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Laboratory flume measurements of the hydrodynamics of discontinuous mussel beds

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Beds of the mussel *Mytilus edulis* are often observed to take on spatially heterogeneous distributions, notably forming "tiger-stripes" which are usually aligned normal to the mean flow direction. To what extent these are caused by ecological factors or hydrodynamic factors is not currently understood. In order to investigate the latter possible cause, laboratory flume experiments were undertaken in which flow profiles were measured in the vicinity of a discontinuous bed of *Mytilus edulis* shells. Results indicate that the boundary layer formed within the mean flow profile above the mussel bed, which scales with the bed roughness due to the mussels, persists for a relatively short distance downstream, whereas the elevated levels of very near-bed turbulence caused by the mussels continue beyond this. No mean flow recirculation or production of coherent eddies is observed as, for example, in the case of vegetated flow. The results imply that, if hydrodynamic controls are important in causing the patterning of mussel beds, the spacing that defines these patterns is set by the length scales of the turbulent wake of each section of the mussel bed, rather than by mean flow characteristics. Measures of these wake length scales are presented and discussed.