Diel patterns of variable fluorescence and carbon fixation of picocyanobacterial Prochlorococcus-dominated phytoplankton in the South China Sea basin

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- Active chlorophyll fluorescence like Fast Repeat Rate fluorometry (FRR) is a powerful technique for assessing the photosynthetic performance and photosynthetic state of phytoplankton.
- The diel pattern at surface in the South China Sea basin is: a nocturnal decrease, dawn maximum, and midday decrease of the maximum quantum yield of PSII (Fv/Fm), indicating macro- and micro-nutrients limitation (Behrenfeld & Kolber, 1999).
- Prochlorococcus thrives in oligotrophic oceans, Prochlorococcus cannot maintain photosynthesis at a stable rate under high-light stress conditions, because it invests substantially less energy in repairing damaged photosystems, it’s a trade-offs for the high tolerance of low nutrient concentrations.
- Through careful analysis of the dynamics of active chlorophyll a fluorescence and carbon fixation of phytoplankton, it is possible to determine the photosynthetic efficiency between light absorption and carbon fixation and to relate that efficiency to the light utilization strategy of the phytoplankton.

Fig. 1 Sampling station. Red: floating sediment trap
Fig. 2 Trap-based POC flux and the fecal pellets content

Fig. 3 Volume of copepod fecal pellets using different phytoplankton prey.
Fig. 4 GAM model: Sinking rate = α*(Dino)+γ*(Diatom)+ε, R2=0.6 (A, B); Fecal pellet = α*(TChla)+ε, R2=0.76 (C); Sinking rate = α*(TChla)+ε, R2=0.48(Δ).