
Influence of Climate on the Iron Oxide Mineralogy of *Terra Rossa*

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Abstract: *Terra rossa* samples were taken from the B horizons of soil profiles and from cracks within limestone in Italy. The average annual temperature (AAT) of the sites ranged from 8.4 to 20.3° C and the average annual precipitation (AAP) from 511 to 3113 mm, with either a 5– 6 month water deficit or a large water surplus. Goethite and hematite were identified in all the samples. Under a moist (> 1700 mm AAP) and cool (13° C AAT) climate, a xeric, hematitic pedoenvironment was preserved by the well-litified carbonate rock. Hematite occurred in trace amounts, even with an AAT of 8.4° C and an AAP of 3300 mm, confirming the specific role of the hard limestone on the pedoclimate of *terra rossa*. The lowest mean crystallite dimension of goethite and hematite was found in the samples from the wettest sites, and in these samples hematite was nearly free of Al substitution. Rubification in *terra rossa* appeared to be due to the specific pedoenvironment. The hematite cannot be considered a relict phase formed under another climate. Illite and kaolinite were the main clay minerals in samples from xeric sites whereas more weathered clays, such as Al-interlayered vermiculite, occurred in cool, moist sites. We postulate that the processes of rubification and vermiculitization could have taken place at the same time.

Key Words: Goethite • Hematite • Pedoclimate • *Terra rossa* • XRD

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