



Pan-Arctic freshwater discharge from GRACE: variability, trends and impacts from 2003-2008

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High-resolution retrievals of recent changes in the Earth's gravity field using GRACE (Gravity Recovery and Climate Experiment) offer insights into Earth system processes encompassing the atmosphere, ocean, land water hydrology, and land ice. With a focus in particular on the Pan-Arctic region, where water/ice mass fluxes and sea ice cover are rapidly changing, we utilize this space geodetic data set along with estimates of the atmospheric precipitation and evaporation fluxes from re-analysis data sets (e.g., NCEP and JRA-25) to determine variations and trends in freshwater river discharge from the entire Pan-Arctic river basins into the Arctic Ocean from 2003 to 2008. As GRACE has now completed more than 6 years of time-variable gravity measurements, this analysis yields new quantitative insights into annual to inter-annual dynamics of the Pan-Arctic hydrologic mass-balance, including regions of ungauged freshwater drainage. Since freshwater river discharge into the Arctic Ocean is a major source of Arctic Ocean freshwater, we will also discuss the relative importance of these freshwater fluxes on climate and circulation changes in the Arctic Ocean by using numerical simulations with an ocean model (ECCO-2).