Altitudinal gradients offer a unique opportunity to understand the main drivers of species richness, which is especially crucial in the era of sixth mass extinction and global environmental changes. Biodiversity along altitudinal gradients has been studied by eminent scientists like Alexander von Humboldt, but factors shaping biodiversity are still far from being well understood. Thus, a clear interpretation of the biotic and abiotic factors that affect how species richness varies with elevation remains elusive. Most studies concerning the role of an altitudinal gradient in shaping biodiversity focused on relatively large organisms, whereas similar research on microscopic animals such as meiofauna (body size up to about 1 mm) is still limited. Studies on microscopic animals have long been dominated by the ubiquity paradigm, stating that small animals can easily inhabit any area around the globe. Only recently have researchers begun to appreciate that microscopic animals are not as widespread as previously thought. However, the mechanisms and extent to which the environment influences the specific communities or traits in microscopic animals are still widely ignored. Currently, we see an extreme limitation in the availability of comprehensive data on the relevant functional traits of many meiofauna groups that may affect their diversity and distribution. The issue is additionally hampered because these small animal groups are often poorly known and many species still await to be discovered. Thus, a prior experience with species identification in certain groups of studied organisms is usually required. **The main objective of my project is to combine various analytical tools to determine diversity and distribution patterns as well as effects at work in the communities of meiofaunaalong an altitudinal gradient**. To achieve this, I will use tardigrades, a morphologically diverse and common group of meiofauna. They exhibit both sexual and asexual reproduction, varying degrees of cryptobiotic tolerance (ability to enter the diapause stage and resist unfavourable conditions such as desiccation), different diet preferences, and various egg-laying strategies. These characteristics make tardigrades a suitable model in the project and a fine representative of the meiofauna. I will accomplish the main objective by **(1) characterising tardigrade communities' composition, abundance, and distribution in mountains** and supplementing it by determining **(2) the ecological factors** and **(3) the effect of tardigrade functional traits that may affect their diversity and distribution**. So far, no study has comprehensively addressed these issues. Appropriate taxonomic identification (based on tardigrades' external appearance and genetic data) combined with data on ecological factors and functional traits will allow me to make general statements about tardigrade composition, abundance, and distribution in mountains. This will greatly contribute to our understanding of the mechanisms shaping the biodiversity of the meiofauna. As some of the analyses and data collections will constitute either a true novelty or the first such big initiative, I will inform the tardigrade and meiofauna research community on the practical guidelines. This refers especially to establishing species boundaries with genetic data conducted on a large scale and to data collection on functional traits. Also, the discovery of new taxa is very likely during the project. Describing them will further enrich the knowledge on the diversity of tardigrade species. The project will significantly contribute to several fields of science, namely biogeography, taxonomy, and evolutionary biology. In summary, the project will unravel unknowns concerning the processes and factors influencing the diversity and distribution of meiofauna. Moreover, the project will be the first tardigrade integrated study conducted on such a large scale. Therefore, it will constitute the framework for subsequent evo-ecologically directed studies on tardigrades but also other microfauna groups.