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On the role of the coastline in the Gulf Stream separation

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Recent model studies on the Kuroshio Extension and laboratory experiments on the Gulf Stream (GS) dynamics have evidenced the crucial role played by the shape of the coastline both in the separation of the current from the coast and in the intrinsic low-frequency variability of the western boundary current extension. In this context a process-oriented model study is presented aimed at analyzing the coastal separation of the GS and the transition to low-frequency fluctuations of the GS extension. The barotropic version of the Princeton Ocean Model is implemented in the North Atlantic with wind stress forcing in an idealized framework with basic elements of realism. The GS separation is analyzed systematically by varying the wind stress amplitude and the inclination of the coastline from Georgia to Cape Hatteras (the cape is artificially moved northward and southward from its real position). The results show clearly the fundamental role played by the shape of the coast not only in the separation process, but also in the intrinsic low-frequency variability of the free extension jet.