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Wave induced velocities inside and outside a riparian seagrass bed.

N. El-Allaoui , T. Serra, and M. Soler
University of Girona, Physics, Spain (marianna.soler@udg.edu)

Coastal wetlands landscapes, such as salt marshes and mangroves, form and evolve by dynamic feedbacks between vegetation establishment, flow hydrodynamics, and landforms changes. The vegetation-flow feedbacks make coastal vegetation very useful for coastal defense against storms and erosion, therefore importance of conservation of both aquatic and riparian vegetation is today commonly recognized. Experiments were carried out in order to study the flow structure within and outside a riparian seagrass bed in a laboratory flume subject to propagating waves. Different canopy densities, vegetation heights and wave frequencies were studied. Experiments were conducted in a 5m-long, 50cm-wide and 50 cm-deep flume equipped with a wave maker. Flow velocity measurements were undertaken with a microADV (Sontek, Inc) in two different points situated in the transversal section of the flume, one within the canopy and the other outside (in the centre of the flume).

A mean return current was found in both regions studied (outside and within the vegetation) only for emergent vegetation. The mean current induced within the emergent vegetation was found larger for lower densities and found at the bottom layer of the flume (from the flume bottom to the half of the depth of the water). In contrast, this current was shifted to shallower depths for larger densities (from the half of the flume water up to 4 cm depth). On the other hand, induced current velocities outside the vegetation were found higher for emergent vegetation patterns than for submerged, decreasing the differences when the canopy density increases. For submerged vegetation of different densities similar values of the mean current velocity were found outside the canopy.

Within the meadow horizontal wave velocity behavior is independent on both the vegetation density and height, but above the vegetation it appears a clear differentiation, becoming higher the wave velocity in the submerged vegetation case.