



Abstract View

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Meanders of the Gulf Stream Downstream from Cape Hatteras 1975–1978

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ABSTRACT

Weekly Gulf Stream paths within 1000 km downstream of Cape Hatteras were obtained for 1975–78 from the Navy's weekly EOF charts based on satellite IR imagery. They displayed two dominant meander modes: first, a standing meander energetic over periods between 4 months and at least 4 years; and second, down-stream-propagating meanders that were most energetic at periods of several weeks. The long-period standing meander was confined between nodes located at the separation point near Cape Hatteras (i.e., where the Stream's mean path turns seaward) and at a point about 600 km farther downstream. The rms amplitude was 36 km at the antinode. The amplitude of propagating meanders increased rapidly in the first 200 km downstream of the separation point, where the capture of warm-core eddies was common. Farther down-stream, the predominant meanders had a wavelength averaging 330 km, a period averaging 1.5 month, a phase speed averaging 8 cm s^{-1} , a downstream group speed averaging 17 cm s^{-1} , and downstream exponential spatial growth rate averaging $3.2 \times 10^{-3} \text{ km}^{-1}$. They were energetic over a broad wavenumber-frequency band (periods of 1–6 months and wavelengths of 200 to more than 800 km) due to variable wavelengths, propagation speeds, and inter-meander space and time scales. The energetic wavenumber band was broadest near 4 cpy; it narrowed and shifted to larger wavenumbers with increasing frequency. The amplitude and frequency of occurrence of propagating meanders had large variability over time scales of a few months and longer.

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