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Shifting ocean circulation warms the Subpolar North Atlantic since 2016

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The Subpolar North Atlantic (SPNA) is known for rapid reversals of decadal temperature trends, with ramifications encompassing the large-scale meridional overturning and gyre circulations, Arctic heat and mass balances, or extreme continental weather. Here, we combine datasets derived from sustained ocean observing systems (satellite and in situ), and idealized observation-based modelling (advection-diffusion of a passive tracer) and machine learning technique (ocean profile clustering) to document and explain the most-recent and ongoing cooling-to-warming transition of the SPNA. Following a gradual cooling of the region that was persisting since 2006, a surface-intensified and large-scale warming sharply emerged in 2016 following an ocean circulation shift that enhanced the northeastward penetration of warm and saline waters from the western subtropics. Driving mechanisms and ramification for deep ocean heat uptake will be discussed.