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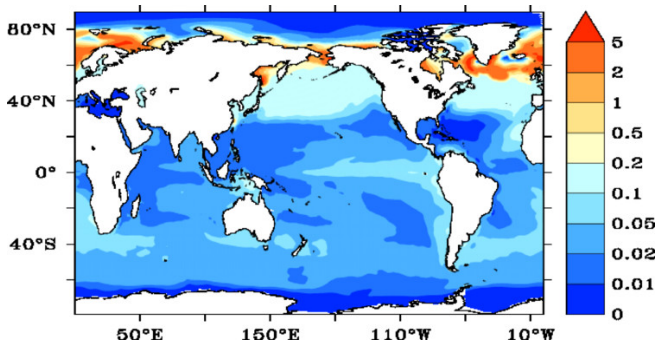
Supplement of

A physically based framework for modeling the organic fractionation of sea spray aerosol from bubble film Langmuir equilibria

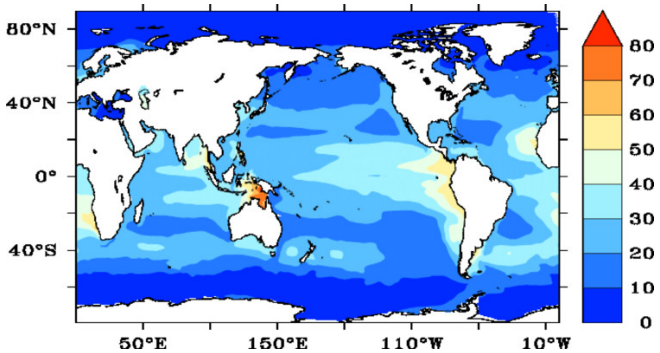
S. M. Burrows et al.

Correspondence to: S. M. Burrows (susannah.burrows@pnnl.gov)

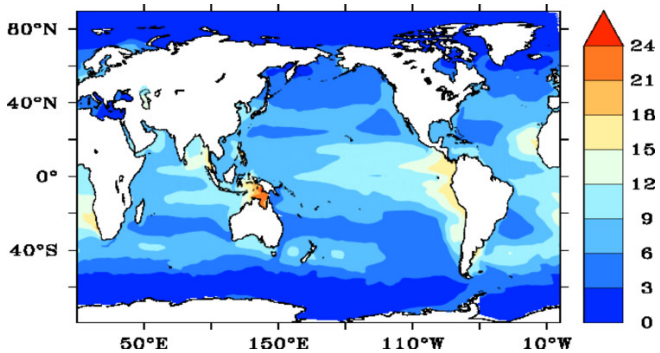
(a) Lipid-like mixture



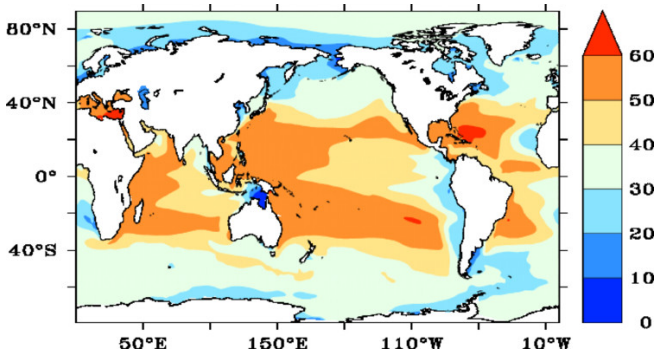
(b) Polysaccharide-like mixture



(c) Protein-like mixture



(d) Processed mixture



(e) Deep abyssal humic-like mixture

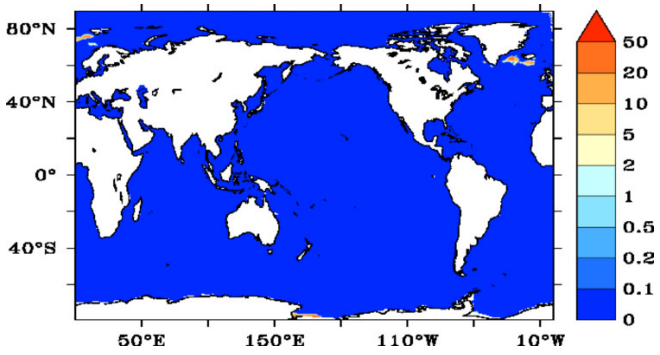


Figure 1: Ocean concentration of each compound class [μmol L^{-1}], May.

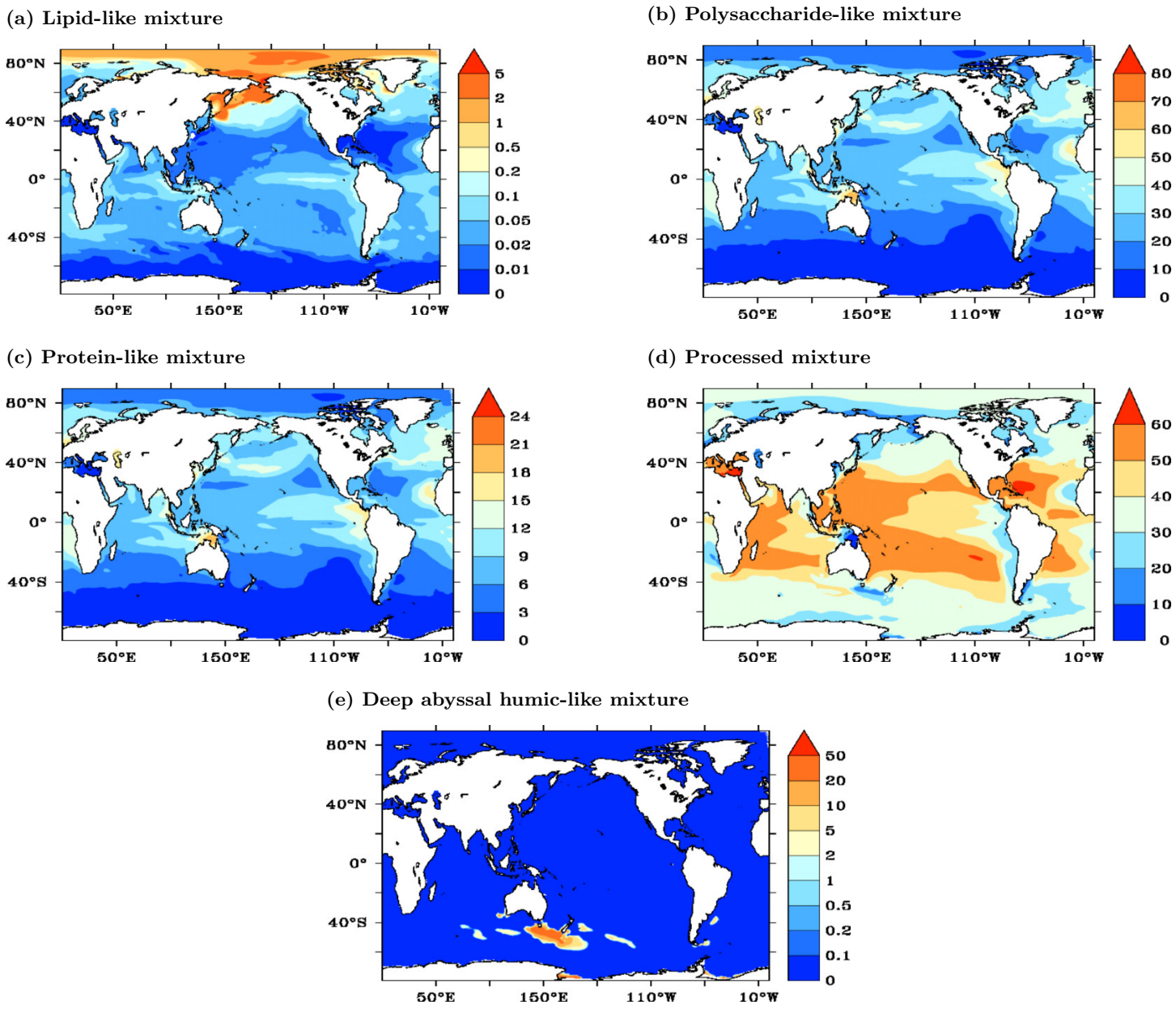


Figure 2: Ocean concentration of each compound class [μmol L^{-1}], August.

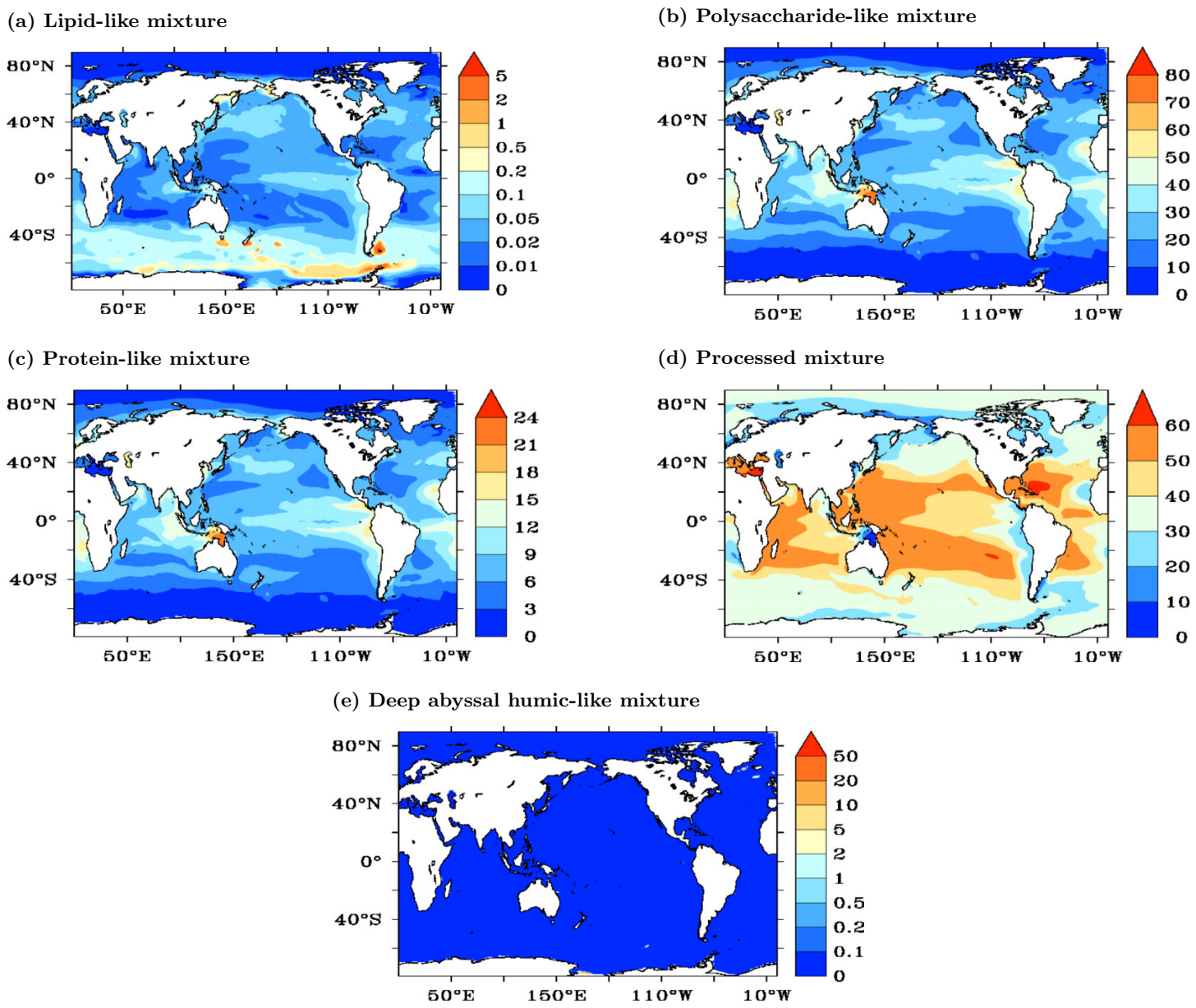


Figure 3: Ocean concentration of each compound class [μmol L^{-1}], November.

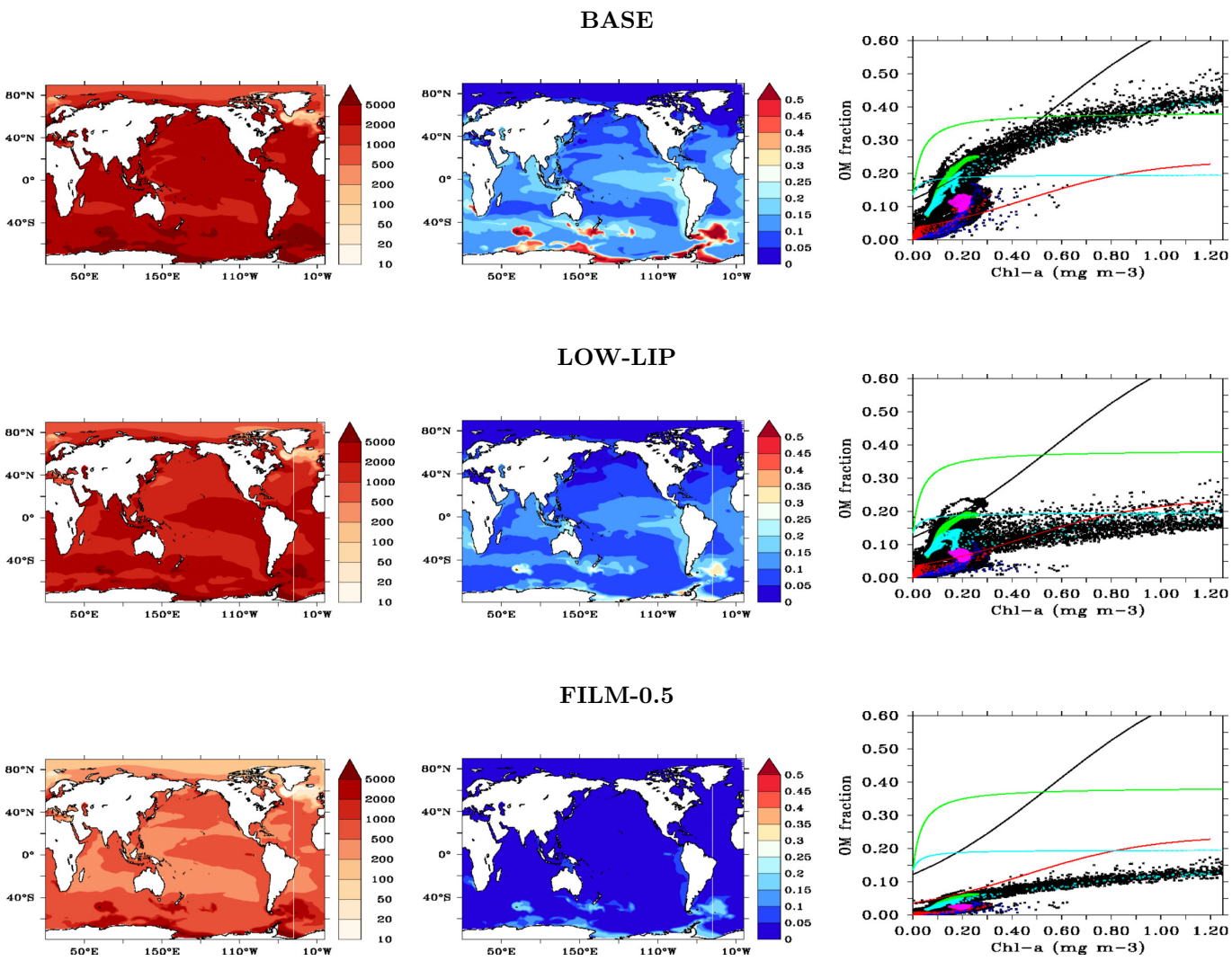


Figure 4: Global estimates of effective enrichment, organic mass fractions, and chl-vs-OM fraction relationship, February. Top: BASE case: using model compounds as described in Table 1 of main paper. Middle: Case LOW-LIP: using model compounds as described in Table 1 of main paper, but with α_{lip} decreased by a factor of ten. Bottom: Case FILM-0.5: using model compounds as described in Table 1 of main paper, but with $l_{\mathrm{bub}} = 0.5\,\mu$m.

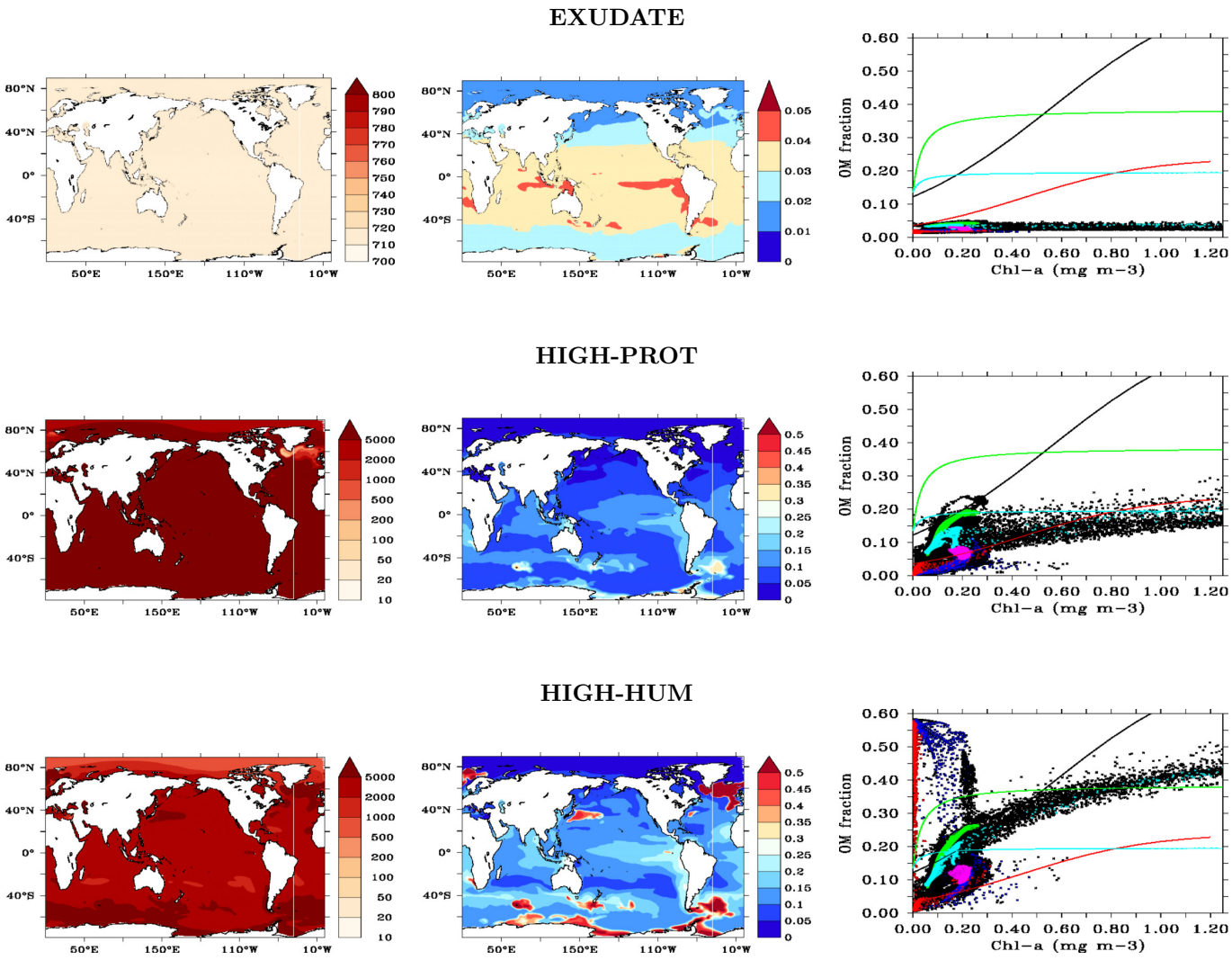
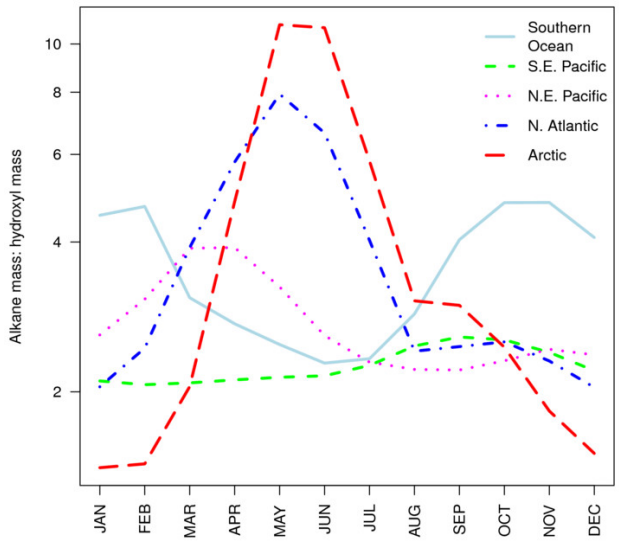
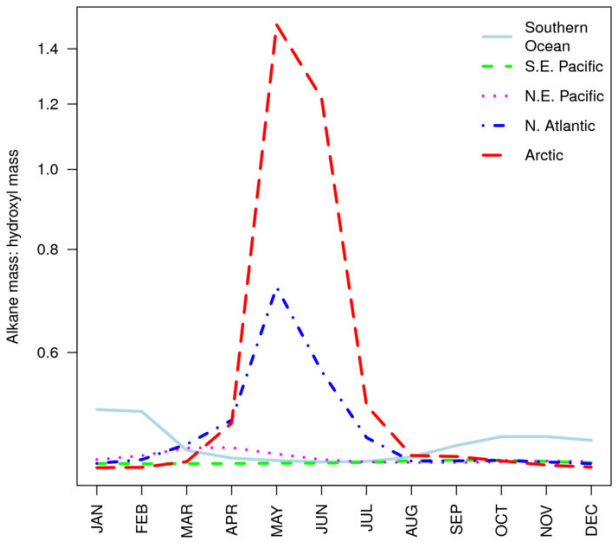


Figure 5: Global estimates of organic mass fraction in nascent film drops – sensitivity cases (February). Top: Case EXUDATE: using empirical constants derived from phytoplankton exudates [*Fuentes et al.*, 2011], with the same physical constants applied to all five compound classes.B Middle: Case HIGH-PROT: using model compounds as described in Table 1 of main paper, but with α_{prot} for casein (ten times larger value). Bottom: Case HIGH-HUM: using model compounds as described in Table 1 of main paper, but with $\alpha_{\mathrm{humic}} \times 10^4$.

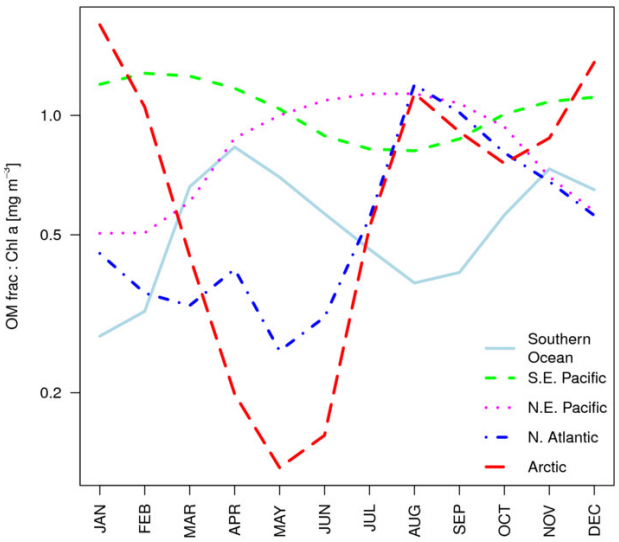
(a) BASE case



(b) LOW-LIP+HIGH-POLY case



(c) BASE case



(d) LOW-LIP+HIGH-POLY case

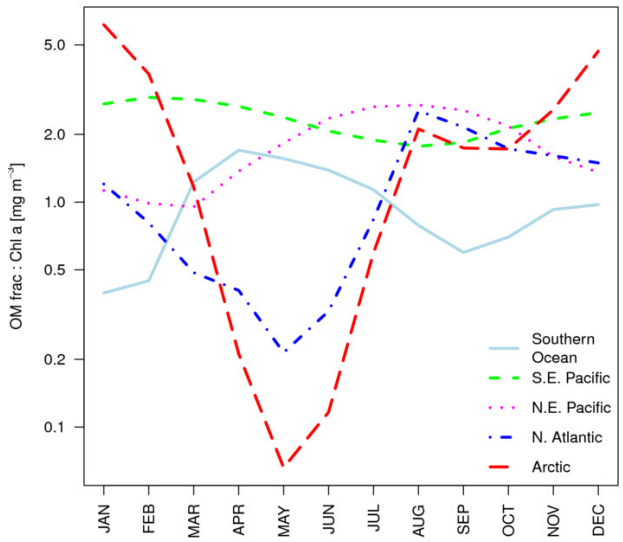


Figure 6: Seasonal cycle of the alkane-to-hydroxyl ratio as estimated from model monthly mean submicron SSA composition. Organic classes were averaged over the regions shown in Fig. 9 and converted to estimated functional group masses using the conversions indicated in Tab. 4.