An application of multivariate statistical analysis using SAS programme to identify heavy metal sources between Cebeci (Kocaeli)-Eregli (Zonguldak), Turkey

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The aim of this work is to determine heavy metal contents and their possible causes that represent the variability of The Sakarya Canyon coastal sediments using SAS programme. Results of the previous study were conducted in the same area and obtained by using SPSS programme (Yalcin et al., 2013). The results of analysis show that Zn,Cr,Zr,V, Ni,Pb,Co,Cu,Ga,As,Nb,Al,Sn,Cd,Fe,Mg,Ti and Mn are the highest values of heavy metals. Correlation analysis results display that there are high relationships between concentrations of Zn and Al,Cr and Mg,Ti,Mn,Fe and V. According to PCA, because of the eigen values that are larger than 1, three components are obtained. From the three components which are obtained: first one includes Ti,Mg,V, Mn,Co,Fe,Cr,Nb, second one contains Pb,Zn,Al, Cd and third one consists of Sn,Zr,Cu,Ga. Though, As wasn't included any of these components. The PCA that uses rotated loadings pointed out that first one variance explanation ratio is 42%, second one variance explanation ratio is 19% and finally third one variance explanation ratio is 16%. Considering all three components, total variance explanation ratio is 77%. Furthermore, PCA was performed using varimax transformation in order to obtain more interpretable results. When hierarchical cluster analysis is applied to data, resulting dendogram showed that highest similarities are between G2, G3 and G4 stations. The similarities between these stations refer to the similarities between the ambient conditions. Regression analysis of the percentage of explanatory (R2) is 0.99 and the results of analysis are shown a high degree of accuracy. According to the data, heavy metals representing different factor groups display genetic similarity.

[1] Yalcin M.G., Simsek G., Ocak S.B., Yalcin F., Kalayci Y., Karaman M.E., "Multivariate Statistics and Heavy Metals Contamination in beach sediments from the Sakarya Canyon, Turkey" Asian Journal of Chemistry, 25 (4), 2059 - 2066 (2013).

Coal petrography and depositional environments relationship of the Tertiary coals from Anatolides (Tokat Region - Turkey)

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The study area is situated in the Anatolides, one of the major tectonic units of the Turkey The aim of the study was to understand depositional environments of the Pliocene and Eocene coal-bearing strata from two different area of the Tokat region, and this is the first detailed investigation on the coal petrographic characterization and the interpretation of coal facies and depositional environment. These Pliocene and Eocene coals are a high ash and sulphur sub-bitumnious coal which is petrographically characterised by a high huminite content, mainly gelinite macerals, relatively abundant vitrite, clarite and carbalgilite microlithotypes. The mineral matter of the studied coal samples are made up mainly of clay minerals and quartz, in which calcite is the dominant mineral phase. Generally, the Pliocene coal has slightly higher ash content than the Eocene coals. Gross calorific values similar between Eocene and Pliocene samples (respectively avr. value 2974.33 and 3051.8 Kcal/kg). These coals have similar huminite reflectance value (average R_{max} values respectively; 0.42% and 0.48%). Based on volatile matter and gross calorific value, Eocene and Pliocene coals can be characterized as "Sub-bitumnious B/C" coals. The ultimate analysis shows that these coals are low in carbon content, but have high oxygen and sulphur content. Palynological investigation in this study (especially Ovoidites parvus, the prevalence of the freshwater algae of Ovoidites ligneolus species) supports the development of that kind of vegetation in the Tokat region. Low TPI values indicate predominance of herbaceous and woody derived tissues and increased rate of subsidence that result in the poor preservation of the maceral structures. GI values indicate variable water table and suggest that the mire was not too acidic.

On the basis of the petrological parameters it is concluded that the Artova and Zile coals from Tokat interior are limno-telmatic type, formed in the lagoon in typical this formation conditions.