



Investigating the Hydrodynamic Conditions and Sediment Transport Potential in Vidy Bay, Lake Geneva, Switzerland

Neil Graham and Jean-Luc Loizeau

Institute F.-A. Forel, University of Geneva, Switzerland

Vidy Bay in Lake Geneva, Switzerland has been extensively studied due to high levels of contamination (Haller et al. 2009; Poté et al. 2008), linked to the presences of a wastewater treatment plant (WWTP) releasing treated effluents into the bay, and inputs from combined sewer overflows. It is for these reasons that better understanding of the transport and fate of hydrophobic contaminants in the bay is necessary.

Hydrodynamic conditions 1.5m above the sediment-water interface of Vidy Bay were monitored for a period of 1.5 years. During this time, the current velocity, current direction, turbidity, and water temperature were monitored on an hourly basis. These measurements were conducted at two sites to understand the hydrodynamic conditions in the bay and in the adjacent main basin of lake Geneva.

The current velocity within the bay was found to vary between 0.15-15.54 cm/s (mean=1.60 cm/s), which was lower than the currents measured in the adjacent main basin, 0.25-12.71 cm/s (mean=3.51 cm/s). The current velocities measured adjacent to the bay are in good agreement with modeled data for the same location (Le et al. 2012). The mean current directions at both sites were consistent at 194.6° and 204.2°, in and adjacent the bay, respectively. The current direction at the site adjacent the bay, was seen to change in predominant direction between the stratified and unstratified seasons. During the unstratified season, the current direction was mainly in the NW direction, while changing to the NE direction under stratified conditions.

Turbidity was found to exhibit spikes at different times of the year; however, these spikes were not correlated with the other measured parameters. A few significant turbidity events are noted (approx. 30x the mean turbidity value). The sources of these spikes are still unknown. The presence of a downwelling event within the bay is noted in the presence of increased turbidity concurrent with decreased water temperature and increased current velocity.

Based on the sediment water interface current regimes found in and around Vidy Bay, it is likely that sediments are exchanged between the main basin and the bay at their boundary. During periods of stronger main basin currents, particles would more likely be advected into the bay, while during periods of lower current velocity would facilitate suspended sediment advection from the bay to the main basin.

Haller L, Poté J, Loizeau J-L, Wildi W (2009) Distribution and survival of faecal indicator bacteria in the sediments of the Bay of Vidy, Lake Geneva, Switzerland. Ecological Indicators 9:540–547. doi: 10.1016/j.ecolind.2008.08.001

Le A.D., De Pascalis F, Umgieser G., Wildi W (2012) Structure thermique et courantologie du Léman. Archives des sciences, Genève. Special Issue.

Poté J, Goldscheider N, Haller L, et al. (2008) Origin and spatial-temporal distribution of faecal bacteria in a bay of Lake Geneva, Switzerland. Environ Monit Assess 154:337–348. doi: 10.1007/s10661-008-0401-8