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Patterns of Coherent Low-frequency Climate Variability in the Atlantic basin during the 20th Century

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Using multiple-taper/singular value decomposition method (MTM/SVD) climate variability is diagnosed over the Atlantic Basin during the 20th century. Two low-frequency signals are compared: the Atlantic multi-decadal oscillation (AMO) and the quasi-decadal oscillation (QDO). The AMO is primarily associated with oceanic processes including the thermohaline circulation (THC), whilst the QDO variability reflects faster atmosphere-ocean interactions. They are both correlated with the Atlantic meridional mode (AMM) and the North Atlantic Oscillation. During the second part of the 20th century, the AMO and QDO variability, Sahelian rainfall and hurricanes power dissipation index (PDI), are also significantly correlated. Phase changes in all time-series occurred in the mid- 60s, when the AMO went from positive to negative values, contributing to the last Sahelian drought. Climate change could have further impacts on the AMO after it changed phase in the mid- 90s, enhance levels of hurricane intensity with important environmental and socio-economical consequences.