Seasonal spatial distribution patterns of seawater quality in Jinhae bay of Korea

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For quantitative analysis of seasonal spatial distribution pattern on the marine water quality in Jinhae Bay of Korea, spatial autocorrelation statistics (Moran's Index) was applied. Water quality data consisting of general water qualities (seawater temperature, salinity, DO, pH, TOC, SS, chlorophyll-a) and nutrients (silicate, phosphate, DIN) were observed at 23 stations for three years (2010 ~ 2012). Study area has the regional characteristics of complex coastline shapes. Therefore, spatial neighborhood range was defined using Gabriel Network method rather than fixed distance method, and spatial pattern was classified into two types, clustered and non-clustered pattern (random & dispersed). As the results of Moran's Index calculation for 10 items, fall showed 53% of spatial clustered pattern (Moran's Index > 0.2). Winter, summer, spring showed 37%, 27% and 23% respectively. Also, six (seawater temperature, TOC, SS, chlorophyll-a, silicate, DIN) of ten items were shown clustered pattern of more than two times in fall. Meanwhile, phytoplankton had a clustered pattern in every fall season for three years. According to the result of correlation analysis between phytoplankton and six water quality items, the only two items (TOC, chlorophyll-a) were correlated with phytoplankton. Therefore, in order to understand the characteristics of the marine environment, there is a need to consider the spatial statistics, as well as non-spatial statistics.

Keyword: seawater quality, spatial clustered pattern, Moran's Index, Gabriel Network, spatial statistics