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An integrated approach to study the dispersion of produced formation waters in the Adriatic Sea (Italy)

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The produced formation waters (PFWs), a by-product of gas extraction, are separated from gas on the platforms and than discharged into the sea through submarine outfalls. The dispersion of PFWs into the marine environment may have relevant impact on marine ecosystems. We reproduce the entrainment and initial dispersion processes of the PFWs by means of a Lagrangian model (UM3 - Three Dimensional Update Merge) applied to offshore platforms currently active in the North Adriatic Sea. A chemical traceability method allowed to identify two chemical tracers (DEG and BHT) to follow the PFW plume into the sea. The numerical simulations are realized in different seasonal conditions using both measured oceanographic data and identified chemical tracers concentrations. The results highlight the influence of water column stability and ambient currents on PFWs dynamic, and provide information on plume trajectory and time and space of near field dispersion. A comparison between numerical results and chemical analysis provide new insight to plan PFW monitoring and discharge and to mitigate their impact on marine ecosystems.