

Located on the northeastern coast of Florida, Ponce Inlet is a shallow, short estuary with depths ranging between 2m in the shallows up to 10m in the thalweg. Current speeds, surface and profiling measurements of conductivity, temperature and depth were collected over a semi-diurnal tidal cycle on September 5, 2007. The mean flow in this estuary agrees with the flow structure of tidally dominated residual flow: inflow in the deeper channel and outflow through the shallower shoals. However, lateral gradients in density with values close to  $0.01 \text{ kg/m}^4$  are observed during ebb but become negligible during flood. The importance of the forcing caused by the ebb-tide density gradient relative to tidal influence and bathymetric effects are assessed.