

Modelling large-scale transport and mixing in the ocean

Lagrangian approach to study large-scale transport and mixing in the ocean. Elaborating a new diagnostic tool for the ocean state, synoptic Lyapunov maps for a given basin on different time scales. Computing finite-time Lyapunov exponents which characterize the rate of separation of neighboring fluid particles over a finite-time interval. Computing evolution of material lines and finding Lagrangian coherent structures in numerical velocity fields for the far-eastern seas in the Pacific.

2011

1. M.V. Budyansky, V.I. Ponomarev, P.A. Fyman, M.Yu. Uleysky and S.V.Prants. Lagrangian approach to chaotic transport and mixing in the Japan Sea. Chaos Theory: Modeling, Simulation and Applications. Selected Papers from the 3rd Chaotic Modeling and Simulation International Conference (CHAOS2010) (eds. C.H. Skiadas, I. Dimotikalis, C. Skiadas). Singapore: World Scientific. P.3-13. 2011. 468p. <http://eproceedings.worldscinet.com/9789814350341/toc.shtml>
2. S.V. Prants, M.V. Budyansky, V.V. Ponomarev, M.Yu. Uleysky. Lagrangian study of transport and mixing in a mesoscale eddy street. Ocean modelling. V. 38, Is. 1-2 (2011) 114-125. [DOI: 10.1016/j.ocemod.2011.02.00](https://doi.org/10.1016/j.ocemod.2011.02.00)
3. S.V. Prants, M.Yu. Uleysky, M.V. Budyansky. Numerical simulation of propagation of radioactive pollution in the ocean from the Fukushima-Dai-ichi nuclear plant. Doklady Earth Sciences. V. 439 (2011) 1179-1182 [Dokl. Akad. Nauk. V.439 N6 (2011) 811-814].
4. S.V. Prants, V.I. Ponomarev, M.V. Budyansky, M.Yu. Uleysky, P.A. Fayman. Lagrangian analysis of mixing and transport of water masses in marine bays // Izvestiya, Atmospheric and Oceanic Physics 2012 (in press).

2012

1. S.V. Prants, M.V. Budyansky, M.Yu. Uleysky. Lagrangian tools to monitor transport and

mixing in the ocean. In: CHAOS, COMPLEXITY AND TRANSPORT. Selected Papers from the International Conference (eds. Xavier Leoncini & Marc Leonetti). Singapore: World Scientific. P.33-46. 2012. [DOI: 10.1142/9789814405645_0004](https://doi.org/10.1142/9789814405645_0004)

2. S.V. Prants, M.Yu. Uleysky, M.V. Budyansky. Lagrangian Coherent Structures in the Ocean Favorable for Fishery. Doklady Earth Sciences, 2012, Vol. 447, Part 1, pp. 1269-1272.

2. S.V. Prants, M.Yu. Uleysky, M.V. Budyansky. Lagrangian Coherent Structures in the Ocean Favorable for Fishery. Doklady Earth Sciences, 2012, Vol. 447, Part 1, pp. 1269-1272.

■ 2013

1. S. V. Prants, V. I. Ponomarev, M. V. Budyansky, M. Yu. Uleysky, and P. A. Fayman. Lagrange Analysis of Mixing and Transfer of Water Masses in the Gulfs. Izvestiya, Atmospheric and Oceanic Physics, 2013, Vol. 49, No. 1, pp. 82-96.

2. S.V. Prants. Dynamical systems theory methods for studying mixing and transport in the ocean. Physica Scripta. 2013. V.87 art.no. 038115

3. S.V. Prants, A.G. Andreev, M.V. Budyansky, M.Yu. Uleysky. Impact of mesoscale eddies on surface flow between the Pacific Ocean and the Bering Sea across the Near Strait. Ocean Modelling. 2013. V. 72 P.143-152 [DOI: 10.1016/j.ocemod.2013.09.003](https://doi.org/10.1016/j.ocemod.2013.09.003)

2014 1. S.V. Prants, M.V. Budyansky, M.Yu. Uleysky. Lagrangian fronts in the ocean. Izvestiya, Atmospheric and Oceanic Physics. Vol. 50, No.3 (2014) pp.284-291. [DOI: 10.1134/s0001433814030116](https://doi.org/10.1134/s0001433814030116)

2. S.V. Prants, M.V. Budyansky, M.Yu. Uleysky. Lagrangian study of surface transport in the Kuroshio Extension area based on simulation of propagation of Fukushima-derived radionuclides. Nonlinear Processes in Geophysics. V.21, 279-289, 2014. DOI: 10.5194/npg-21-279-2014

3. S.V. Prants, A.G. Andreev, M.Yu. Uleysky, M.V. Budyansky. Lagrangian study of temporal changes of a surface flow through the Kamchatka Strait. Ocean Dynamics. V.64 (N6) 771-780

(2014) DOI: 10.1007/s10236-014-0706-9

4. S.V. Prants, M.V. Budyansky, M.Yu. Uleysky. Identifying Lagrangian fronts with favourable fishery conditions. Deep Sea Research I. V. 90, p.27-35 (2014) DOI: 10.1016/j.dsr.2014.04.012

5. S.V. Prants. Chaotic Lagrangian transport and mixing in the ocean. The European Physical Journal Special Topics. V.223, Issue 13, pp 2723-2743 (2014) DOI: 10.1140/epjst/e2014-02288-5

2015

1. M.V. Budyansky, V.A. Goryachev, D.D. Kaplunenko, V.B. Lobanov, S.V. Prants, A.F. Sergeev, N.V. Shlyk, M.Yu. Uleysky. Role of mesoscale eddies in transport of Fukushima-derived cesium isotopes in the ocean. Deep Sea Research I. (2015), V.96, pp. 15-27 DOI information: 10.1016/j.dsr.2014.09.007.

2. S.V. Prants, M.V. Budyansky, V.I. Ponomarev, M.Yu. Uleysky, P.A. Fayman Lagrangian analysis of the vertical structure of eddies simulated in the Japan Basin of the Japan/East Sea. Ocean Modelling. V.86 pp.128-140 (2015) <http://dx.doi.org/10.1016/j.ocemod.2014.12.010>.

3. S.V. Prants. Backward-in-time methods to simulate chaotic transport and mixing in the ocean. Physica Scripta V. 90 074054 (2015). doi:10.1088/0031-8949/90/7/074054 Science 1.2.

4. S.V. Prants, A.G. Andreev, M.V. Budyansky, M.Yu. Uleysky. Impact of the Alaskan Stream flow on surface water dynamics, temperature, ice extent, plankton biomass and walleye pollock stocks in the eastern Okhotsk Sea. J. Marine Systems. V.151 pp.47-58 (2015). doi:10.1016/j.jmarsys.2015.07.001

5. S.V. Prants. Modeling fluid dynamics in the ocean and atmosphere. Discontinuity, Nonlinearity, and Complexity. V.4, N3 pp. 219-223 (2015). DOI: 10.5890/DNC.2015.09.001

6. S.V. Prants, M.V. Budyansky, M.Yu. Uleysky, J. Zhang. Hyperbolicity in the ocean. Discontinuity, Nonlinearity, and Complexity. V.4, N3 pp. 257-270 (2015). DOI: 10.5890/DNC.2015.09.004

2016

1. S.V. Prants, V.B. Lobanov, M.V. Budyansky, M.Yu. Uleysky. Lagrangian analysis of formation, structure, evolution and splitting of anticyclonic Kuril eddies. Deep Sea Research I. V.109 pp.61–75 (2016). DOI: 10.1016/j.dsr.2016.01.003

2. Sergey V. Prants. A Lagrangian study of eddies in the ocean. Regular and Chaotic Dynamics, 2016, Vol. 21, No. 3, pp. 335–350. DOI: 10.1134/S1560354716030060

2017

1. S.V. Prants, M.Yu. Uleysky, M.V. Budyansky. Lagrangian oceanography: large-scale transport and mixing in the ocean. Berlin, New York. Springer Verlag. 2017. 271 p. ISSN 1610-1677 ISBN 978-3-319-53021-5.

2. S.V. Prants, A.G. Andreev, M.V. Budyansky, M.Yu. Uleysky. Mesoscale circulation along the Sakhalin Island eastern coast. *Ocean Dynamics*. (2017) V. 67. Is.3 P. 345-356.
doi:10.1007/s10236-017-1031-x

3. S.V. Prants, M.V. Budyansky, M.Yu. Uleysky. Statistical analysis of Lagrangian transport of subtropical waters in the Japan Sea based on AVISO altimetry data. *Nonlin. Processes Geophys.* V.24, p. 89-99, 2017 doi:10.5194/npg-24-1-2017.

5. S.V. Prants, M.V. Budyansky, M.Yu. Uleysky. Lagrangian simulation and tracking of the mesoscale eddies contaminated by Fukushima-derived radionuclides. *Ocean Science*. V.13 P.453-463 (2017). <https://doi.org/10.5194/os-13-453-2017>

6. M.V. Budyansky, S.V. Prants, E.V. Samko, M.Yu. Uleysky. Identification and Lagrangian analysis of oceanographic structures favorable for fishery of neon flying squid (*Ommastrephes bartramii*) in the South Kuril area. *Oceanology*, 2017, Vol. 57, No. 5, pp. 648–660.

7. M.V. Budyansky, M.Yu. Uleysky, A.G. Andreev, S.V. Prants. A Lagrangian analysis of Kuril eddies. *Vestnik DVO*. N4 P.81-88 (2017) (in Russian)

2018

1. Prants S.V., Budyansky M.V., Uleysky M.Yu. How eddies gain, retain and release water: the case study of a Hokkaido anticyclone. *Journal Geophysical Research. Oceans*. 2018. Vol. 123. Is. 3. P. 2081-2096. DOI: 10.1002/2017JC013610

2. Prants S.V., Uleysky M.Yu., Budyansky M.V. Lagrangian study of transport of subarctic water across the Subpolar Front in the Japan Sea. *Ocean Dynamics*. 2018. V. 68(6). P. 701-712.
<https://doi.org/10.1007/s10236-018-1155-7>

3. Ponomarev V.I., Fayman P.A., Prants S.V., Budyansky M.V., Uleysky M.Yu. Simulation of mesoscale circulation in the Tatar Strait of the Japan Sea. *Ocean Modelling*. 2018. V. 126. P. 43-55. <https://doi.org/10.1016/j.ocemod.2018.04.006>
4. Prants S.V., Uleysky M.Yu., Budyansky M.V. Lagrangian analysis of transport pathways of subtropical water to the Primorye coast. *Doklady Earth Sciences*. 2018. Vol. 481. Part 2. P. 1099–1103. [Doklady Akademii Nauk, 2018, Vol. 481, No. 6.]. doi: 10.1134/S1028334X18080329
5. Andreev A, Budyansky M., Uleysky M., Prants S. Mesoscale dynamics and walleye pollock catches in the Navarin Canyon area of the Bering Sea. *Ocean Dynamics*. 2018. V.68, N 11. P. 1503-1514. <https://doi.org/10.1007/s10236-018-1208-y>

2019

1. 1. S.V. Prants, A.G. Andreev, M.Yu. Uleysky, M.V. Budyansky. Lagrangian study of mesoscale circulation in the Alaskan Stream area and the eastern Bering Sea. *Deep Sea Research II*. V. 169-170 art. No. 104560 (2019) DOI: <https://doi.org/10.1016/j.dsr2.2019.03.005>
2. P.A. Fayman, S.V., Prants, M.V., Budyansky, M.Yu. Uleysky. Coastal summer eddies in the Peter the Great Bay of the Japan Sea: in situ data, numerical modeling and Lagrangian analysis. *Continental Shelf Research*. V.181. 143-155. 2019 <https://doi.org/10.1016/j.csr.2019.05.002>

2020

1. S.V. Prants, M.V. Budyansky, V. B. Lobanov, A. F. Sergeev and M.Yu. Uleysky. Observation and Lagrangian analysis of quasi-stationary Kamchatka trench eddies. Journal of Geophysical Research (Oceans) 2020 V.125 , Issue 6. e2020JC016187
<https://doi.org/10.1029/2020JC016187>

2. P.A. Fayman, S.V. Prants, M.V. Budyansky, M.Yu. Uleysky. New circulation features in the Okhotsk Sea from a numerical model. Izvestiya, Atmospheric and Oceanic Physics. 2020, Vol. 56, No. 6, pp. 618–631. DOI: 10.1134/S0001433820060043

3. P.A. Fayman, M.V. Budyansky, M.Yu. Uleysky, S.V. Prants, V.L. Vysotsky, D.A. Pripachkin. Modeling the transport of radioactive pollution in the Ussuri Gulf during the first days after the nuclear accident in the Chazhma Bay in August 1985. Vestnik DVO RAN (In Russ. English abstract) N5 2020. p.18-31.