

## **Estimation of Seasonal and Interannual Freshwater Input to Brepollen (Svalbard)**

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### **Abstract**

The Arctic is particularly vulnerable to warming, and the environmental impacts of climate change are amplified in this region. Consequently, with the increased melting of glaciers – the largest natural reservoirs of freshwater – fjord ecosystems are likely receiving higher loads of contaminants today than in the past, which may pose a threat to the ecosystem. Here, we assess the seasonal changes in freshwater input to Brepollen, the inner part of the Hornsund fjord, a semi-enclosed glacial bay with limited water exchange. Seasonal and interannual estimations are made for two years, 2022 and 2023. The primary sources of freshwater input to the fjord include: frontal ablation of tidewater glaciers, surface melting of glaciers, meltwater runoff from unglacierized areas and precipitation over the entire basin. Frontal ablation was determined using imagery from TerraSAR-X, supplemented with Sentinel-1 satellite data. The estimations of the surface melting of glaciers were based on ablation stakes. Atmospheric precipitation and meltwater runoff from non-glacierized areas were assessed using meteorological and hydrological data collected at the Polish Polar Station Hornsund. We estimated the seasonal input of freshwater to Brepollen with 11-day resolution, and it is the first estimation with such high temporal resolution for the whole Svalbard archipelago. The study is part of the project “Quantification of Heavy Metal Discharge with Freshwater Runoff to an Arctic Fjord Ecosystem (Hornsund, Spitsbergen)”, and results will allow for the estimation of the amount of heavy metals delivered to Brepollen from the land.

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