

1991 年度日本海洋学会岡田賞受賞記念講演  
沿岸海洋前線の生成機構と変動に関する研究\*

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**A Study on Generation Mechanism of a Shallow Sea Front and Its Variabilities**

—Lecture by the Member Awarded the Okada Prize of the  
Oceanographical Society of Japan for 1991—

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**Abstract :** The author reviews his study on generation mechanism of a shallow sea front and its variabilities awarded the Okada Prize of the Oceanographical Society of Japan for 1991.

A new physical model is proposed for frontogenesis (nonhydrostatic model) in a shallow sea such as the Kii Channel during winter. This model retains the vertical acceleration term in momentum equation to simulate properly phenomena of a large aspect-ratio in the frontal region, such as gravitational convection induced by surface cooling.

Numerical experiments are carried out to examine the validity of the model by using vertically two-dimensional model basin. Gravitational convection induced in the frontal region strengthens the horizontal convergence to form a remarkable front comparable to the observed one and that this effect of convection surpasses that of a tenfold cooling rate in a usual model adopting the hydrostatic approximation. It is also found that sharpness of front largely depends on horizontal eddy viscosity (diffusivity).

Water exchange process caused by fluctuations of front is examined by tracking numerous labeled particles. Gravitational convection also plays an important role in this process by producing a large Lagrangian drift in the frontal region.

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