Nitrite accumulation in the Seine River, France: Abundance and activity of nitrifiers

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In the Seine River, France, nitrite concentrations exceed the European norm (0.6μM). Nitrite is produced and eliminated by ammonia oxidizers (AO) and nitrite oxidizers (NO) respectively in the oxic water column. In order to get more insight in the role of pelagic nitrification in the origin and persistence of elevated nitrite concentrations downstream of Paris we studied the potential for AO and NO. In addition the key players in ammonia and nitrite oxidation in the water column and the 2 main WWTP outlets of the Seine River were enumerated with qPCR. We showed that the pelagic ammonia and nitrite oxidation potentials were similar whereas nitrite oxidizers outnumbered ammonia oxidizers by an order of magnitude. The low levels of ammonium in the water column are efficiently oxidized by ammonia oxidizing archeae. However, the relatively low nitrite oxidation rates was in contrast with high numbers of NO. This discrepancy is most likely due to mixotrophic and or heterotrophic growth of *Nitrobacter*, the dominant species in the water column. Rather alternative metabolism of NO than high abundance of pelagic NO in the highly anthropogenic impacted river explains the persistence of nitrite along the Seine River.