



Eocene paleosols of King George Island, Maritime Antarctica

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Red layers between lava flows on King George Island, Maritime Antarctica, were formed during the Eocene, which was one of the warmest periods on Earth in the Cenozoic. Our hypothesis is that these red layers are paleosols formed in periods of little or no volcanic activity. Therefore, our main objective was to identify the main pedogenic properties and features to distinguish these from diagenetic features formed after the lava emplacement. Additionally, we compared our results with volcanic soils formed under different climates to find the best present analogue. The macromorphological features indicate a pedogenic origin, because of the occurrence of well-defined horizons based on colour and structure. Micromorphological analyses showed that most important pedogenic features are the presence of biological channels, plant residues, anisotropic b-fabric, neoformed and illuvial clay and distinct soil microstructure. Although the paleosols are not strongly weathered, the geochemical data also support the pedogenic origin despite of diagenetic features as the partial induration of the profiles and zeolites filling nearly all voids in the horizons in contact with the overlying lava flow, indicating circulation of hydrothermal fluids. The macromorphological and micromorphological features of these paleosols are similar to the soils formed under seasonal climates. Thus, these paleosol features do not correspond to the other proxies (e.g. sediment, plant fossils), which indicate a wet, non-seasonal climate, as in Valdivian Forest, Chile, during the Eocene in King George Island