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The Slope of Sea Level along the North American Atlantic Coast

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Attempts have been made for many years to measure the slope of sea level along the North American coast. Such studies have been made from both oceanographic and geodetic perspectives. Oceanographers have wanted to know the strength of the Gulf Stream at various latitudes, and especially where it flows on the narrow shelf close to the Florida coast and where it leaves the coast around Cape Hatteras. Geodesists have been more concerned with obtaining an accurate measurement of the slope so that sea level can be used as an effective datum. Both sets of studies have benefitted recently from the new generation of geoid models provided by the GRACE and GOCE missions which have enabled the mean dynamic topography (MDT) to be measured along the coast more reliably than before. In addition, a new set of ocean models has provided insight into the main factors in ocean dynamics which determine the MDT. In this presentation, we describe our work with the different models and what we have learned about the circulation along this part of the world coastline. Such a study provides an excellent example of the complementarity of oceanographic and geodetic expertise within sea-level science.