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Investigation of uranium and thorium isotopes in the Garonne-Lot and Dordogne fluvial systems (France)

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Human activities lead to the release in the environment of various chemical species like heavy metals, or organic contaminants. Many of these substances bind strongly to sediments, which are delivered to rivers. Thereafter the fate of these pollutants in fluvial environments is linked to the transport of these particles. U-Th series radionuclides are potential tracers to investigate these processes of transport from land to sea. But, up to now, their use is mainly devoted to marine science. Here we present a preliminary investigation of uranium and thorium isotopes in the Garonne-Lot and Dordogne fluvial systems (S.W. France). The Dordogne River, to the north, originates in the Massif Central; the Garonne River in the Pyrénées. The confluence of both rivers forms the Gironde estuary. The Garonne Riverr is the major tributary and, at present, is the main pathway of heavy-metal contamination issued from former Zn ore processing industries located upstream on a tributary, the Lot. Selected sites on this fluvial system (Lot, Garonne, Dordogne, Gironde estuary) were sampled at different times of the year to collect water samples in order: (1) to determine the levels of dissolved uranium and their variations with stations and hydrological characteristics and (2) to establish the signature of U-Th series radionuclides in particulate phases. After filtration, dissolved uranium was purified using standard radiochemical techniques and counted for the determination of U-238 activity and U-234/U-238 activity ratio using low-level alpha-spectrometry. After HNO3-HClO4-HF digestion, selected particle samples were processed as the same in order to determine U-238, U-234, Th-232, Th-230. U-Th series activities show significant variations along the river-estuary-ocean transect. The rather high dissolved uranium values, when compared to global mean riverine uranium concentration, may be ascribed to the considered drainage basins. These results will be discussed to assess if U-Th series radionuclides are suitable as

tracers to study transport within the Garonne-Lot and Dordogne fluvial systems.