

Intrusion fronts and internal jumps at the Columbia River mouth,
observed via shore-based marine radar

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Surface manifestations of interfacial phenomena in stratified flows (such as internal waves and ebb plume fronts) are observable in X-band radar imagery, revealed via surface current divergence induced modulations to the scattering wave field. Recent observations from atop a bluff overlooking the Columbia River mouth are testament to the richness of signal in a wave-averaged image time series of a highly stratified environment. Utilizing shipborne in-situ observations and airborne ATI-SAR surface current estimates as corroborating evidence, we identify and discuss the evolution of three features in the radar image time series that were observed to recur over multiple tidal cycles: a surface intrusion front, a bottom intrusion front, and an oblique, internal hydraulic jump. The surface intrusion front and internal hydraulic jump are identified by the presence of locally amplified backscatter intensity (i.e. a positive anomaly), whereas the bottom intrusion front is identified by the presence of locally attenuated backscatter (i.e. a negative anomaly).