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Sedimentology, stratigraphy and chronology of a decantation tank in the sewer network of Orléans (France).

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Current debates on the status of the Anthropocene convey geologists and palaeoenvironmentalists toward new spatial and temporal targets. One of the most emblematic socio-ecosystem of the Anthropocene is urban areas in which the dynamics of materials are mainly controlled by human activities. This brings unprecedented elemental, molecular and isotopic concentrations and distributions that lead Norra (2009) to propose a new geological sphere: the Astysphere. Here we propose that sediments accumulated in sewer networks can provide original, integrated, and multi-thematic archives for the recent history of cities by considering urban systems as any catchment where materials are produced, transported and sedimented.

The study site is a decantation tank that collects stormwater and wastewater from the north of Orléans city, upstream wastewater plants in Orléans. Sediments accumulated since 1942 over 17 m depth and were never cleaned out until 2015. Two sedimentary cores of 70 (A) and 250 cm long (B) were collected before clean out and then a third of 150 cm (C) after.

Sediments are organized into layers constituted by sands and gravels alternating with silts and organic layers. Sharp contacts between those layers indicate evenemential sedimentation, as expected in sewer networks. We formulate the hypothesis that organic/mineral alternations result from a seasonal dynamic.

⁷Be presence in topmost sample from core A confirms it was deposited within the last 6 months. In core C, only the upper half core, mostly mineral, displays significant ⁷Be levels whereas ⁷Be is absent from the lower half, which is mostly organic. This would confirm that our hypothesis of a seasonal alternation, with organic facies deposited during spring- summer and mineral facies deposited during fall-winter. 30 ¹⁴C dates measured on cores A and B by postbomb method are logically distributed with depth, the most ancient (beginning of the eighties) being recorder at 2.5m depth.

This study shows that sediments accumulated in a decantation tank constitute sedimentary archives comparable to more natural ones, thus allowing palaeoenvironmental reconstructions for the Anthropocene. We are currently examining the mineral and organic content of this archive to provide a detailed chronology of the history of man-made materials (drugs, plastics, pesticides...) in urban contexts.