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Monthly concentration variations of the atmospheric elements in TSP and PM2.5 on the East Sea coastal region: Comparisons of distribution patterns between TSP and PM2.5

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The East Asian region is one of the largest emitters of crustal (Asian Dust) and anthropogenic aerosols as well as pollution precursors (SO_2, NOX and NH3) in the world. The southern East Sea acts as a receptor of the huge crustal and anthropogenic emissions from the East Asian region by long and medium-range transport under the influence of the monsoon system. We investigated the elements (Al, Fe, nss-K, nss-Ca, nss-Mg, As, Cd, Cu, Mn, Pb and Zn) concentration and its monthly variation on the east coast of Korea (37.08 [U+F0B0] N and 129.41 [U+F0B0] E) in both TSP and PM2.5, collected during March 2014-March 2017. It showed that the monthly variations of geometric means for the atmospheric elements in TSP had a similar pattern in two sites (Uljin, east coast, and Ulleung Island; the distance of $\sim$140 km), indicating that the both sites could be considered in terms of a system of soil- and anthropogenic- dominated components; the soil-dominated component was pronounced in spring (e.g., March-April) followed by autumn (e.g., October-November). However, the monthly distributions of EFs (enrichment factors) in TSP showed a different pattern from those of elemental concentrations in PM2.5 statistically, except for nss-K. Therefore, the atmospheric elements, mostly anthropogenic origin, in PM2.5 have a different pathway (e.g., transport, formation and deposition) within the atmosphere. The EFs in PM2.5, especially, showed a higher value in summer season (e.g., July and August) when the atmospheric elemental concentration and composition could be influenced by wet deposition and the summer monsoon, which together with anthropogenic aerosol transport decrease the concentration of soil components and fine-sized particles remaining in the atmosphere.