Geochemical and mineralogical characteristics of beach sand sediments in southwestern Black Sea: An approach to heavy mineral placers

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Abstract:
Coastal or beach placer deposits are enrichments of heavy minerals with significant metal content that have been mechanically formed. This work studies the geochemical and mineralogical characteristics of beach sand sediments of southwestern Black Sea, Turkey which cover approximately 20 km$^2$ area. The study area has 4 main geological units: Upper Cretaceous moderately-K kalkalkaline Istanbul volcanics, Oligocene Danismen Formation which is dominated by flood plain, marshy and lake environments, Upper Miocene-Pliocene Belgrad Formation which is dominated by terrestrial deposits, mostly gravel, sand and clay dominated and Quaternary formations which include sandy beaches, sand dunes and river alluvials.

A total of 8 beach sand samples were analyzed by X-ray Diffraction (XRD) and X-ray Fluorecance (XRF). Mineralogical compositions are mainly dominated by quartz, siderite, albite, calcite and minor amount of magnetite. Siderite-rich beach sands are observed in western part of the study area and mostly derived from Danismen Formation. Fe$_2$O$_3$ contents of this area are determined up to 40%. On the other hand, in eastern part of the study area REE-Th-U content of beach sands are relatively higher than source rocks which is defined as a high-Al moderately-K kalkalkaline felsic rocks. The highest HFSE concentration were determined in -250+125µm fraction which consists of 16.5% of eastern beach sand. In this fraction LREE-Zr-U content rise drastically. It can be considered that REE-LREE contents is related with monazite minerals and U contents is related with zircon minerals, considering the monazite and zircon minerals are resistant to weathering and likely to occur in the orthomagmatic phase in the source volcanics.
Key words: Beach sand sediments; REE-Th-U; heavy minerals; southwestern of Black Sea; Turkey