Title

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Freshwater inputs from small mountainous rivers are responsible for a disproportionate fraction of the global delivery of sediment to the ocean compared to discharge rates (Milliman and Syvitski, 1992) and represent an important source of terrestrial particulate organic carbon to the ocean (Goni et al., 2013). Despite the contributions to global budgets, the focus on ROFI (region of freshwater influence) dynamics, to date, has tended to focus on systems that have large, persistent river discharges (>400 m^3s^{-1}). Here we will evaluate the momentum and buoyancy responses of a coastal system forced by relatively low river discharges.

The Firth of Thames (herein called `Firth') is a large, shallow semi-enclosed estuary that drains into Hauraki Gulf and the North-East shelf of New Zealand. At the landward boundary, the system is forced during the Austral winter by discharge events of up to 150 m^3s^{-1}. The vertical extent of the ROFI spanned the top 1 to 2 m, but was present at distances greater than 25km from the source. To resolve the variability of very thin plume, surface moorings were utilised. While this observational approach is uncommon, it has provided the first near-field observations of stratification and flow from the Firth.

During discharge events, strong seaward residuals are evident in the ROFI's near-field. For the largest events this seaward-directed buoyancy and momentum flux damps the tidal oscillations for several tidal cycles. At the longer timescale, the Firth is a balance between advection and rotation which is dependent on the timing of discharge events. The system is salinity stratified for around 4 to 5 months of the year. Since river-derived water has high sediment and nutrient loading from the surrounding catchment, exchanges with shelf seas are likely to impact adversely on ecosystem health, with oxygen minimum observed at a far-field site over multiple years. This talk will focus on understanding how transient river discharges alter the structure and budget at both the event and inter-annual time-scale.