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ABSTRACTS BOOK

Title : Ants in space and time: spatiotemporal niche dynamics in ecosystem complexes

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Text :

Wood-pastures harbor important natural and social values and are among Europe's most ancient land use forms. By accommodating four habitat types (grasslands, solitary trees, forests, and forest edges) on a relatively small spatial scale, these "ecosystem complexes" host functionally and compositionally distinct arthropod communities, thus enhancing landscape-level biodiversity. In the presented study, we aimed to uncover both the spatial and temporal niche-based mechanisms that enable this diversifying effect by simultaneously monitoring the niche breadths and overlaps of ant communities living on the four different habitat types of wood-pastures throughout three seasons. To achieve this, we connected ant occurrence data with fine-scale microclimatic measurements and constructed four-dimensional hypervolumes of 28 ant species. Based on our results, ants exhibit substantial changes in their realized niche metrics across the different habitat types and throughout the year, leading to spatially distinct communities and community-wide temporal changes. The direction and magnitude of seasonal changes varied among the three behavioral groups distinguished based on their observed behavioral and ecological dominance (dominant, intermediate, subordinate). This suggests a differential effect of seasonality along the dominance hierarchy. Importantly, while certain general trends were observed, the communities of the four different habitat types showed peculiarities in niche dynamics. This implies that the effects of seasonality on niche dynamics are modulated by habitat structure and its associated microclimatic conditions. Our study unveils the interactive effects of seasonality, habitat structure, and microclimate on niche dynamics and overlaps, showcasing the intricate interplay and temporally variable nature of these factors facilitating species coexistence.