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Simulation of mesoscale and sub-mesoscale circulation in the northwestern coastal region of the Japan Sea

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Based on the analysis of high resolution satellite data and numerical simulation with eddy resolved circulation layered model, intra-seasonal and interseasonal evolution of interacted mesoscale and sub-mesoscale circulation, anticyclonic and cyclonic eddies formation, moving and degradation on the shelf, over continental slope and adjacent deep basin of the Northwestern Japan Sea are shown. On the external shelf of Peter the Great Bay activity of sub-mesoscale cyclones rise during fall when thickness of the upper mixed layer is increasing and vertical density gradient in seasonal pycnocline is weakening. Horizontal scale of the sub-mesoscale cyclones is in range of 1 to 12 km, while scale of mesoscale eddies is in range of 15 to 60 km. Time scale of sub-mesoscale cyclones, as a rule, doesn't exceed 2-3 days, while time scale of mesoscale eddies varies from several days over an edge of the narrow shelf and steep continental slope of the Japan Basin to about several months on the wide external shelf of Peter the Great Bay and longer time in central area of the deep basin. Some mesoscale anticyclones and cyclones can be quasi-stable over correspondent features of bottom topography. Lagrangian approach has been applied to study mesoscale eddies evolution over the continental shelf and slope of the Japan Basin, including Peter the Great Bay. Transport and mixing in the Peter the Great Bay are estimated in terms of Lagrangian method.

Biography

Vladimir Ponomarev has completed his PhD from Pacific Oceanological Institute (POI FEB RAS) and Postdoctoral studies from the same institute. He is the Head Scientist of POI. He has published more than 50 papers in reputed journals.

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