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## The AMV phase-dependence of the connection between February NAO and March surface air temperature over the Tibetan Plateau

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The Tibetan Plateau (TP), referred to as the “Asian water tower”, contains one of the largest land ice masses on Earth. The local glacier shrinkage and frozen-water storage are strongly affected by variations in surface air temperature over the TP (TPSAT), especially in springtime. This study reveals a distinct out-of-phase connection between the February North Atlantic Oscillation (NAO) and March TPSAT, which is non-stationary and regulated by the warm phase of the Atlantic Multidecadal Variability (AMV+). The results show that during the AMV+, the negative phase of the NAO persists from February to March, and is accompanied by a quasi-stationary Rossby wave train trapped along a northward-shifted subtropical westerly jet stream across Eurasia, inducing an anomalous adiabatic descent that warms the TP. However, during the cold phase of the AMV, the negative NAO does not persist into March. The Rossby wave train propagates along the well-separated polar and subtropical westerly jets, and the NAO–TPSAT connection is broken. Further investigation suggests that the enhanced synoptic eddy and low-frequency flow (SELF) interaction over the North Atlantic in February and March during the AMV+, caused by the enhanced and southward-shifted storm track, help maintain the NAO anomaly pattern via positive eddy feedback. This study provides a new detailed perspective on the decadal variability of the North Atlantic–TP connections in late winter–early spring.