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ORGANIC MATTER ALTERATIONS ALONG AN ALTITUDINAL GRADIENT IN MEDITERRANEAN HIGH-MOUNTAIN SOILS

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The objective of this study was to characterize the changes in soil organic matter (SOM) composition with a climatic elevation gradient in Mediterranean high-mountain soils. The Mediterranean area and high-mountain ecosystems are especially vulnerable to degradation and climate change. In these environments, SOM is particularly important for ecosystem services, because of its key role in important soil processes, its rapid responses to environmental changes, and feedback to the atmospheric climate system. Four soil profiles were sampled along an altitudinal gradient (1250, 1900, 2400, 3101 m a.s.l.) in the Sierra Nevada Natural Park (SE-Spain). This area provides Europe's first barrier against the advance of desertification from North Africa. Higher percentages of total carbon, total humic extract and humin fractions were observed in the fine-earth samples of the soils from lower altitudes. Although the profile at 1900 m showed the highest humification degree (HA/FA ratio), in general SOM quality decreases with height. Py-GC/MS and 13C NMR spectroscopy have been used to characterize the SOM composition. Results suggest that the upper soil layers were dominated by labile organic matter with high abundances of polysaccharide derived compounds, whereas more resilient materials occurred in deeper horizons. Along the altitudinal climosequence, the aliphatic-C region in the NMR spectra (0-110 ppm) is lower in the low-altitude soils compared to those from higher altitude, where harsh climatic conditions seems to be limiting the decomposition of the aliphatic compounds. The decrease in alkyl-C/O-alkyl-C ratio with altitude is well correlated with the decrease in the humification degree.