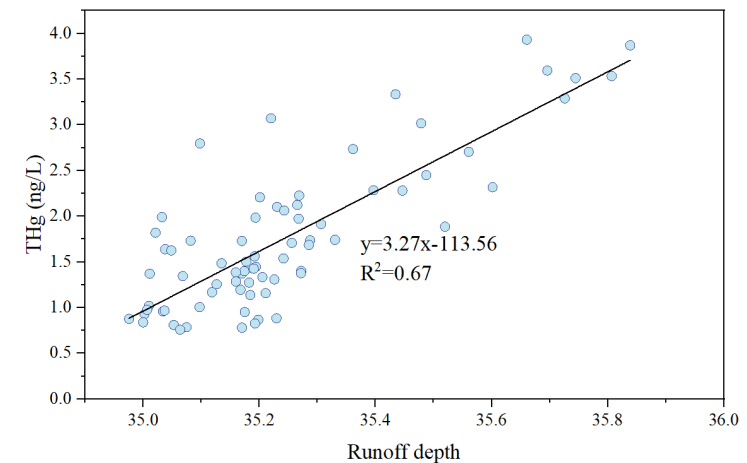
Snow/permafrost-fed river



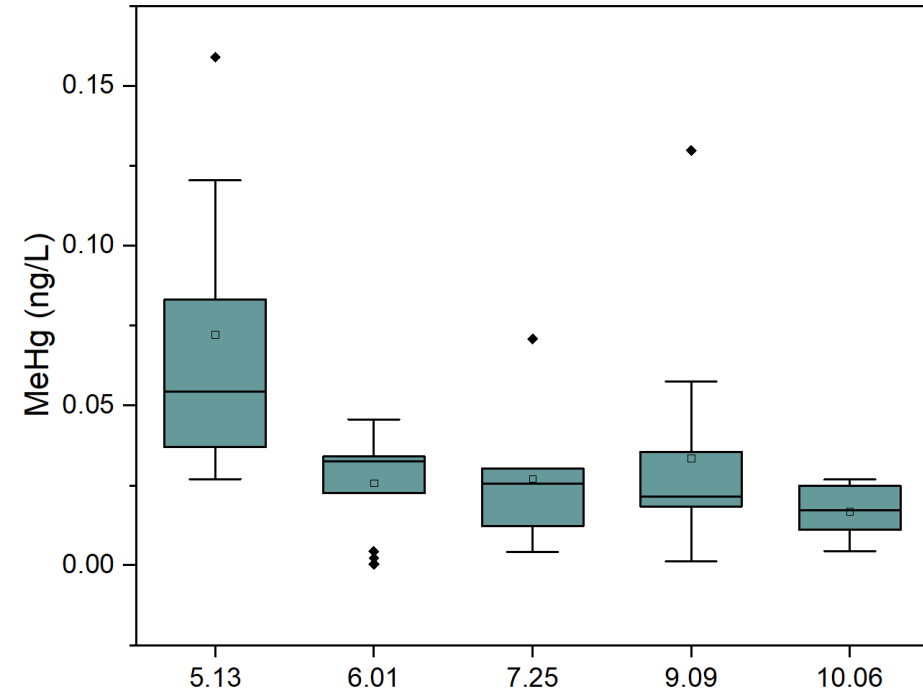
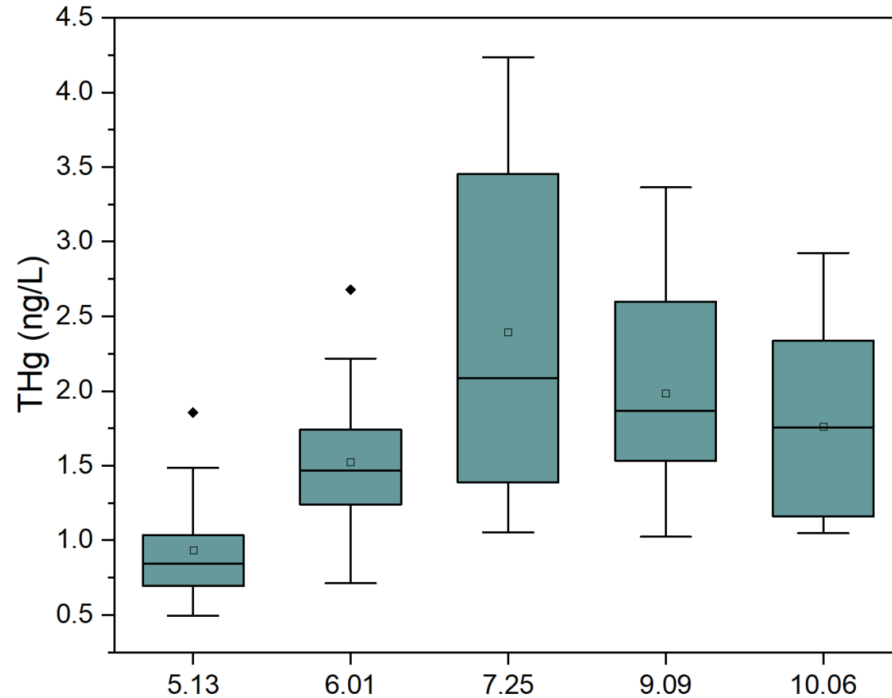
Increasing Hg concentration from upstream to downstream



Hg concentration regulated by runoff



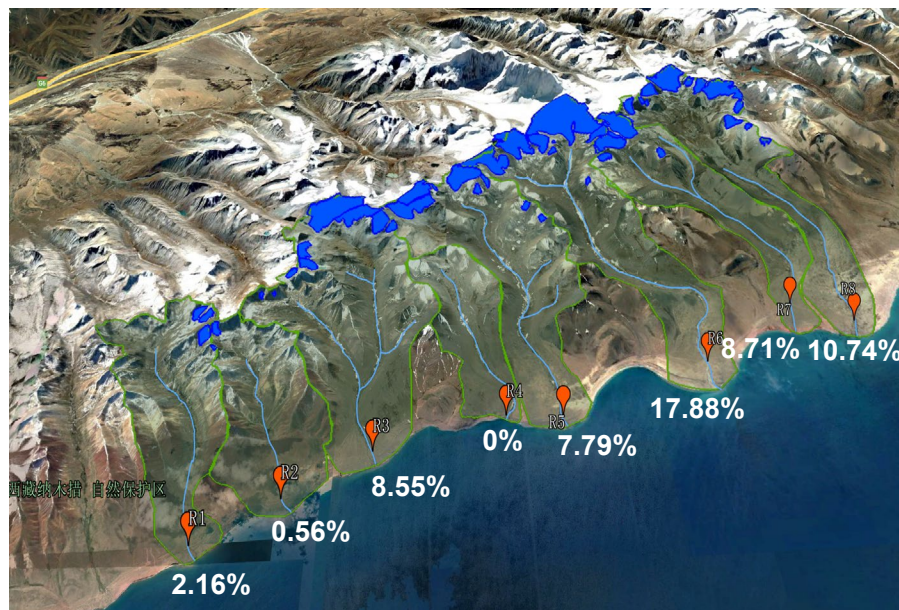
Spatial and temporal trends of Hg in river water



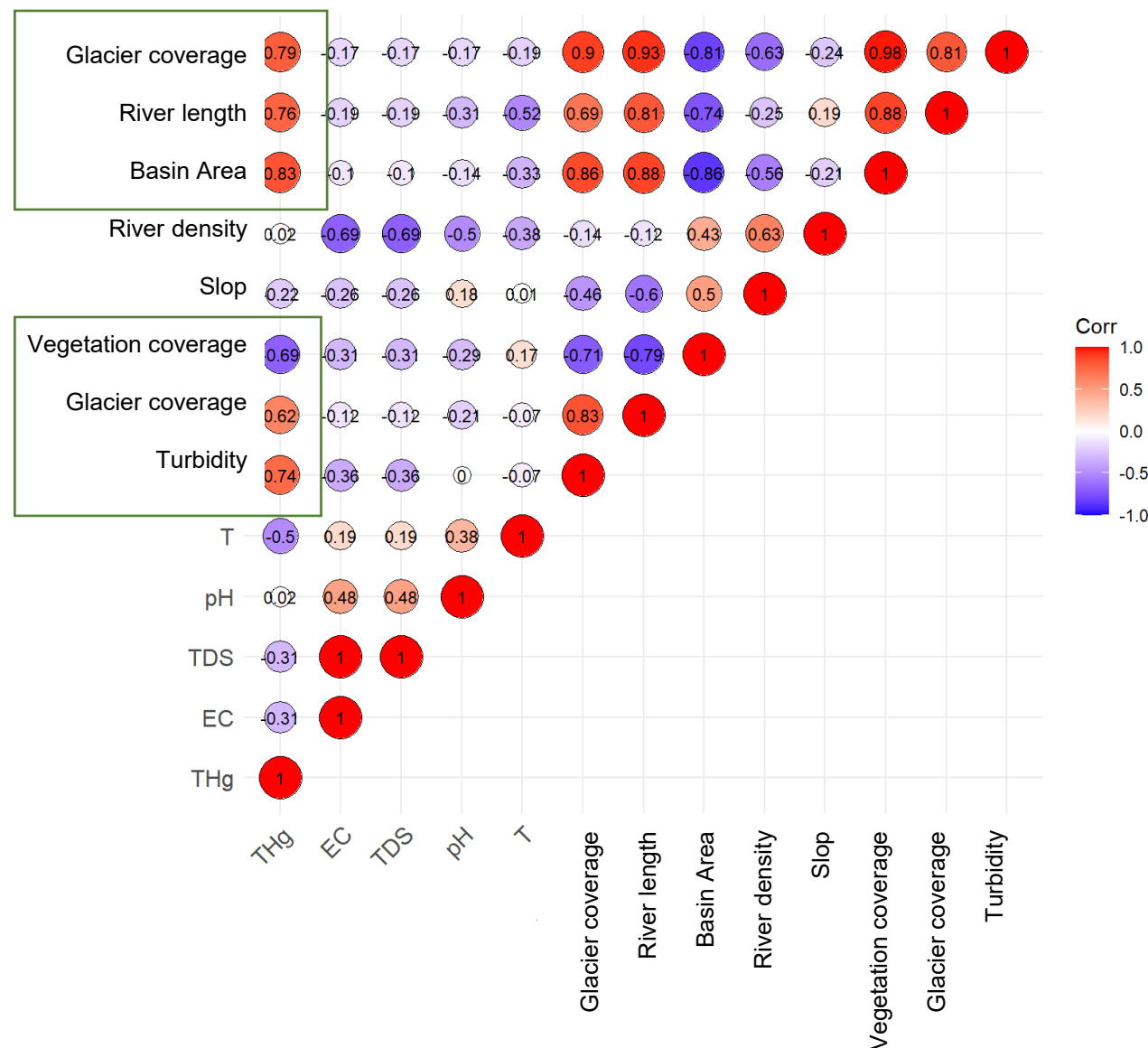
THg and MeHg in river system showed the highest concentration during July and May respectively



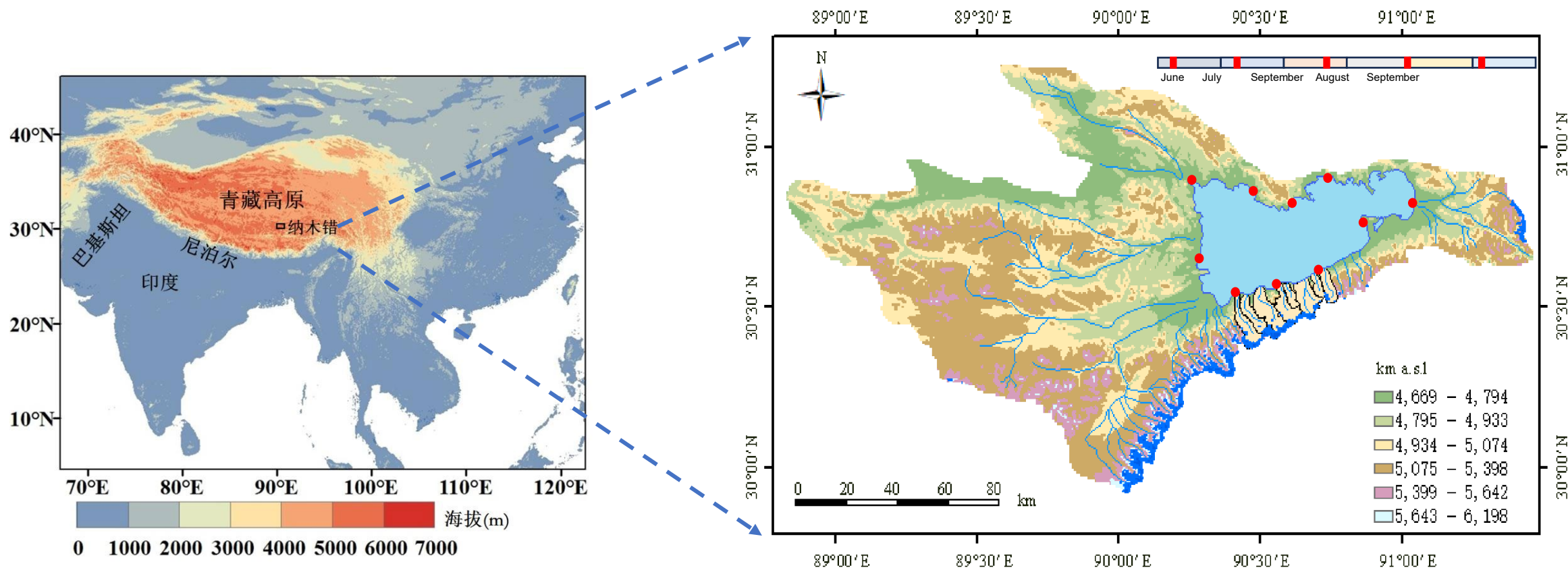
Factor influence the Hg concentration in different river



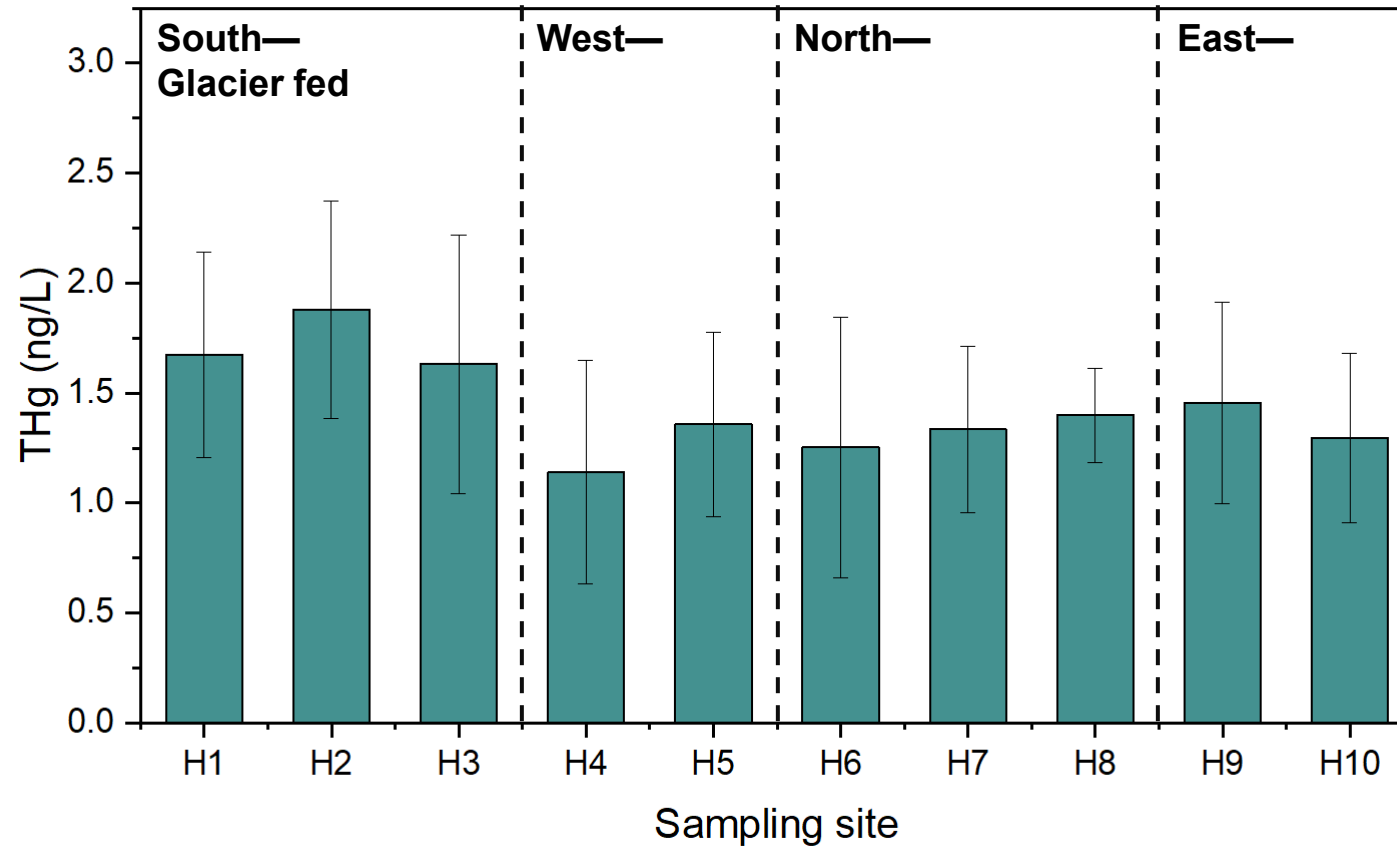
The basin area and glacier coverage are main factors influence the Hg concentration in river water



Spatial and temporal trends of Hg in nearshore lake water

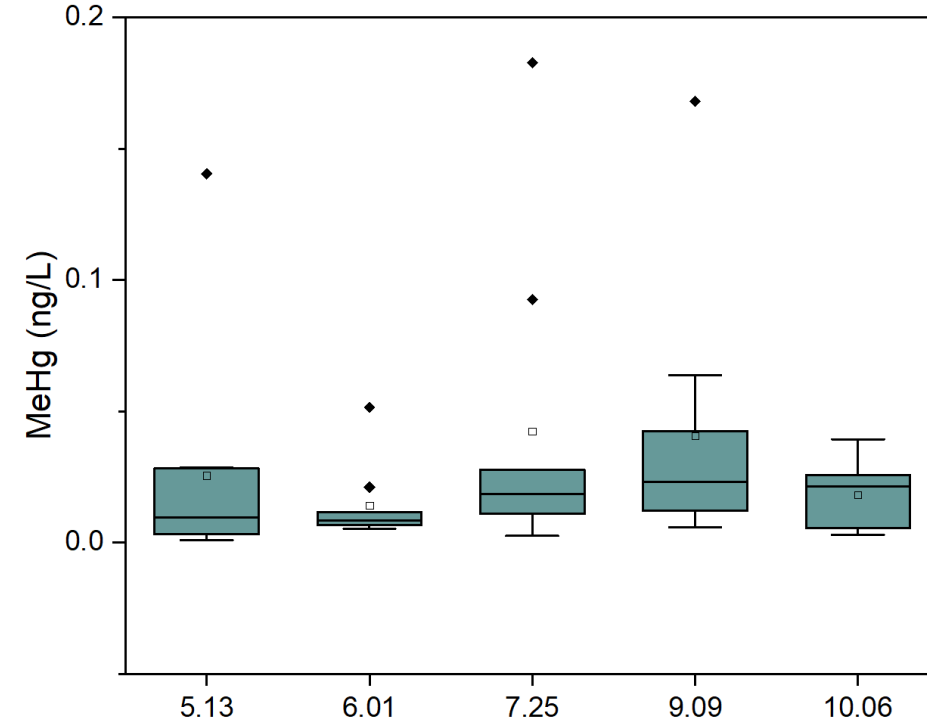
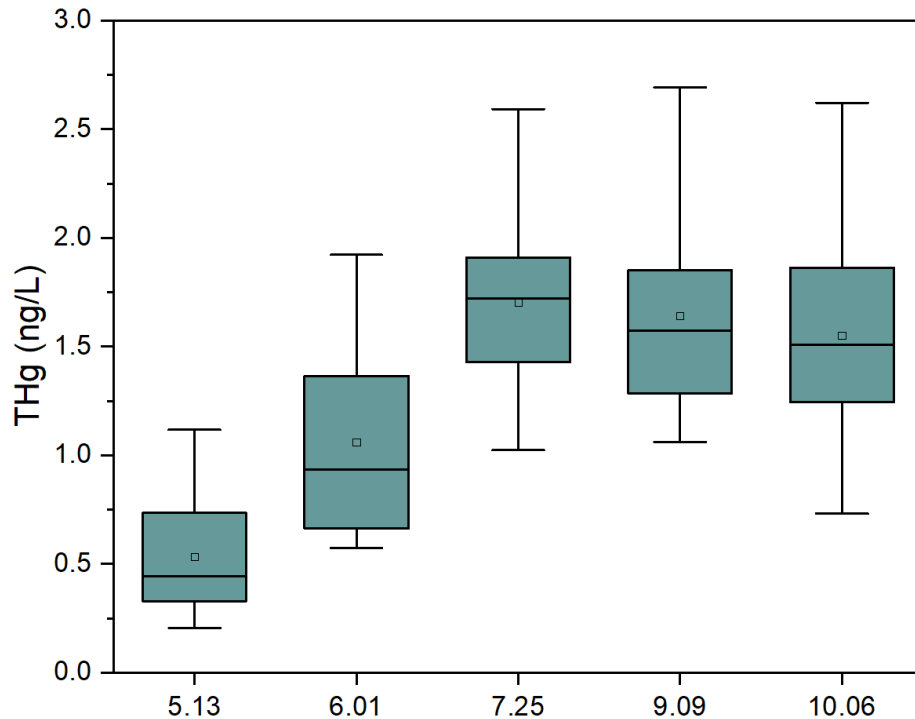


Spatial and temporal trends of Hg in nearshore lake water



THg in nearshore lake water showed the highest value in the south side which fed by glacier meltwater

Spatial and temporal trends of Hg in nearshore lake water

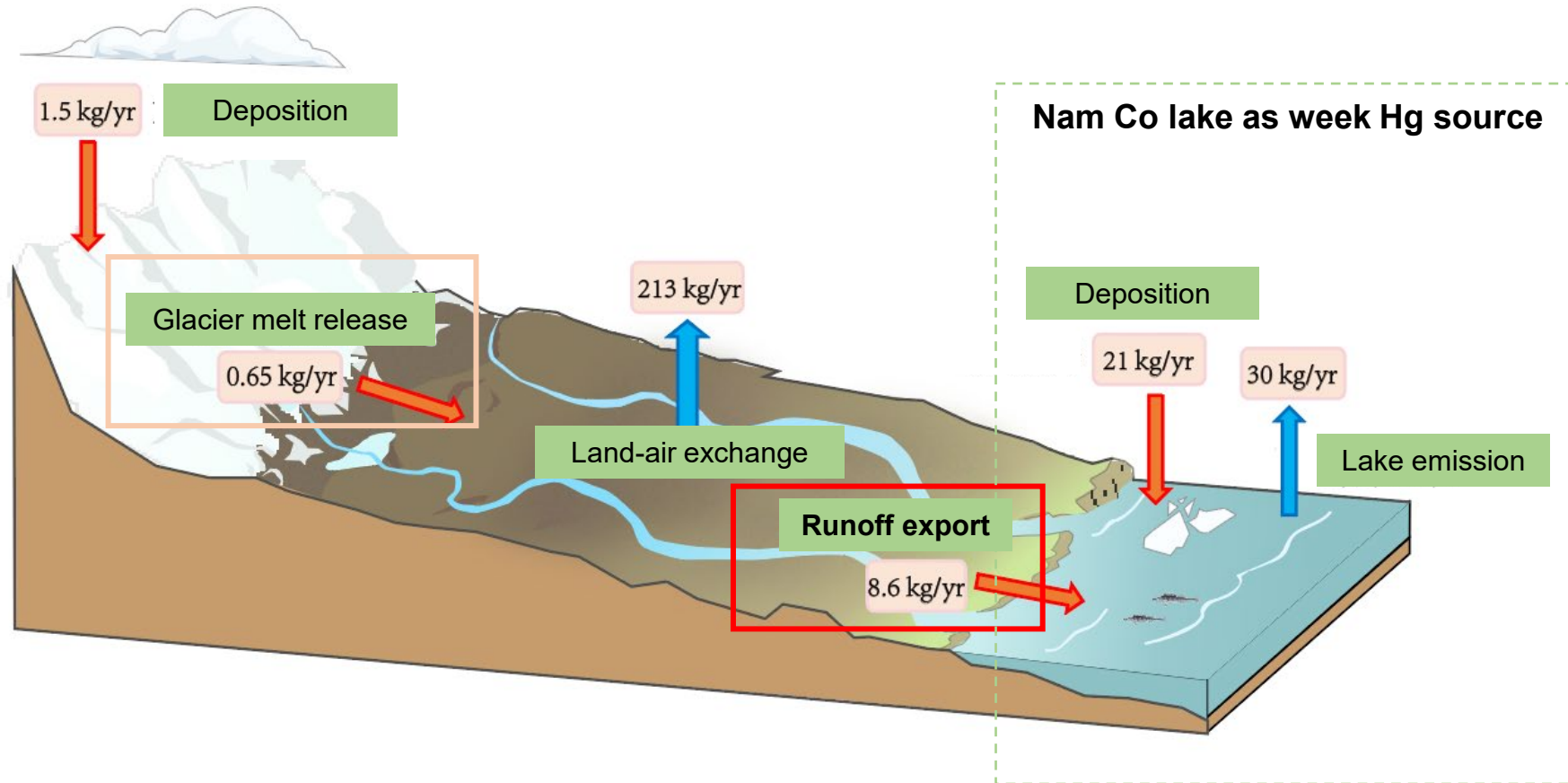


THg in nearshore lake showed the highest concentration during July

The seasonal variation of MeHg was not significant, but average the value of MeHg in nearshore lake water are higher than that in river water



The Nam Co Basin



Although Hg through directly glacier release is less, glacier and permafrost-fed runoff contribute significantly amount of Hg into downstream lakes.



Conclusion

- ❑ Hg in Glacier-fed river and permafrost-fed river have different spatial pattern
- ❑ The basin area and glacier coverage are main factors influence the Hg concentration in river water
- ❑ Hg in the river water and nearshore lake water have the same seasonal pattern, showed higher concentration during July which is the most intense melting season.
- ❑ Melting glaciers and permafrost could increase the release of Hg, and increase the input of Hg into Lake water in the future.



An aerial photograph of a vast, arid landscape. In the foreground, a winding river flows through a dry, brownish-green plain. The middle ground shows rolling hills and valleys with sparse vegetation. In the background, a range of mountains is visible, with some peaks covered in snow. The sky is blue with scattered white clouds.

Thanks for your attention!

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