

The Importance of Rock Particle Size to Localized Plant Species Distribution in Subnival Habitats of the Central Great Caucasus Mountains

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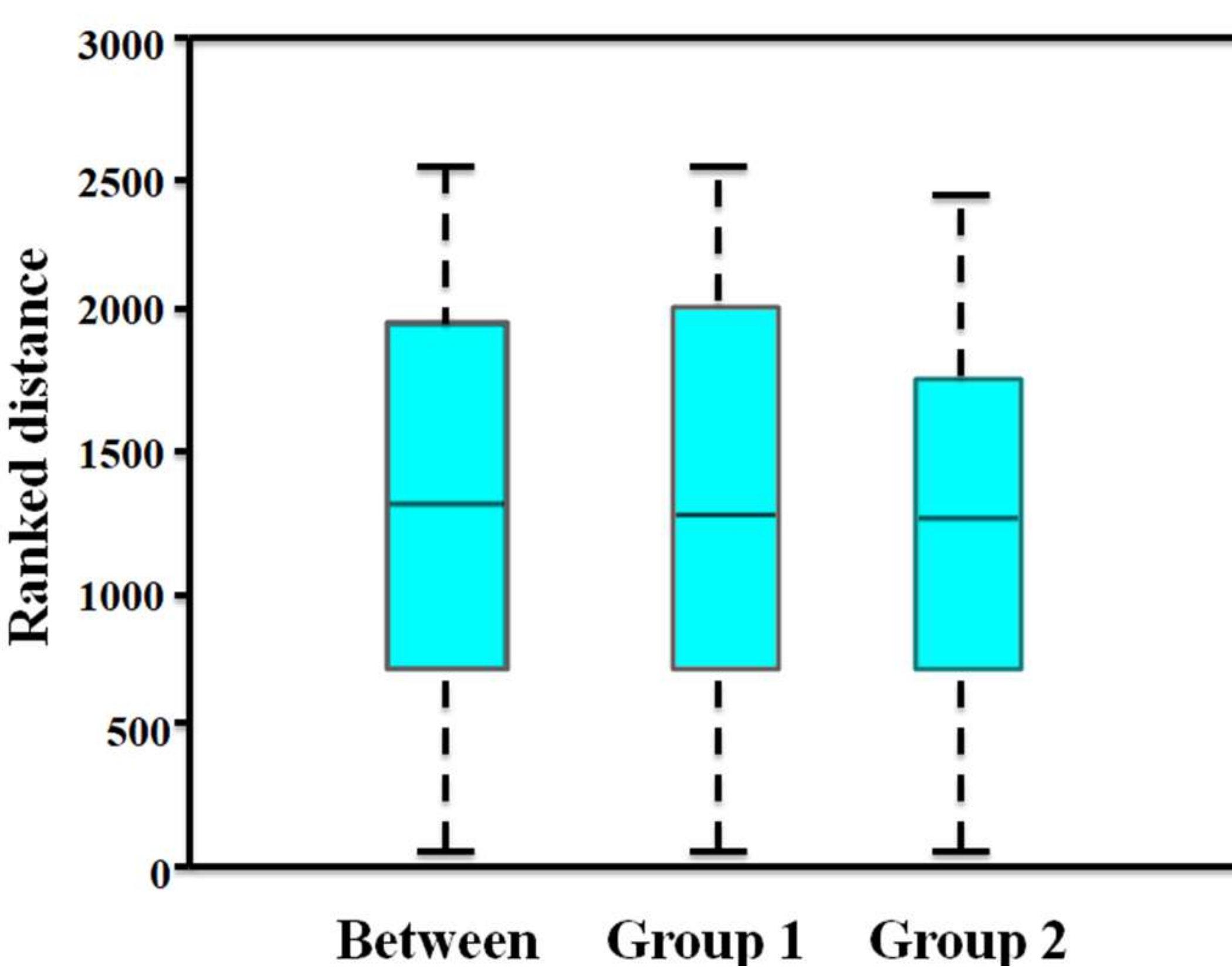
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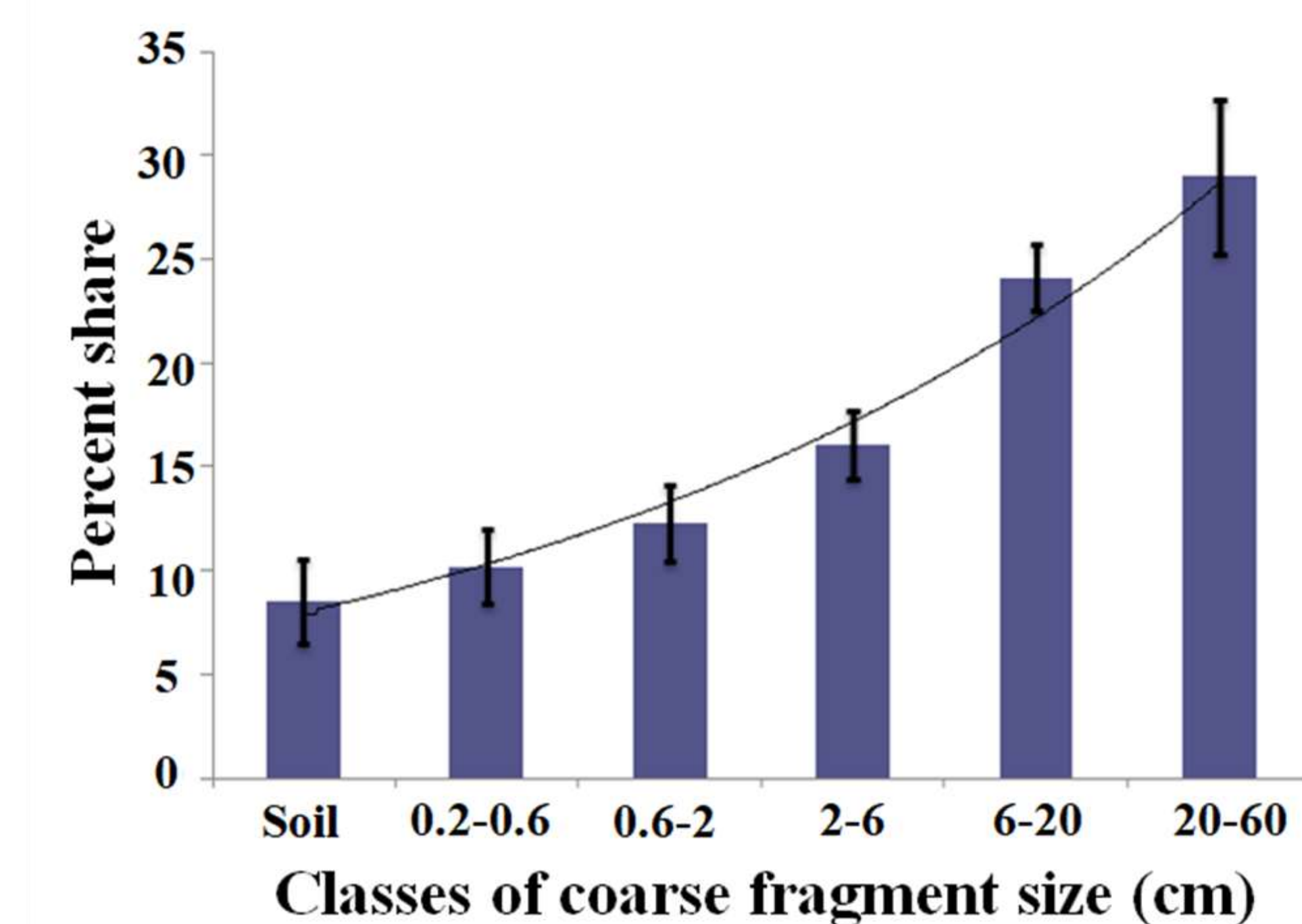
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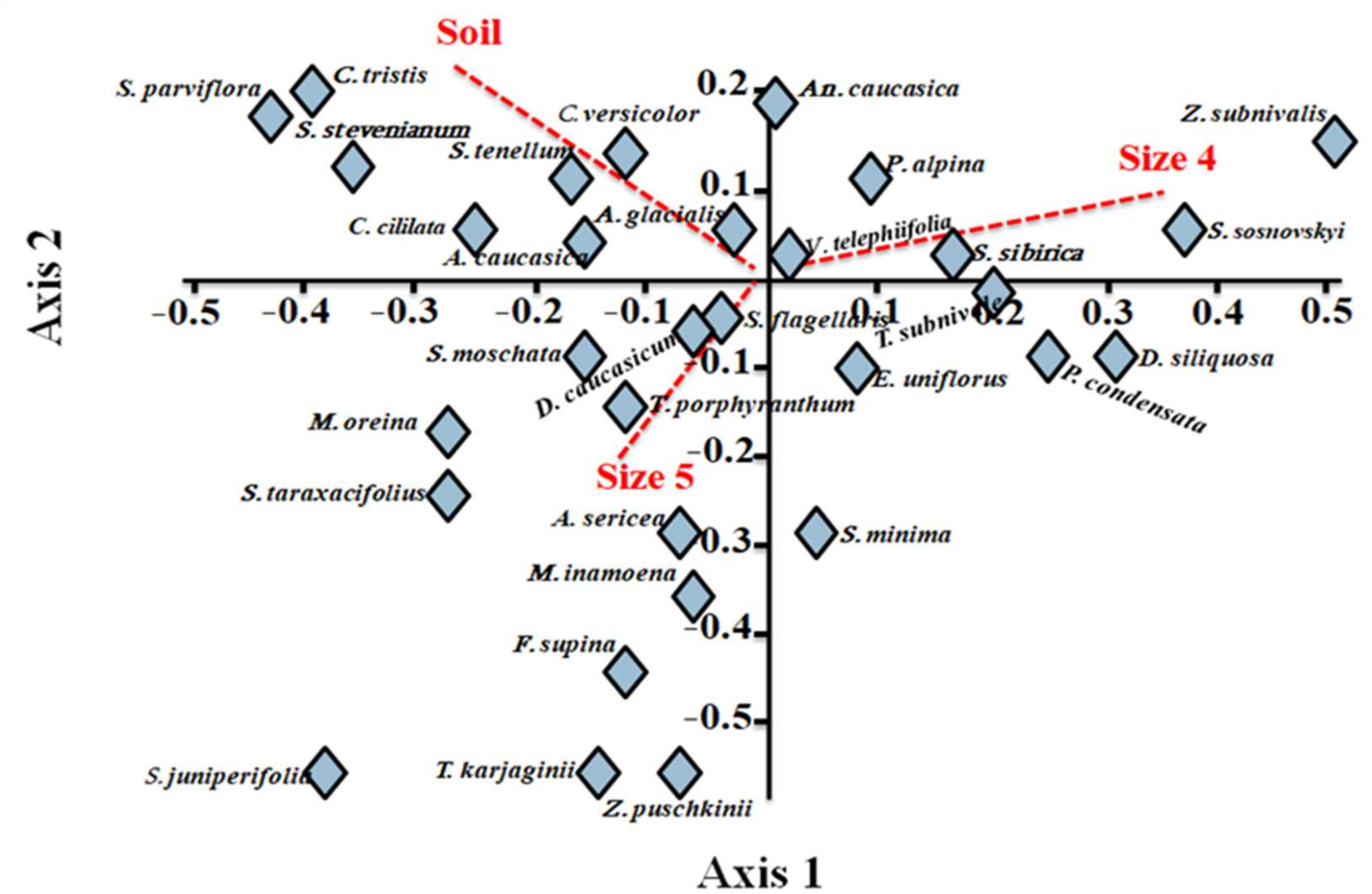
Location of our study areas: Mt. Kazbegi and Mt. Tetnuli, the major eastern and western landmarks of the Central Great Caucasus.



ANOSIM test between two groups (Mt. Kazbegi and Mt. Tetnuli, 3000 to 3100 m a.s.l.). ANOSIM statistics: Mean rank within = 1284, Mean rank between = 1273, $R = 0.71$, $p = 0.009002$.



Size distribution of coarse surface fragments in alpine-nival ecotone areas of the Central Great Caucasus (3000 to 3100 m a.s.l.)



CCA ordination biplot of plant species distribution in alpine-nival ecotone (3000-3100 m a.s.l.) in the Central Great Caucasus along a gradient of rock fragment size. Size 4 and Size 5 correspond to rock fragment size class 6-20 cm and 20-60 cm, respectively.

- I. The climate (mean air temperature and annual precipitation) at two sampling areas (3000-3100 m a. s. l.) were qualitatively similar, as the climagrams for Mt. Tetnuli and Mt. Kazbegi showed a similar shape and overlapped strongly
- II. Size distribution of coarse particles showed a prevalence of large-sized rock fragments. We included soil in this distribution because soils are formed from the finest particles and thus can represent a natural product of rock Fragmentation
- III. The largest size class (20- 60cm) was in a strong negative correlation with smaller classes (0.2-0.6cm, 0.6-2cm and 2-6cm), but correlation was insignificant among the largest fragments (6-20cm) and the soil patches.
- IV. Multivariate ordination revealed several species with a clear preference for soils (*Carex tristis* and *Sibbaldia parviflora*), while other species preferred mid-sized (20-60cm) rock particles (*Tephrosia karjagii*, *Ziziphora puschkinii*, *Festuca supina*, *Minuartia inamoena* and *Saxifraga juniperifolia*). Further, *Senecio sosnovskyi* and *Ziziphora subnivalis* tended to colonize large (6-20cm) rock fragments.