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# The effect of bed form migration on oxygen consumption in the hyporheic zone

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Dissolved oxygen (DO) is one of the key solutes of river ecosystems because it controls the redox processes and fuels the metabolism of organisms living in the water and the hyporheic zone. Oxygen dynamics in sandy streambeds have been extensively studied under conditions that are characterized by stationary bed forms, despite the fact that bed form migration is common in most streams. Therefore, we evaluated the effect of overlying water velocity and bed form celerity on hyporheic exchange flux (HEF) and oxygen consumption under moving bed conditions. We measured the two-dimensional DO distribution under various water velocities using a planar optode in an experimental recirculating flume system (260 cm $\times$ 29 cm), packed with natural sandy sediment collected from the Yarkon River in Israel. Hyporheic exchange flux was measured with salt (NaCl) tracer additions. The oxygenated zone in the sediment expanded when the stationary bed started to migrate upon increase in water velocity, but remained relatively constant despite further increase in celerity. By combining the DO distribution with HEF measurements we calculated the average DO consumption rates. The average DO consumption rate under bed form migration increased initially with velocity due to increasing advective pumping. However, the consumption rate decreased at faster velocities due to the increasing role of bed movement, and decreasing role of advective pumping. These results are important for understanding stream metabolism, and the role of the hyporheic zones during bed form migration.