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## The potential contributions of phytoplankton cells and zooplankton fecal pellets to POC export fluxes during a spring bloom in the East China Sea

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### Abstract

Sinking particles are mainly composed of phytoplankton cells and zooplankton fecal pellets, but the proportions of these sources contribute to the overall particulate organic carbon (POC) flux are highly variable temporally and spatially. Here, we report for the first time simultaneous estimates of the POC fluxes from phytoplankton cells and zooplankton fecal pellets during a spring bloom in the East China Sea. The sinking rate of phytoplankton during the bloom event was  $12 \pm 2 \text{ m d}^{-1}$ , which was more than 10 times the rate at non-bloom stations ( $1.0 \pm 0.8 \text{ m d}^{-1}$ ). Microscopic observations indicated that the formation of aggregates by the *Prorocentrum donghaiense* (the dominant phytoplankton species) enhanced the sinking rates during the bloom. These enhanced sinking rates and 10 times higher phytoplankton biomass during the bloom increased POC fluxes to as high as  $24 \text{ g C m}^{-2} \text{ d}^{-1}$ , about 100 times the rate at reference non-bloom stations ( $0.26 \text{ g C m}^{-2} \text{ d}^{-1}$ ). The POC flux of fecal pellets at bloom stations ( $0.95 - 1.4 \text{ g C m}^{-2} \text{ d}^{-1}$ ) increased to only about 6 times the rates at non-bloom stations ( $0.20 - 0.25 \text{ g C m}^{-2} \text{ d}^{-1}$ ). The fecal pellet POC flux was mainly enhanced by the increase of phytoplankton abundance, which led to higher mesozooplankton grazing rates and fecal pellet production rates during the

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