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Analysis of the period features and its long time scale impact factors of saltwater —A Case Study of Modaomen Waterway.

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Abstract:
Saltwater intrusion has caused a huge threat to the safety of water supply in the estuary area and the sustainable development of social economy. In this paper, Modaomen waterway was chosen as a case study. By using wavelet analysis, trend test and correlation analysis, this paper investigated the rules of saltwater intrusion, and analyzed the effects of low flow, tide level and sea level rise on the saltwater intrusion. The result showed that: 1) There existed significant changes of the saltwater series in hour, day and month time scales, which with a 15d as the first main period. 2) In the latest decades, the low flow decreased in Makou station that locates in upstream of Modaomen waterway, while it increased in Sanshui station. The lowest tide level in dry season decreased in Zhuyin and Denglongshan stations, while the sea level in dry season was on the rise. 3) Through the numerical classification method, the saltwater intensity series of long time scale was constructed. The results indicated that saltwater intrusion of Modaomen waterway has increased significantly from the early 1990s. 4) Correlation analysis of the impact factors with a long time scale showed that there was a negative correlation between the intensity of saltwater intrusion and low flow and the lowest tide level, while the sea level rise and the tidal range is positively related to the intensity of saltwater intrusion. The impact of the low flow to saltwater intrusion is the greatest, followed by the lowest tide level, and then the tidal range, that of the sea level rise is the least. The research results have great realistic significance to master the periodic characteristic of saltwater, and ensure the safety of the local water supply and take steps to the saltwater intrusion.

Keywords: Saltwater intrusion, Periodic variation, Long time scale impact factor, Modaomen