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Magnetic susceptibility and free iron oxides (Fed) of a loess-paleosol section at Southwestern Sari (Northern Iran)

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Introduction: Magnetic susceptibility and the amount of extractable free iron oxides (Fed) commonly increased by soil development (Karimi et al., 2013; De Jong et al., 2000). The aim of this study was to investigate the magnetic susceptibility and Fed variations in loess-paleosol sequence section at Southwestern Sari in northern Iran.

Material and methods: Location and climate of the study area: The loess-paleosol section is located in southwest city of Sari. A total 66 samples were taken at 10 cm intervals. Fed, magnetic susceptibility, particle size distribution and carbonates were measured.

Results and Discussion: The section composed of a modern soil (MS) and three paleosols (PS). The PS1 and PS2 paleosols consist of relatively thick Btk horizons and the PS3 paleosol was composed of two thick Bsskg horizons. The lowest amount of Fed was 6.98 g kg⁻¹ in 100-90 cm depth of modern soil (Bk horizon) and the highest amount was 13.57 g kg⁻¹ in 540-530 cm depth of PS3 (Bsskg horizon). The Xlf varied from 16.6 to 172 × 10⁻⁸ m³kg⁻¹, which is the lowest values occurred in Bsskg Horizon of PS3 paleosol and the highest values were in Btk horizons of PS1 and PS2 paleosol. High values of Xfd in PS2 paleosol represents the higher amount of supermagnetic particles which indicated more intense weathering conditions during PS2 paleosol formation. The Xlf/Fed ratio reflects the proportion of ferrimagnetic minerals of Fed content (Hu et al., 2009; Ghafarpour et al., 2016). Higher Fed content and lower Xlf/Fed in PS3 paleosol are the indication lower ferrimagnetic minerals which mean that most of the Fed consist of low magnetic susceptibility minerals. In fact, reducing conditions decreased the magnetic susceptibility by destroying original magnetic minerals and/or by limiting the formation of secondary ferrimagnetic minerals (Kravchinsky et al., 2008).

Keywords: Free iron oxides (Fed), Loess, Magnetic susceptibility, Paleosols

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