

Assimilation of satellite data to 3D hydrodynamic model of Lake Säkylän Pyhäjärvi

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Abstract:

To analyze the applicability of occasional initialization (OI) of total suspended matter (TSM) concentration field based on turbidity derived from satellite data to numerical simulation, dispersion studies of suspended matter in Lake Säkylän Pyhäjärvi (lake area 154 km²; mean depth 5.4 m) were conducted using the 3D COHERENS simulation model. To evaluate the practicality of OI, five cases with different initialization frequencies were conducted: 1) every time, when satellite data were available; 2) every 10 d; 3) 20 d; and 4) 30 days; 5) control run without repeated initialization. To determine the effectiveness of initialization frequency, three methods of comparison were used: simple spatial differences of TSM concentration without biomass in the lake surface layer; averaged spatial differences between initialization data and model results; and time series of TSM concentration and observation data at 1 m depth at the deepest point of the lake. Results showed that OI improves the prediction significantly when applied often, i.e. at 10 day intervals. Even if it is applied less often, OI improves the prediction.

Key words

COHERENS; model prediction; suspended particulate matter; suspended solids; turbidity; water quality

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