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Water mass properties derived from satellite observations in the Barents Sea

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The Barents Sea is a region of deep water formation where Atlantic Water is converted into cooler, fresher Barents Sea Water before being isolated from further atmospheric interactions. Barents Sea Water properties exhibit variability at seasonal, interannual and decadal timescales, variability which is transferred to Arctic Intermediate Water, a contributor to the deeper branch of Atlantic Meridional Overturning Circulation. This variability is encoded in depth integrated steric height, a quantity that can be estimated from satellite observations. In situ surveys of the Barents Sea are critical for evaluating heat, freshwater and transport budgets however, these have limited duration and coverage so we ask if water column properties can be estimated from satellite observations. To decode the variability stored in steric height, we combine proxies for heat and freshwater content based on satellite sea surface temperature and salinity with climatological temperature and salinity profiles. Our results show sea surface temperature is indicative of depth-integrated heat content in the south eastern Barents Sea. Although a loss of detail is inherent in this method, freshwater content and water column temperature can be reconstructed from satellite data showing the potential for remote monitoring of the variability in Barents Sea Water properties.