The fate of river-borne floating marine litter in the coastal sea: a case study of flooding discharge from numerous small rivers in the northeastern part of the Black Sea

Evgeniya Korshenko¹,², Victor Zhurbas², Alexander Osadchiev², and Pelagiya Belyakova³

¹State Oceanographic Institute, Moscow, Russian Federation (kekapon@gmail.com)
²Shirshov Institute of Oceanology, Russian Academy of Sciences, Moscow, Russia
³Water Problems Institute, Russian Academy of Sciences, Moscow, Russia

This study is focused on delivery and transport of floating marine litter, which is carried by river discharge to coastal sea. This floating matter initially is contained in river plumes and its transport is governed by river plume dynamics. Despite the great importance of understanding the fate of floating marine litter (including plastic litter) in the sea, many aspects of its transport and accumulation remain unstudied. In this study we consider a large flood which happened in the northeastern part of the Black Sea in October 2018. A high resolution circulation model with a non-uniform horizontal grid (the grid bin length is decreased up to 200 m in a local area of interest) is applied to simulate transport of floating matter brought into the sea by overflowing rivers. The floating matter transport is modelled by horizontal advection of Lagrangian particles seeded in the mouths of main rivers of the study region in proportion to the actual river runoff. The particles that originated from different river mouths merge together on a horizontal velocity convergence line. These areas of accumulated marine litter remain stable during several days and are transported off the river mouths by a quasi-geostrophic alongshore current. However, some of the particles are trapped in the surf zone and form irregular contamination of the shoreline depending on local circulation features controlled by bottom topography and local wind forcing.