

Small river plumes near the north-eastern coast of the Black Sea under climatic mean and flooding discharge conditions

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The study is focused on the impact of discharge from small rivers on propagation and final location of fluvial waters and suspended matter at the north-eastern part of the Black Sea under different local precipitation conditions. Several dozens of mountainous rivers inflow into the sea at the studied region and most of them, except the several largest of them, have small annual runoff and limitedly affect adjacent coastal waters under climatic mean conditions. However, discharges of these small rivers are characterized by quick response to precipitation events and can dramatically increase during and shortly after heavy rains, which are frequent in the area under consideration. Propagation and final location of fluvial waters and terrigenous sediments at the studied region under climatic mean and rain-induced flooding conditions were explored and compared using in situ data, satellite imagery and numerical modelling. It was shown that the point-source spread of continental discharge dominated by several large rivers during climatic mean conditions can change to the line-source discharge from numerous small rivers situated along the coast in response to heavy rains. Intense line-source runoff of water and suspended sediments form a geostrophic alongshore current of turbid and freshened water, which induces intense transport of suspended and dissolved constituents discharged with river waters in a north-western direction. This process significantly influences water quality and causes active sediment load at large segments of narrow shelf at the north-eastern part of the Black Sea as compared to climatic mean discharge conditions.