



Paleopedological, mineralogical properties and paleo-environmental implications of Late Miocene paleosols in Denizli area (SW TURKEY)

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Paleosols developed in floodplain mudstones/siltstones of the Late Miocene Asartepe formation in Denizli area generally display red or reddish colored that ranges from 50-90 cm thick. The contact between the parent rock and paleosol layer generally gradational. The truncated weathered profiles, secondary carbonates accumulations as nodular, fiber and massive, root traces, prismatic/blocky soil structures, destruction of primary sedimentary structures, desiccation cracks and horizonations are important indicators to recognize the paleosols in the field.

Mineralogical properties of paleosols reflect typical pedologic distribution. According to X-Ray diffraction analysis, mostly dominant clay mineral is illite, accompanied by moderately kaolinite, smectite and trace of chlorite. It is clearly that the amount of clay mineral content shows an increase in soil zones. In addition, a part of clay minerals of paleosols also represent residuals of parent rocks. The illite and kaolinite are also well-crystallized in the soil layers. The mineralogical composition of pedogenic carbonates is calcite and dominant non-clay mineral constituents such as quartz, feldspar, hematite are present throughout the sections. Hematite forms poorly crystalline or amorphous shape and well measured by Hunterlab miniscan™ XE Plus spectrophotometer.

Stable isotopes geochemistry studies were performed on bulk paleosol and pedogenic carbonates in order to reconstruct terrestrial paleoenvironment; the $\delta^{13}\text{C}$ values for soil organic matter and pedogenic carbonate are averagely -26‰ and -7.3‰ (VPDB), respectively. These results indicate that Late Miocene paleosols and pedogenic carbonates imply a pure C_3 vegetation (all trees, most shrubs). The $\delta^{18}\text{O}$ records from pedogenic carbonates are between -5.81‰ and -8.85‰ (VPDB) and average value is -7.33‰ . During the soil-forming processes of Late Miocene, little variations in $\delta^{18}\text{O}$ values represent fluctuations in climate and that could be interpreted as product of arid to semi-arid and humid/wet seasons.