

# A 3-D simulation of long-term variability in the flow field and T-S structure in the Ise-Mikawa Bay estuary

Koichi Taguchi\* Kisaburo Nakata\*\* Tetsuya Ichikawa\*

## Abstract

The long-term variation in flow velocity, temperature and salinity fields in the Ise-Mikawa Bay estuary was examined in a triennial simulation, using a time-dependent 3-D hydrodynamic model. The simulation covered from April 1993 to March 1996. The daily change regimes of the observed sea-surface winds, tidal elevation at the open boundary, river discharges and meteorological parameters were incorporated into the forcing variables of the modelled estuary.

Simulated distributions of velocity, temperature and salinity were compared favorably with the field measurements both in time and space, suggesting good reproducibility of the flow field by the hydrodynamic model. It was found from the results that the estuarine flow field in the surface layer, especially in summer seasons, varied considerably year-to-year depending on the meteorological conditions. The flow field in the summer of 1993 was characterized by a clockwise gyre in the upper reach of the estuary, and was associated with river discharge and prevailing wind. In 1994, it was very stagnant under dry and calm conditions, and in 1995, it was marked by an offshore current system affected by a flood river plume. In contrast, the hydrodynamics of the middle layer, at a depth of approximately 5 m, were consistent and the flow field was characterized by large-scale, clockwise circulation.