

Titanium nanoparticles fate in small sized watersheds under different land-uses

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We monthly sampled surface waters from three catchments having contrasted land-uses and analysed and observed titanium dioxide nanoparticulate (NPs-TiO₂) in sampled waters by single particle ICPMS and electron microscopy. We report one-year sampling data with the detection of NPs-TiO₂ in surface waters, with an average of 9.1×10^8 particles L⁻¹, corresponding to a mass concentration equal to 11 µg NPs-TiO₂ L⁻¹. An increase of concentration in warmer months is observed in the forested and agricultural catchments. In addition, both had higher concentrations of NPs-TiO₂ than the predicted values by probabilistic models but are within the range of recently measured NPs-TiO₂ in the field with similar approaches. The positive correlations between NPs-TiO₂ mass concentration or particle number with the concentration of some trace elements and DOC in the forested and agricultural catchments suggest the detected NPs-TiO₂ in these two systems are mostly from geogenic origin as well as in the urban catchment. Besides, the microscopy imaging confirmed the presence of NPs in the three catchments. Furthermore, the highest normalized flux of NPs-TiO₂ (1.65 kg TiO₂ year⁻¹ km⁻²) obtained for the agricultural catchment suggests that the agricultural practices have a different impact on the NPs-TiO₂ dynamics and exports than other land-uses (Urban or forestry). A similar trend is also found by the reanalysis of recent literature data.