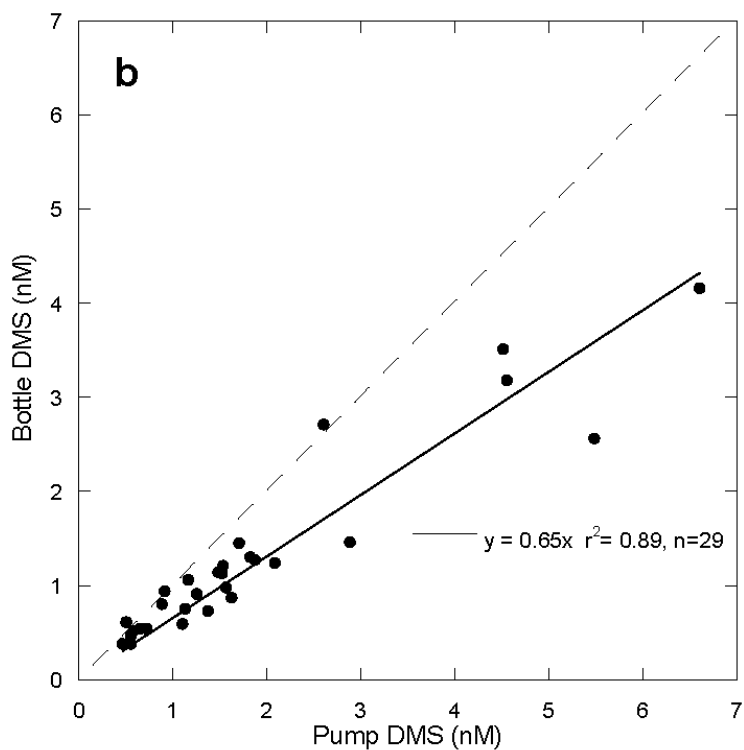
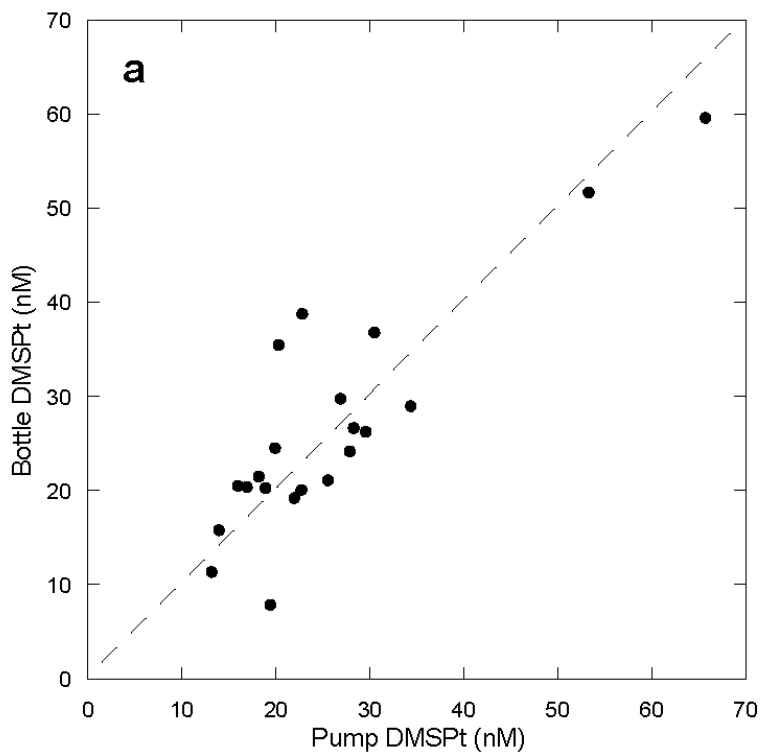
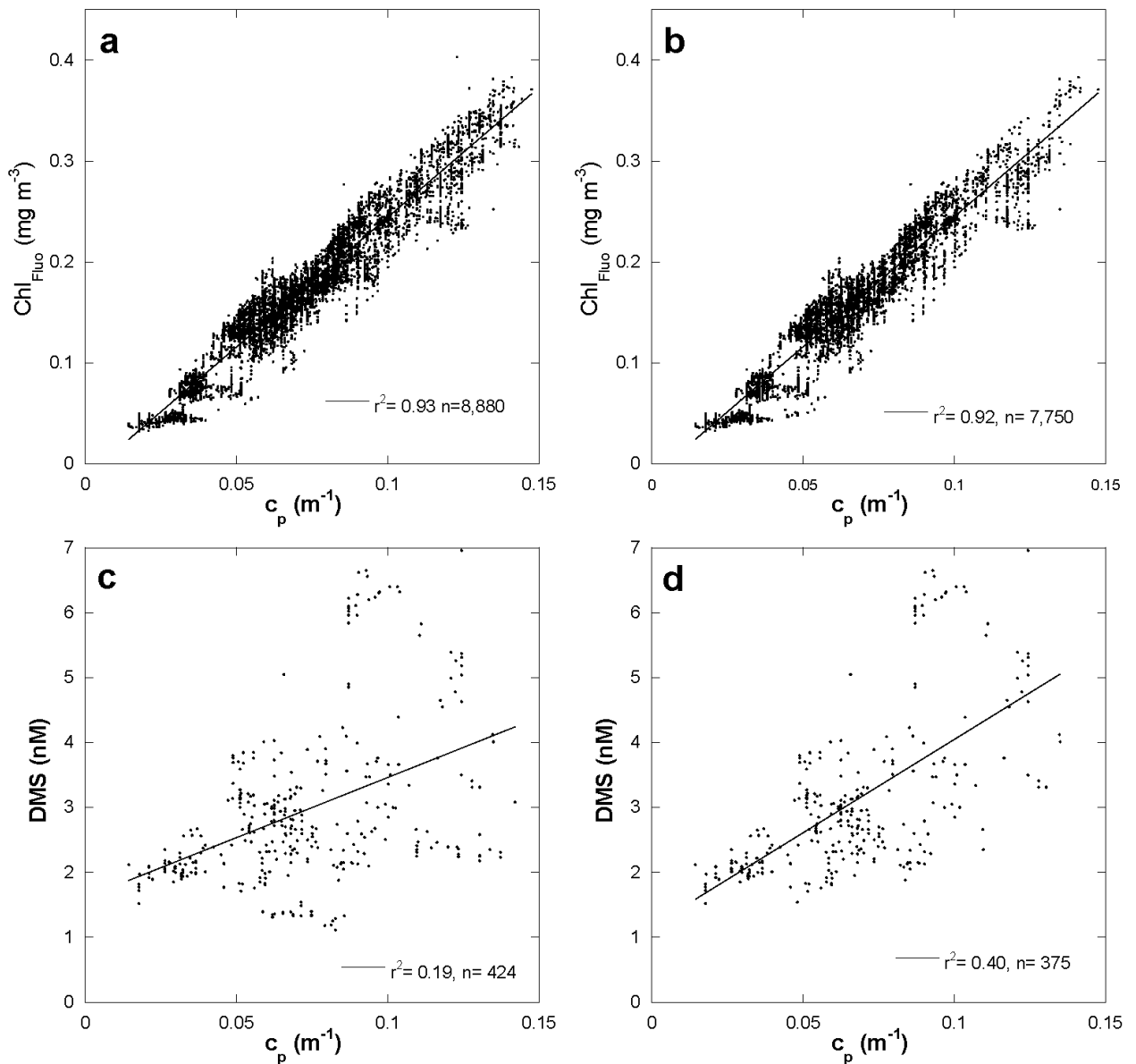


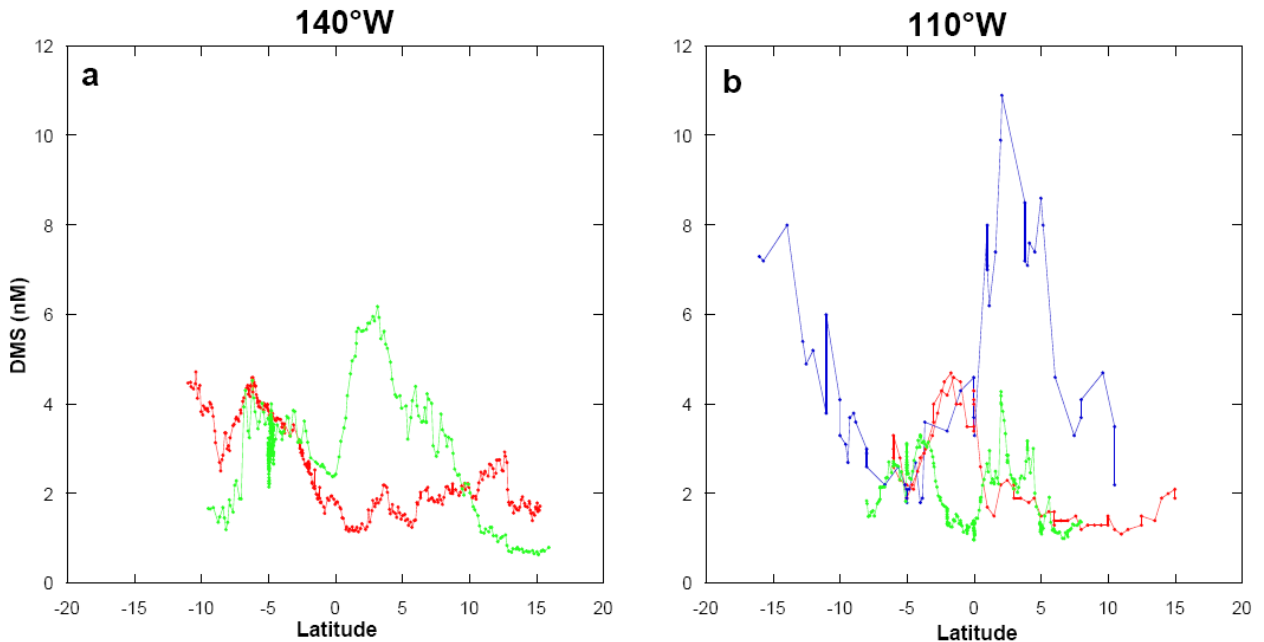
**Figure S1.** Histograms showing mean sea surface DMS:Chl simulated by the (a) PISCES and (b) PlankTOM5 models. Data are sorted (1) by month (August (AUG) and December (DEC)), (2) by latitudinal band (30°- 90°) in the Northern Hemisphere (NH) and the Southern Hemisphere (SH), and (3) by phytoplankton group dominance (NANO, blue bar; DIAT, red bar; COC, green bar). The vertical error bar is 1 SD and the dashed white line is the median.



**Figure S2.** Comparison between pump and bottle concentrations of (a) DMSPt and (b) DMS (nM). Samples were collected in January-February 2005 during the KEOPS cruise (Belviso et al. 2008), several days before the Kerguelen-La Réunion transect aboard R/V Marion Dufresne II.



**Figure S3.** Correlation between nocturnal beam attenuation coefficient ( $c_p$ ) measured at 660 nm and (a, c) fluorescence-based chlorophyll ( $\text{Chl}_{\text{Fluo}}$ ) and (b, d) DMS concentrations (cruise CN-148). Comparison between  $c_p$  and  $\text{Chl}_{\text{Fluo}}$  were restricted to nighttime data because diurnal fluorescence values exhibited strong light-dependent decreases each day (Behrenfeld and Boss, 2006). Some data deviating from the general  $c_p$ -Chl trend were removed as discussed in Behrenfeld and Boss (2006). (a, c): full data set, (b, d) with ED (Equatorial Divergence) data removed.



**Figure S4.** Spatio-temporal variations of DMS concentrations (nM) during ENSO events (El Niño (red), La Niña events (blue) and non-ENSO (green), in the Equatorial Pacific at 140°W (a) and 110°W (b). Data collated from the PMEL global DMS database (<http://saga.pmel.noaa.gov/dms/>), contribution numbers: CN-13, CN-56, CN-84, CN-112 and CN-148.