Tide/Topography Interactions on Fraser Ridge

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The aim of this project is to quantify the magnitude, vertical structure and temporal variability of the flood tide accelerated bottom boundary jet above a glass sponge reef on Fraser Ridge. Fraser Ridge is located on the prodelta of the Fraser River in Georgia Strait and consists of a rocky outcrop surrounded by river sediment in 200 m of water. Orientated northwest-southeast, this ridge is a rocky outcrop 2000-m long by 500-m wide rising 50 m from the bottom. This subsurface ridge is one of a handful of locations, all off the coast of British Columbia, where reefs made up of glass sponges exist. These rare reefs form the base of an ecosystem and a window into ancient habitats as sponge reefs were once common in the world's shallow seas. Since a sponge reef is fixed to the substrate, local fluid dynamics is an important factor in the communities survival. In a 2007 study of the fluid dynamics over Fraser Ridge, asymmetrical tidal flows with a lee wave forming above the northern flank of the ridge on each flood tide were observed. In conjunction with this hydraulic effect, flow intensified in the lower layers over the ridge and down the lee flank above the large sponge reef that wraps around the northwest end of Fraser Ridge. The bottom jet formed on flood tide is likely strongest and narrowest over this sponge-rich area, delivering nutrients and keeping sediments suspended. Since this data set was collected from a ship-mounted ADCP, flow in the important bottom boundary layer is masked by bottom interference and side-lobe contamination. Resolving this bottom-layer jet will complete the three-dimensional quantification of the flow from the 2007 study and provide an important piece to the puzzle of why sponges colonized this location. To characterize this near-bottom flood jet, an Aquadopp Z-cell profiler will be bottom-mounted directly below the accelerated bottom flow of the lee wave.