**Supplement:**

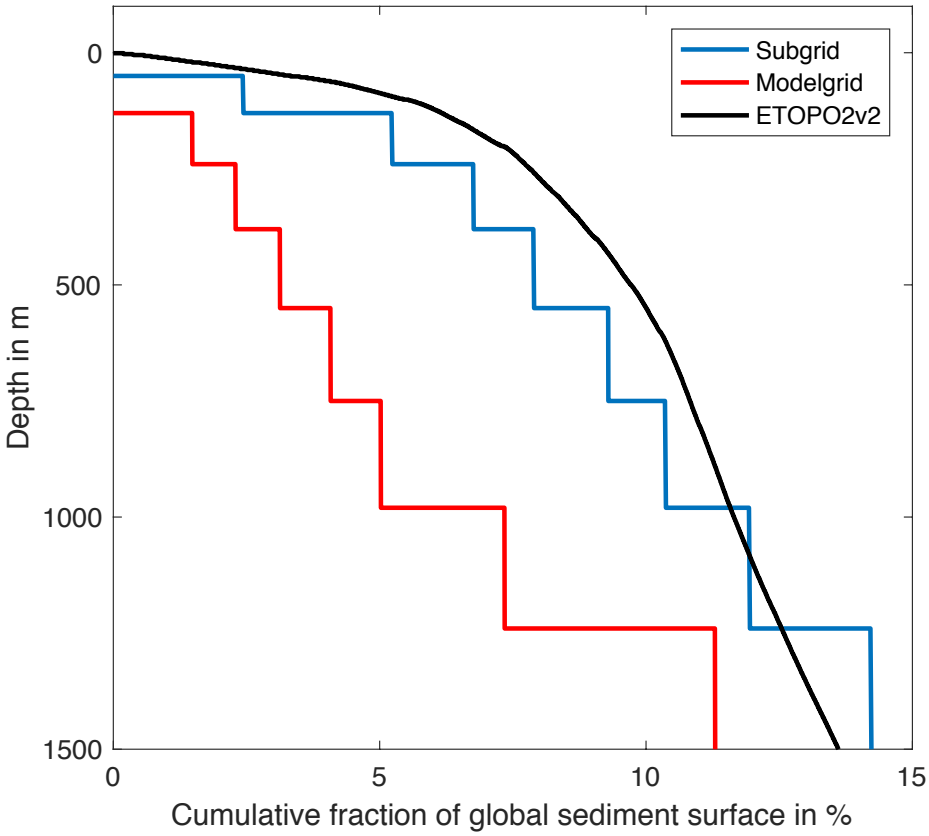


**Fig. S1: Hypsometry for the upper ocean for the model bathymetry (blue and red lines) versus observations (black line) from ETOPO2v2 (National Geophysical Data Center, 2006).**

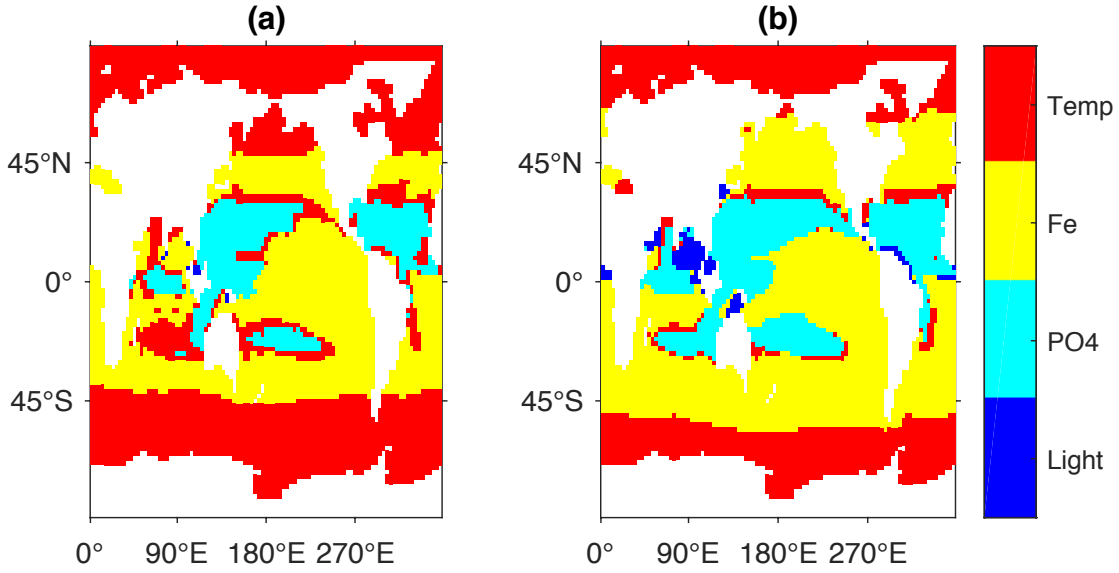


**Fig. S2: Spatial distribution of the most limiting factors for growth of diazotrophs for (a) the preindustrial case and (b) simulation year 5000 for *Weath0.15*. Limitation of iron (Fe) and phosphate (PO4) are based on Monod kinetics so that the limitation factors vary between 0 and 1. The light limitation factor also varies**

**between 0 and 1. In the model, diazotrophs only grow at temperatures higher than 15.7 °C. For temperatures above 15.7 °C, diazotroph growth depends on the equation exp(T/15.7°C)-2.61. Diazotroph growth is not limited by nitrate availability in the model. A more detailed description of diazotroph growth and iron limitation can be found in** Keller et al. (2012) **and** Nickelsen et al. (2015)**.**

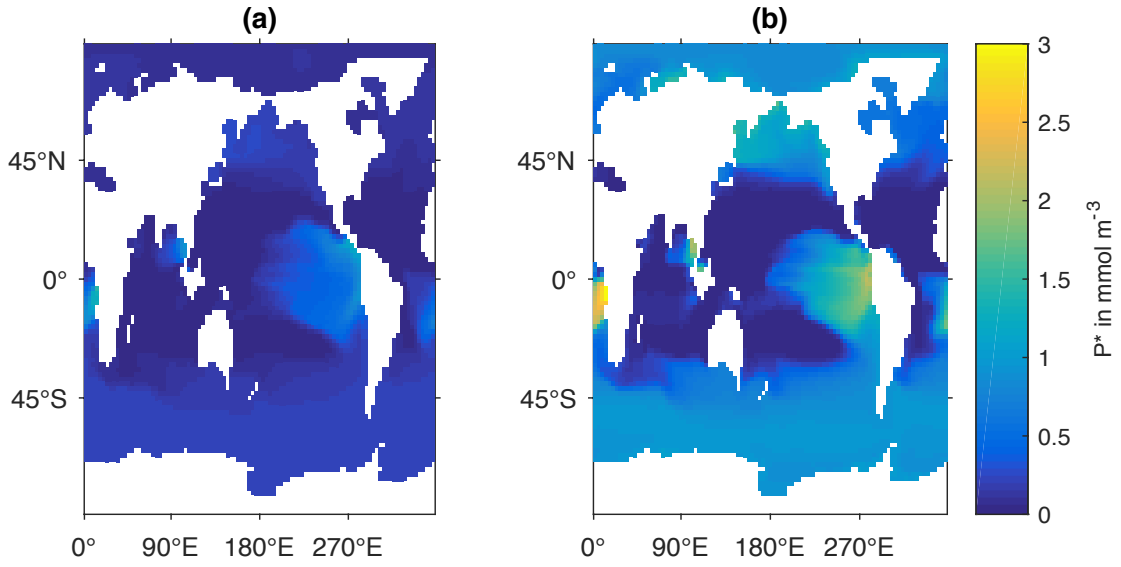


**Fig. S3: Spatial distribution of P*=P-N/16 (dissolved P, N) in the surface ocean for (a) the preindustrial case and (b) simulation year 5000 for *Weath0.15*.**