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Characterization of small soil microaggregates and nanocolloids using two flow field fractionation methods

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Soil microaggregates (SMA, d <250 μm) play a key role for the structure and ecological functions of soils. Small SMA (<20 μm) are considered as the building units of these aggregates. The knowledge about their distribution and chemical composition helps to understand their role in SMA formation and architecture. Our work focused on the characterization of potential functional building units of small SMA and their nucleus. We investigated the size distribution and chemical composition of small SMA using field flow fractionation methods. With centrifugal field flow fractionation (CF3), we established a new method allowing the fractionation of small SMA between 0.02-20 μm which were further characterized by light scattering, UV and ICP-MS. Furthermore, the nanocolloids (d<220 nm) were analyzed with asymetric flow field flow fractionation (AF4) coupled to a UV-detector and ICP-MS. The results showed that the chemical composition as well as the size distribution of small SMA including nanocolloids changed with the soil clay content. The elements Al, Si, Fe and organic carbon in the SMA size fractions revealed different mass ratios providing a deeper insight into the composition of SMA building units.