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Title: Seasonal Variability of Total Suspended Matter in Minas Basin, the Bay of Fundy

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Category: Marine Renewable Energy

Minas Basin, at the eastern end of the Bay of Fundy in Nova Scotia, Canada, is a large macro-tidal estuary. Strong currents associated with the very large tidal water level range could potentially provide a source of renewable tidal energy, but are a fundamental part of the Bay of Fundy ecosystem. Significant extraction of tidal energy could lead to local and far field changes in the tidal regime and sediment dynamics. We present observations of total suspended matter (TSM) concentrations from ocean colour imagery (MERIS data) in Minas Basin from May 2008 to July 2011. Time series of TSM in 1-km-square pixel boxes throughout the Basin were produced, and temporal autocorrelation analysis has been carried out with those time series. The analysis shows a strong semi-annual variability in TSM concentration in most parts of the Basin. Larger TSM is observed in mid-winter (Feb-Mar), and smaller TSM characterizes mid-summer (Jul-Aug). The strength of this signal varies throughout the Basin, with the largest variation occurring in the centre of Minas Basin, and the smallest variation occurring in Cobequid Bay. It is notable that the variation is smaller in Cobequid Bay but the TSM is the highest in this region. The maximum and mean TSM derived from both summer and winter MERIS data were compared to predictions using the Delft3D model, using different values of the critical bed shear stress for muds to approximate different biologically-controlled sediment cohesion in the different seasons. Comparison between the magnitude and spatial patterns of observed and simulated TSM will help to evaluate the appropriate sediment parameters in the model and understand the observed seasonal variability of sediments in suspension.