

## Impact of exchange flows on wetland flushing

Hrund Ó. Andradóttir<sup>1</sup> and Heidi M. Nepf

Ralph M. Parsons Laboratory, Department of Civil and Environmental Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts, USA

**Abstract.** The flushing of littoral regions is governed by barotropic river flows,  $Q_R$ , and baroclinic exchange flows,  $\Delta Q$ . This note presents field observations of two different flushing regimes in a shallow wetland that borders a lake. In spring, when river flows are high, the wetland circulation is river- or jet-dominated,  $\Delta Q/Q_R < 1$ , and the river short-circuits through the wetland in a much shorter time than the nominal residence time. During summer low flows, however, the wetland circulation is dominated by exchange flows,  $\Delta Q/Q_R > 1$ , that vary both on diurnal and synoptic (10–20 days) timescales in response to differential heating and cooling between the wetland and lake and to wind. These exchange flows can enhance wetland flushing by a factor of 10 relative to river flushing. A one-dimensional decoupled heat and flow model represents diurnal exchange flows in this system well and may be used to assess the importance of exchange flows in other systems.