# Measurement of mass exchange processes and coefficients in a simplified open-channel lateral cavity connected to a main stream

Mignot, E., Cai, W., Polanco, J. I., Escauriaza, C., & Riviere, N. (2017). Measurement of mass exchange processes and coefficients in a simplified open-channel lateral cavity connected to a main stream. Environmental Fluid Mechanics, 17(3), 429-448. <10.1007/s10652-016-9495-7> Accessed 05 Nov 2020.

**Abstract**

Lateral cavities are major storage zones in riverine environments for which the mass exchanges with the main stream strongly impact the characteristics of the habitat in these dead zones. An experimental work is presented here with a controlled main stream and a connected open-channel lateral cavity to assess the processes responsible for these exchanges and to quantify the exchange capacities. In a first step, the measurements of passive scalar transport allow us to identify the physical processes involved in the exchange of mass from the main stream and its spreading within the cavity. In a second step, the quantitative mass exchange coefficient, representative of the exchange capacity, is measured for 28 flow and cavity configurations. The sensibility analysis to the governing parameters proposed by the dimensional analysis then reveals that changing the geometric aspect ratio of the cavity does not affect the exchange coefficient while increasing the normalized water depth or decreasing the Reynolds number of the main stream tend to increase this coefficient. Indeed, these parameters modify both the growth rate of the mixing layer width at the interface and the amplitude of the alternating transverse velocity across the interface, thus affecting the exchange capacities from the main stream to the cavity..

**Keywords**

Mass exchange, Turbulent diffusion, Cavity, Exchange coefficient, Dye release method.