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Evaluation of mixing and stratification in Geum River Estuary, Korea

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The mixing and stratification processes evaluate the effect of freshwater discharge in Geum River Estuary which can be controlled by an artificial gate operation. Field observations have been performed to obtain data of current and oceanic variables (i.e. temperature, salinity, and density). The mixing and stratification processes in this region can be determined by tidal currents and time of after freshwater discharge. Most of the discharged freshwater appears to be advected back and forth by the tidal currents. As time goes on, discharged freshwater is mixed during flood tide and forms a stratified layer during ebb tide because of high and low shear or low and high buoyancy between upper and lower layer. Such cyclic processes can be quantitatively evaluated by conducting field observation and analyzing in accordance with tidal currents and time of after freshwater discharge. The gradient Richardson numbers show that discharged freshwater forms strong stratification for a short time of after freshwater discharge during ebb tide. In the flood tide after the ebb tide, this stratification gradually becomes unstable and mixing occurs slowly. In the case where the freshwater has been discharged for a long time, mixing is dominant irrespective of the tidal currents. This is because mixing has progressed by the cyclic process and buoyancy is weakened.

Key words: stratification, mixing, gradient Richardson number, observation

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