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New estimates of observed poleward freshwater transport since 1970

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Global water cycle changes induced by anthropogenic climate change pose a growing threat to existing ecosystems and human infrastructure. However, scarce direct observations of precipitation and evaporation means historical water cycle changes remain uncertain. In this work, we apply a novel watermass-based diagnostic framework to the latest observations of ocean salinity to quantify poleward freshwater transport in the earth system since 1970. This observational estimate is not replicated in any model in the current generation of CMIP6 climate models - likely due to the inaccurate representation of surface freshwater flux intensification in such models. These results provide a first-of-its-kind baseline of observed warm-to-cold freshwater transport since 1970, and also underscore the need to further explore surface freshwater fluxes in existing climate models.