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Assessment of the tracer potential of emerging contaminants in aquatic systems

OLHA NIKOLENKO, ESTANISLAO PUJADES, LAURA SCHEIBER, FRANCESC LABAD, SANDRA PÉREZ, ANTONI GINEBREDA AND ANNA JURADO

Severo Ochoa Excellence Center of the Spanish Council for Scientific Research (CSIC)

Presenting Author: olha.nikolenko@idaea.csic.es

The advancement of analytical and sampling techniques facilitates studies of the dynamics of emerging contaminants (ECs) in aquatic systems. Collected evidence show the possibility to use ECs as co-tracers in conjunction with more conventional tracers (major ions, nutrients, isotopes) to distinguish and delineate wastewater pollution associated with anthropogenic activities in urban or agricultural settings. As a rule of thumb, conclusions about the potential application of ECs as co-markers are made based on their correlation with conventional counterparts. However, such approach is robust only for the cases where it is conceivable to differentiate all end-members based on concentrations or isotopic compositions of conventional tracers. *In-situ* investigations, obviously, targeting open dynamic environmental compartments, report usually an overlap between signals derived from conventional indicators. In this context it is important to understand the applicability of ECs not only for untangling sources of wastewater input into aquatic ecosystems, but also for characterizing hydrogeological and biochemical properties of the studied system. In this study we present an approach, which incorporates multivariate statistical analysis and mixing modelling, used to identify the most suitable ECs to be employed as anthropogenic tracers. This approach can be applied under different environmental settings and we verified its performance on a dataset containing the information about concentrations of 105 ECs as well as major and minor ions in surface and groundwater collected from 7 sampling points on a monthly basis during a one-year monitoring campaign carried out at the Besòs pilot site located in Barcelona (Spain).