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Mineralogy, geochemistry, micromorphology and WRB classification of a soil-sedimentary sequence on limestone in Monte Coronichi (Istria, Croatia)

Vedran Rubinić, Lea Beloša, Elizabeta Tomašić, Goran Durn

The aim of this work was to analyze a soil-sedimentary sequence in a vineyard on the Istrian peninsula in order to relate its properties to climatic conditions and to classify it according to WRB. Regional climate is moderately warm with hot summers (Csa). The profile consists of recent Terra rossa overlying two red palaeosols on limestone of Lower Eocene age. The designations and depths (in cm) of the horizons are: Ap (0-30), Ap/Bt1 (30-70), Bt1 (70-110), Bt2 (110-170), 2Btb1 (170-200), 2Btb2 (200-230), 3Btb3 (230-260), 3Btb4 (260-300), R (>300). Its (micro)morphology (color, structure, clay coatings, Fe/Mn nodules) indicates long and intense weathering and pedogenesis (interrupted by erosion/sedimentation cycles). Accordingly, pH_{KCl} values are lower than 4.2. The soil is (heavy) clay, with clay content increasing with depth. However, this increase is interrupted in 2Btb1 and 3Btb3 horizons, which contain less clay than the horizons immediately above. Nevertheless, both 2Btb1 and 3Btb3 have abundant illuvial clay. Along the profile, CEC increases with increasing clay content, and its values indicate low-activity clays. The main soil minerals are kaolinites and illitic material, with significant amounts of quartz and hematite. Distribution of the three most abundant oxides reflects weathering intensity: SiO₂ decreases with depth, while Al₂O₃ and Fe₂O₃ increase. The whole sequence is named Rhodic Lixisol (Clayic, Cutanic, Hypereutric, Profondic). Considering that Lixisols are soils of seasonally dry (sub)tropical regions, and in agreement with the results presented here, one can conclude that the studied profile developed in a climate different from the present one. This work has been fully supported by Croatian Science Foundation under the project No 2019-04-8054 - WIANLab (Western Istrian Anticline as an ideal natural laboratory for the study of the regional unconformities in carbonate rocks).

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