Nutrient flux by resuspension of sediment in the East China Sea

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East China Sea (ECS) is characterized by a distinct bentic nepheloid layer caused by tidal fluctuation and other forcing in all seaward transects [1]. The effect of massive resuspension on fluxes of nitrate and phosphate was studied through laboratory experiment with surface sediments collected at three different sites including one site with high turbulent kinetic energy in the ECS. The contents of organic carbon and nitrogen in the sediment were 0.38-1.07 and 0.059-0.15%, respectively. Resuspension was reproduced in bottles filled with filtered seawater and added wet sediment. Nutrients were measured from bottles with seawater only and added sediment at the 1-3 day interval for 15 days.

The phosphate and nitrate concentrations increased logarithmically with good correlation coefficients of r^2 = 0.83 -0.95 and 0.84-0.95, respectively, over time. Nutrients regenerated per 1 g (dry weight) of sediment by resuspension over time were as following equations: phosphate (μmole g^{-1}) = (0.030-0.068)ln(day) and nitrate (μmole g^{-1}) = (0.19-0.35)ln(day). The residence time of resuspended sediment is 27 days [1]. And assuming the concentrations of suspended particulate matter range from 28-100 mg L^{-1} in the nepheloid layer of 10 m. The fluxes of nitrate and phosphate regenerated by resuspension were calculated to be 6.4-29 and 1.0-8.2 μmole m^{-2} day^{-1}, respectively. Decomposition of organic carbon and consumption of oxygen by resuspension effect from the nitrate flux and Redfield ratio were in the range of 0.042-0.28 mmol C m^{-2} day^{-1} and 0.055-0.36 mmol O_2 m^{-2} day^{-1}, respectively. These values correspond to 0.28-1.9 and 0.7-4.3% of net carbon settling flux to the sediment and sediment oxygen consumption in the ECS [2].

[1] Hung et al., (2007) *J. Oceanogr.* 63, 189-202.
[2] Song et al., (2016) *Deep Sea Res.* 124: 53-63