Sampling and replication in soil invertebrate research

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The selection of appropriate spatial scale when designing experiments is of crucial importance for soil fauna research, as many groups display spatial dependance and spatially structured diversity patterns at small and intermediate scales. From methodological point of view, estimation of spatial variability in community structure and abundance of soil fauna is essential. Spatial autocorrelation in soil fauna distribution violates the assumptions and affects the results of classical tests of significance and regression analysis in inferential statistics. This study investigates diversity patterns in communities of soil oribatid mites (Acari: Oribatida). The distribution patterns at the metacommunity level were analyzed as the decay in community similarity as a function of intersample distance. In all three sites community assemblages were spatially autocorrelated. The results suggest that Oribatida communities separated by distances as large as 60 m may not be spatially independent. Soil cores collected within such vicinity should not be used as independent examples of community response to environmental factors, and should not be treated as independent replicates in statistical analysis.