Relationship between enrichment of rare earth elements and paleoenvironment and paleoclimate of the No.4 coal from Pingshuo Mine, Ningwu Basin, North China

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The Pingshuo Mine lacated in north of Ningwu basin is an important mine in Shanxi Province. To investigate the mineralogy and geochemistry of Pingshuo coals, the 10 bench samples of the No. 4 coal were collected. From top to bottom, the No.4 coals are named as P1 to P10.

The content of total REY in the No.4 coals varies from 25.55ug/g to 1359.28ug/g and averages 248.91ug/g, higher than that in common Chinese coals (135.89ug/g, Dai et al., 2012a).However the CC (Dai et al., 2012) of benches P4 and P2 are higher than others (10.00 and 3.21, respectively), means abnormal enrichment in these benches, and LREY enrichment is a major contributor (CC of LREY are 12.40 and 3.64 respectively).

The salinity contents as well as Sr/Cu, Sr/Ba□Th/U, Ca/Sr and Al/Ti are obvious zonality. From top to bottom, the coal accumulating environment can be divide into two sections, e i., Section I, including upper No.4 coals (from P1 to P4), revealed that paleoclimate cycled between warm and humid to semi-arid and hot. Section II,including lower No.4 coals (from P5 to P10), is stable depositional environment with freshwater, warm and humid.Importantly, in P4 and P2, the salinity strengthens due to evaporation over recharge. Thus the content of Ca^{2+} and Ba^{2+} also increases, and the swamp alkaline increases too. That not promote the clay minerals to REY adsorption, but make contribution to gelatinize, and then produce a large amount of humic acid to motivate alkaline ion combine with macerals. Other hand, Temperature increases may be reduce the activity of hydroxyl, making easier to be complex ion. So these elements such as REY, Ca, Sr, Ba and so on can be enrichment in minerals and macerals.