

Effects of tubificid bioturbation on pore structures in sediment and the migration of sediment particles

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Bioturbation play an important role in affecting the behavior of pollutants near the water-sediment interface. However, the mechanisms of this effect are still not very clear. In this study, the effects of tubificid bioturbation on pore structures of the sediment and the migration of sediment particles were evaluated using a series of simulations. In the experiments, the distribution and variation of the tubificid burrows and macropores in the sediment were investigated by X-ray computed tomography (CT) and digital image collecting, without sampling or disturbing the sediment. The migration of the sediment particles was determined using CT by adding $BaSO_4$ to the sediment as a tracer.

The results indicate that after the addition of the tubificids, both the burrows and the macropores in the sediments increased with time, and the rate of increase slowed gradually. With the increased worm density, the burrows and the pore structures also increased. The in-depth distribution of the burrows and macropores was determined by the settlement time of the worms (Figure 1). Thickening of the oxidized zones in the superficial sediments in the presence of tubificid bioturbation was also observed. The main action of tubificids on the sediment particles was the transport of particles from the inner sediment (especially in the range of 30-50 mm in depth) to the water-sediment interface. Both the formation and the variation in the burrows and macropores, as well as the transport of particles from the inner-sediment to the interface, would affect the behaviors of contaminants in the sediment and overlaying water near the water-sediment interface.

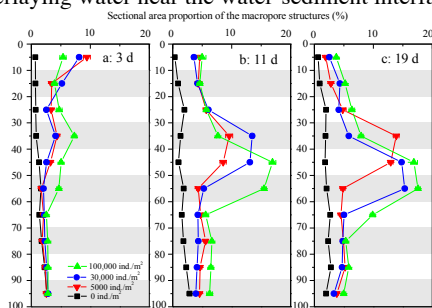


Figure 1: Vertical distribution of the macropore structures in the sediment.