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Effect of different geopedological conditions on behavior of selected heavy metals in forest soils of Western Alborz, Iran

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Soils developed on six different parent materials were studied in order to compare heavy metal distribution under different geopedological conditions in Western Alborz, Iran. Total metal contents, metal partitioning and distribution profiles are discussed in relation to inheritance factor and pedogenic processes. Total content of Cr, Co, Ni, and V were highest in the pedons developed on Dolerite (Do) and Peridotite (Pe), and lowest in the pedons derived from Phyllite (Ph), Tonalite (To), Shale (Sh), and Limestone (Li). Zn and Pb concentrations were highest in the Sh. The variability of total Cu was lowest among different pedons, however, this figure was significantly different when only samples from lower horizons were compared which reflects homogenizing and masking effects of pedogenic processes. Enrichment or depletion of the elements was assessed using Ti as reference element. Generally, elements are enriched in pedons developed on Ph and To, especially in argillic horizons; however, pedons derived from Do and Pe are mostly depleted from heavy metals except for Pb. In pedons developed on Sh and Li, different heavy metals showed completely different enrichment/depletion pattern with depth. The pedogenic processes that lead to these patterns are discussed on the basis of chemical and pedological results. The modified BCR (European Community Bureau of Reference) sequential extraction procedure was conducted to speciate elements into four operationally defined fractions: HOAc extractable, reducible, oxidizable, and residual. Fe, V, Ni, and Cr were predominantly found in the residual fraction; the contribution of reducible and oxidizable fractions is

variable among these elements and different genetic horizons. Co is mostly distributed in the non-residual fractions of pedons developed on Pe, Do, and Sh. The order of Cu and Zn in each fraction was generally as follows: residual $>$ reducible $>$ oxidizable $>$ HOAc extractable. However, in epipedons of To and Li, the contribution of oxidizable fraction was as equal as reducible fraction. As for Mn, the order was reducible $>$ residual $>$ HOAc extractable $>$ oxidizable for pedons developed on Ph, To, Sh, and Li. On the contrary, this element is preferentially associated in residual fraction of pedons developed on Pe and Do.