

Bottom flow formation accompanied by the baroclinic instability in the downstream region of the Soya Warm Current during summer

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Driving mechanism of the Soya Warm Current during summer is investigated using an idealized model. The Soya Warm Current is an ocean current flowing along the northeastern coast of Hokkaido, Japan, and we focus on its bottom flow downstream from the Soya Strait. Analysis shows that momentum is produced in the vicinity of a coastal slope due to eddy generation accompanied by internal instabilities of a baroclinic jet flow: eddy kinetic energy resulting from the release of mean available potential energy associated with baroclinic instability is transferred from upper-layer down to bottom surface by the form stress on density interfaces, so that the conversion from the eddy energy into mean kinetic energy occurs near the bottom. The bottom drag in the along-isobath direction then increases approximately to the same strength as the form stress. The surface pressure gradient cannot account for the bottom flow formation since the along-isobath SSH gradient almost vanishes far downstream from the inflow region.

Keywords: the Soya Warm Current, baroclinic instability, bottom flow, form stress