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Exploring uni-element geochemical data under a compositional perspective

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Abstract

Different features of geochemical information were studied by comparing spatial distribution of concentration values and compositional data values. Geochemical data are compositional and should be treated as such to avoid spurious correlations and misleading interpretations. However, geochemists are also interested to discuss in terms of elemental concentrations. In this work the spatial distribution of Fe, Mn, Ti, Co, Cr, Ni and V based on 3,535 topsoil samples collected in Campania region (Southern Italy) and analysed by ICP-MS after aqua regia digestion, is studied. Unielement maps and CoDA based maps, namely of ilr-transformed data and of two subcompositions of 3 components have been produced and interpreted. Results show that the ilr maps often show different geochemical patterns from those provided by the maps based on raw concentrations, namely for V, Fe and Co. This is not surprising as each studied ilr is a (log)ratio of an element against the others and account for the compositional variability. Nevertheless, the geochemical patterns of both raw and ilr based maps relate mostly with the geolithological features of the region: (1) (Ti, Ni, Cr)log-ratio variables are the best pathfinder in differentiating between