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Seasonal variability of eddy kinetic energy in the North Atlantic subtropical gyre: A high-resolution ocean model analysis

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A global ocean model with 1/12° horizontal resolution is used to assess the seasonal cycle of surface eddy kinetic energy (EKE) in the North Atlantic. The model reproduces the salient features of the observed mean surface EKE, including amplitude and phase of its seasonal cycle in most parts of the basin. In the interior North Atlantic subtropical gyre, EKE peaks in summer down to a depth of ∼200 m, below which the seasonal cycle is weak. Investigation of the possible driving mechanisms reveals the seasonal changes in the thermal interactions with the atmosphere to be the most likely cause of the summer maximum of EKE. The development of the seasonal thermocline in spring and summer is accompanied by stronger mesoscale variations in the horizontal temperature gradients near the surface which corresponds, by thermal wind balance, to an intensification of mesoscale velocity anomalies toward the surface. An extension of the analysis leads to similar results in the South Atlantic, North Pacific and South Pacific subtropical gyres.