

Fate and transport of tetracycline and ciprofloxacin and impact on nitrate reduction activity in coastal sediments

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Fluoroquinolones and tetracyclines are frequently detected antibiotics in aquatic sediments. We investigated the transport and fate of ciprofloxacin (CIP) and tetracycline (TC) as well as their impact on nitrogen transformations in sediments from the Seine Estuary (France). Flow through reactor experiments showed that although TC and CIP strongly interacted with the sediment components through adsorption and (bio)-chemical transformation, they kept their antimicrobial activities. Less nitrate reduction was observed during the first period of breakthrough, while TC and CIP were absent in the column effluent. Whereas TC is to a large extent chemically transformed and little adsorbed in the sediment, CIP was less transformed and more adsorbed, most likely due to the great reactivity of TC with redox-active mineral surfaces. Our findings show the strong capacity of natural sediment to retain and transform antibiotics, while still maintaining their antimicrobial activity or inhibitory effect of nitrate reducing activity