

Geochemistry of coals from Peñarroya Basin (Spain)

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Scope of the study

This study focuses on the geochemistry of selected bituminous and anthracite coals from the Peñarroya Carboniferous Basin (Spain). These coals were deposited in marginal lacustrine and/or fluvial floodplain sedimentary environments and vary widely in rank (Rr: 0.6% to 3.2%) (Marques, 2002).

A factor analysis (varimax normalised) was performed in order to establish the affinities of major, minor and trace elements with aluminium-silicate, sulphide and carbonate mineral associations found in these coals. Results obtained by using three major factors are shown in table below.

Factor 1					Factor 2			Factor 3	
Aluminium-silicate					Carbonate			Sulphide	
Al	0.97	Cr	0.91	Pb	0.61	Mn	0.92	S	-0.88
Se	0.97	Sc	0.90	Cu	0.58	Fe	0.90	As	-0.87
Si	0.97	Ba	0.90	Sr	0.57	V	0.87	Co	-0.86
Ash	0.97	Tb	0.87	Ni	0.52	Ca	0.79	Ni	-0.81
Ti	0.96	U	0.87	Mg	0.50	Mg	0.71	Cd	-0.42
Cs	0.96	Gd	0.85	Cd	0.34			Mo	-0.15
Rb	0.95	Na	0.84	Ge	0.18				
K	0.94	Li	0.80	Sb	0.20				
Ce	0.92	Zr	0.75						

Discussion of results

The association of Fe with carbonates instead of sulphides is due to the low sulphur contents ($0.3\% < S_{\text{total}} < 1.1\%$), and fluid circulation related with igneous activity during coalification. These fluids are responsible for the occurrence of epigenetic carbonates and some clay minerals (mainly kaolinite). Taking into account the affinities shown in the table and the high amounts of Mn, V, Cs, Rb, Cr, Sc and Li detected in these coals (compared with data from Swaine, 1990), it can be assumed that: (i) Mn and V are mainly related with igneous fluids; and, (ii) the anomalous amounts of Cs, Rb, Cr, Sc and Li could be related with the input of detrital minerals from Precambrian and Lower Palaeozoic rocks, during coal sedimentation.

References

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Hydrogen isotopic compositions of long-chain n-alkanes in the Doro River basin, Hokkaido Island, Japan

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We measured the compound-specific δD of long-chain (C_{23} - C_{31}) n-alkanes (δD_{ALK}), which are vascular plant biomarkers, in forest soil, marsh peat and lake sediment collected from the drainage basin of the Doro River (Uryu experimental forest) in order to evaluate an applicability of organic matter δD as source indicator. The δD_{ALK} values showed a large variability, ranging from -243 to -173 ‰. Our result showed that δD_{ALK} was obviously different between forest and marsh samples, showing that n-alkanes in peat samples were significantly depleted in deuterium relative to that of forest. This indicates that the δD of vascular-plant biomarkers reflect the depositional environment, probably in response to relative humidity. The higher δD_{ALK} in forest samples could be related to increased evapotranspiration in tree plants, while marsh plants have lower δD_{ALK} possibly due to the lower evaporation effect in leaf waters. The results from river, estuary and lake sediments indicated that n-alkanes in the Doro River sediments were a mixture of forest and marsh sources while estuary sediments in other rivers show higher δD_{ALK} , suggesting they mainly come from forest soils. This study indicates that hydrogen isotopic composition of organic compounds can be a useful tool for inferring sources of riverine organic matter.