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According to the farming or human use of their watershed, the karst aquifers were particularly vulnerable to contamination by fecal bacteria mainly Escherichia coli (E. coli). To date, if E. coli is a commensal bacteria originated from intestinal tracts of humans and vertebrate animals, the water and sediment are also considered as a putative second habitat where some strains could be naturalized.
Among the phenotypic characteristics of E.coli, association with particles not only could enhance the survival of some strains but also greatly influenced the particles dynamics. The great genetic diversity of E. coli may explain this variety of lifestyles of this bacteria species. Indeed we have previously shown that in river, the structure of the population of E. coli was not stable, but depended on hydrological conditions (Ratajczak, 2010). In this work we go further into the understanding of the behaviour of E. coli population in karstic hydrosystem by investigating (i) the structure of E. coli population based on the distribution in four main phylo-groups (A, B1, B2, D) according their settling velocities from surface water to groundwater. For this purpose we combined microbiology , microscopy (SEM) and hydrology approaches.
During their transfer along the karst hydrosystem, both modalities of the association of E. coli to the particles and, the structure of E. coli population were modified. Settling experiment led us to separate two contrasted fractions according to the association of E. coli to particles: (i) “non settleable particles“ mainly composed by particles with settling velocities ranging between 10-5 to 10-2 mm.s-1, corresponding to organics and organo-mineral microflocs (ii) “quickly settleable particles” with settling velocities ranged from 10-1 to 1 mm.s-1, composed of two dominant particulate populations of mode 8 μm and 40 μm. The mode of 40 μm is composed of minerals (carbonated or quartz) particles some of them being associated to organic flocs. The results show that in a karstic aquifer, the distribution of E. coli based on (i) their association to these two fractions (ii) their phylogroup, varies differently along the transfer between the swallow hole to the spring. Consequently as in river, the structure of the population in groundwater is not stable and is related to their association with particles.