MODELLING THE RADIONUCLIDE CONTAMINATION OF THE BLACK SEA IN THE RESULT OF CHERNOBYL ACCIDENT USING CIRCULATION MODEL AND DATA ASSIMILATION

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Assimilation of observations is powerful tool to improve the predictive capabilities of models for radionuclide transport and fate. We describe results of numerical experiments on assimilation of data on radionuclide contamination of the Black Sea in the result of Chernobyl accident in the three-dimensional model of circulation and radionuclide transport THREETOX. Data assimilation in THREETOX can be formulated as procedure that contains two steps: update and forecast. On update step THREETOX is to be run from the time of release or the time of deposition to the time of forecast using updated input from all the data available at this period to be assimilated. On forecast step THREETOX is to be run from forecast time to the end of modeling period using results of update step to produce forecast of radionuclide transport. Two data assimilation methods were used: steady state specific Kalman filter (SSKF) and method iteration of optimal solution (IOS). These methods have been applied to the assimilation observational data of ^{137}Cs concentration in the "Typhoon" surveys for the period June 1986 to September 1990. From results of numerical experiments we conclude, that data assimilation can essentially improve predictive capability of models for radionuclide transport. The IOS was more effective than SSSKF and computational time for this method is small in comparison with general time for calculation. Results from the study will provide a better understanding of the processes of radionuclide transport in the seas. This novel approach is implemented in the EU DSS RODOS for a real-time simulation of the radioactivity transport in the marine environment.