Dynamical frontogenesis in the transitional regions between the subtropical and the subpolar gyres

*三寺 史夫[1]
*Humio Mitsudera[1]

1. 北海道大学低温科学研究所
1. Institute of Low Temperature Science, Hokkaido University

Sea surface temperature fronts in the transitional regions between the subtropical gyre and the subpolar gyre have significant impacts on extratropical atmospheric circulations and climate. Exchange of subtropical and subpolar waters through the transitional regions are also important for thermohaline circulation, material circulations and biogeochemical cycles. However, our understandings of complex flow dynamics in the transitional regions are still lacking. In this presentation, we discuss a large-scale oceanic frontogenesis in the transition regions from a point of view of baroclinic Rossby wave (BRW) propagation pathways, i.e., the BRW characteristics. This theory indicates that frontogenesis occurs where BRWs that bring a thick layer subtropical origin and BRWs that bring a thin layer of subpolar origin encounter, thereby creating a thickness jump and a baroclinic jet. The characteristic curves are deflected greatly by barotropic flows. We particularly pay attention to the effects of small-amplitude topographic features. Two transitional regions are discussed; one is the Transitional Domain in the western North Pacific, and the other is the Brazil/Malvinas confluence zone in the southern Atlantic. It was found that the surface front jets in the Transitional Domain, so-called the Isoguchi Jets, are produced primarily by convergence of thickness flux due to BRWs along the characteristic curves. On the other hand, eddy thickness flux across the characteristic curves is important for causing bifurcation of the Brazil/Malvinas Confluence into two fronts - the Subtropical Front and the Subantarctic Front. Eddy thickness flux is weak eastward of the bifurcation, where these fronts follow the BRW characteristic curves that are dominated by ambient barotropic flows.

キーワード：特性曲線、背の低い海底地形、傾圧ジェット
Keywords: Rossby wave characteristics, small-amplitude topography, baroclinic jet

