Abstract Submitted
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**High-Schmidt-number mass transport mechanisms from a turbulent flow to absorbing sediments** CARLO SCALO[1], UGO PIOMELLI, LEON BOEGMAN, Queens University — We have investigated the mechanisms involved in dissolved oxygen (DO) transfer from a turbulent flow to an underlying organic sediment bed, populated with DO-absorbing bacteria, relying on the coupling between the bio-geochemistry of the sediment layer and large-eddy simulation for the transport on the water side [Scalo et al., *J. Geophys. Res.*, *117*(C6), 2012]. Time correlations at the sediment-water interface (SWI) show that the diffusive sublayer acts as a de-noising filter with respect to the overlying turbulence; the mass flux is not affected by low-amplitude background fluctuations in the wall-shear stress but, rather, by energetic and coherent near-wall transport events, in agreement with the surface renewal theory. The spatial and temporal distribution of the mass flux is therefore modulated by rapidly evolving near-wall high-speed streaks (associated with intermittent peaks in the wall-shear stress) transporting patches of (rich-in-oxygen) fluid to the edge of the diffusive sublayer, leaving slowly-regenerating elongated patches of positive DO concentration fluctuation and mass flux at the SWI. The sediment surface retains the signature of the overlying turbulent transport over long time scales, allowed by the slow bacterial absorption.

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