

The results of the Laboratory of Nonlinear Dynamical Systems (2015)

Результаты по применению ляпуновских показателей для описания перемешивания и переноса в океане, поиска мезомасштабных вихрей с риском радиоактивного загрязнения в результате аварии на АЭС "Фукусима-Дай-ичи" и для поиска лагранжевых фронтов в океан благоприятных для рыбного промысла размещены на сайте АВИЗО
<http://aviso.altimetry.fr/index.php?id=3160>

Our results on applications of Lyapunov exponents in quantifying transport and mixing in the ocean, searching for mesoscale eddies with a risk to be contaminated by the Fukushima derived radionuclides, and indentifying Lagrangian fronts favorable for fishery were posted at the AVISO site <http://aviso.altimetry.fr/index.php?id=3160>

According to voting at the Institute Scientific Council, the following result was recognized as **the most important one in the Institute in 2015**

Three dimensional Lagrangian analysis of the vertical structure of deep-sea eddies in the Japan Basin of the Japan Sea

The output from an eddy-resolved circulation model is used to analyze the vertical structure of simulated deep-sea eddies in the Japan Basin of the Japan Sea constrained by bottom topography. We focus on Lagrangian analysis of anticyclonic eddies generated in the model in a typical year approximately at the place of the M3 mooring (Takematsu 1999) and the hydrographic sections (Talley 2001) where such eddies have been regularly observed in different years (1993-1997, 1999-2001). Using a quasi-3D computation of the finite-time Lyapunov exponents and displacements for a large number of synthetic tracers in each depth layer, we find that the simulated feature evolves from the eddy, that does not reach the surface in summer, into a one reaching the surface in fall. This result is confirmed by computing deformation of the model layers across the simulated eddy in zonal and meridional directions and in the corresponding temperature cross sections. Computed Lagrangian tracking maps allow to trace the origin and fate of water in different layers of the eddy. The results of simulation are compared with observed temperature zonal and meridional cross sections for a real anticyclonic eddy sampled at that place during the CTD hydrochemical survey in summer 1999 (Talley 2001). Both the simulated and observed eddies are shown to have the similar core and the profiles of the layer interfaces and isotherms.



