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Rock fragments as micro-fertile islands in semiarid areas

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Understanding the roles of rock fragments in the eco-geomorphic system in semiarid climatic regions is of great importance because of their influence on overland flow generation, sediment movement, and soil properties; the effects of these factors provide habitats for flora and fauna.
On north- and south-facing hillslopes in the northern Negev region of Israel, soil was sampled from under rock fragments of divers sizes – small, medium, and large, i.e. 4-6, 8-10, and 13-16 cm, respectively – and positioned on the soil surface or partially embedded in the soil – hereafter "on top" and "embedded", respectively. Control samples were taken from bare soil. Soil samples were taken in February from each aspect, and for each size and position of rock fragments. The soil was sampled from two depths: 0-2 and 5-10 cm. For each soil sample, moisture, organic matter, and calcium carbonate contents were determined. Soil temperatures at the above two depths were measured once per month during one year.
Organic matter, calcium carbonate, and moisture contents in soil under rock fragments were higher than those in bare soil.
The rock fragment characteristics (size and position) affected each of the soil properties with differing intensities. Under the large and medium rock fragments soil moisture contents were significantly higher than those under the small ones; and embedded rock fragments promoted higher moisture contents than those on top of the soil. Rock fragment position had the most significant effect on soil organic matter content, which was higher under the "on top" fragments.
Rock fragment size and position had significantly greater effects on the south-facing than on the north-facing hillslopes, with regard to increasing the spatial variability of soil temperature, moisture, organic matter and calcium carbonate contents. Therefore, the south-facing aspect exhibits clear fragmentation of the soil.
On the south-facing hillslope the positive influence of rock fragments on the organic matter content compensated to some extent for the smaller contribution of litter deposited by its sparse shrubs, compared with that on the north-facing one.
Variations in soil properties were associated with the rock fragments, which can be seen as micro-fertile islands with similar function to those of shrubs, i.e. concentrating natural resources and releasing them to the environment, and forming potential habitats for varied fauna and flora.