Potential Habitat Diversity and correlates with species richness in the Alps and Carpathians

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Larger scale species richness is strongly dependent on habitat diversity. In mountain systems, habitat diversity is often difficult to assess because of fines scale topographic variation and lack of consistent data availability. Here we present a method that assesses the potential, bioclimatically-based habitat diversity at large spatial scales driven by fine-scale topographic variation. Further, we tested to what degree this potential habitat diversity explains the high mountain species richness in the Alps and Carpathians using the IntraBioDiv data set. We develop a series of climate maps at the spatial resolution of 200m. Therefore, we used climate station data, a digital elevation model spanning Alps and Carpathians, and the DAYMET climate mapping package. Several climate maps were selected and recombined to form small biolimatic hypercubes in the environmental hyperspace. By this, each pixel belonging to the same hypercube type can be considered to share similar environmental characteristics, and thus they belong to the same potential habitat type. The number of such habitat types within IntraBioDiv sample grid cells reached up to 300. Depending on the threshold elevation and aggregation function, the correlation with high mountain species richness reached values of r=0.85. In the Alps, the habitat-richness correlations were higher than in the Carpathians, likely due to better climate data availability.