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Measurements of Gulf Stream Meandering and Evidence of Seasonal Thermocline Development Using Long-Range Acoustic Transmissions

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ABSTRACT

Phase-coded signals with 60 rms resolution were transmitted twice weekly for several months from acoustic sources at ~2000 m depth in the Sargasso Sea to three bottom-mounted receives designed as West, East, and North stations at ranges approximately between 1000 and 2000 km. The transmission paths to West and East stations were entirely in the Sargasso Sea. The path to North station crossed the Gulf Stream and so traversed one of the most time- and range-dependent environments found anywhere in the ocean. Arrivals at all three stations were stable and could be identified from range-dependent ray traces. Travel times at West station clearly change in response to the warming of the seasonal thermocline from spring to summer. The travel-time change with predictions. Travel-time changes at North station primarily respond to the north-south meandering of the Gulf Stream.

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