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Decadal Atlantic Water variability in the Nordic Seas

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This study explores interannual to decadal variability of Atlantic Water properties in the Nordic Seas area based on a reexamination of the historical hydrographic record for the years 1950-2009, obtained by combining multiple data sets. The analysis shows a succession of four multi-year warm events where Atlantic Water temperature anomalies at 100m depth exceed 0.4C, and three cold events. Three of the four warm events lasted 3-4 years, while the fourth began in 1999 and persisted through the end of our analysis. This most recent warm event is anomalous with respect to the 60-year record, being the strongest, having the broadest geographic extent, being surface-intensified, and occurring under exceptional meteorological conditions. Three of the four warm events were accompanied by elevated salinities consistent with enhanced transport into the Arctic, but the event spanning July 1989-July 1993 was accompanied by reduced salinities. Of the three cold events two lasted for four years, while the third lasted for nearly 14 years. Two of the three cold events are associated with reduced salinities, but the first had elevated salinities. Relationships to observed surface heat flux is explored and shown to be insufficient to explain the observed anomalies in ocean heat content, implying that Atlantic Water transport variations are crucial.