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Application of complex flow decomposition in the Denmark Strait Overflow plume

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Past observations of the Denmark Strait Overflow (DS0) plume indicate sub-mesoscale eddy variability on a timescale of ∼2 days. During the summer of 2018 a square-shaped mooring array experiment, along with repeat hydrographic sections, was carried ∼120km downstream of the Denmark Strait Sill. The array allowed for velocity and temperature measurements to be conducted up to 300m above the local bathymetry of each mooring for ∼12 days. Dense (σ > 27.8 kg mˆ-3) and cold (Θ < 2 C) waters that characterize the DSO plume were detected at all moorings simultaneously with eddying motions. The dominant scale of variability was 1.7 days, a timescale similar to the reported sub-mesoscale one. Additionally, wavelet spectrum analysis of the velocity field revealed, at various times, the concurrent existence of high energy in scales ranging from the sub-mesoscale up to the turbulent regime. The aim of this study is to decouple the complex flow, identify sub-mesoscale structures, and detect their propagation through the array. This analysis will allow the study of eddy-plume interactions and their implications for high frequency variability in the plume. For the above purposes, the methods of Principal Oscillation Patterns (POP) and Complex Empirical Orthogonal Functions (CEOF) are primarily deployed.