



Supplement of

Projected Effects of Climate-induced Changes in Phytoplankton biomass in the Southern South China Sea

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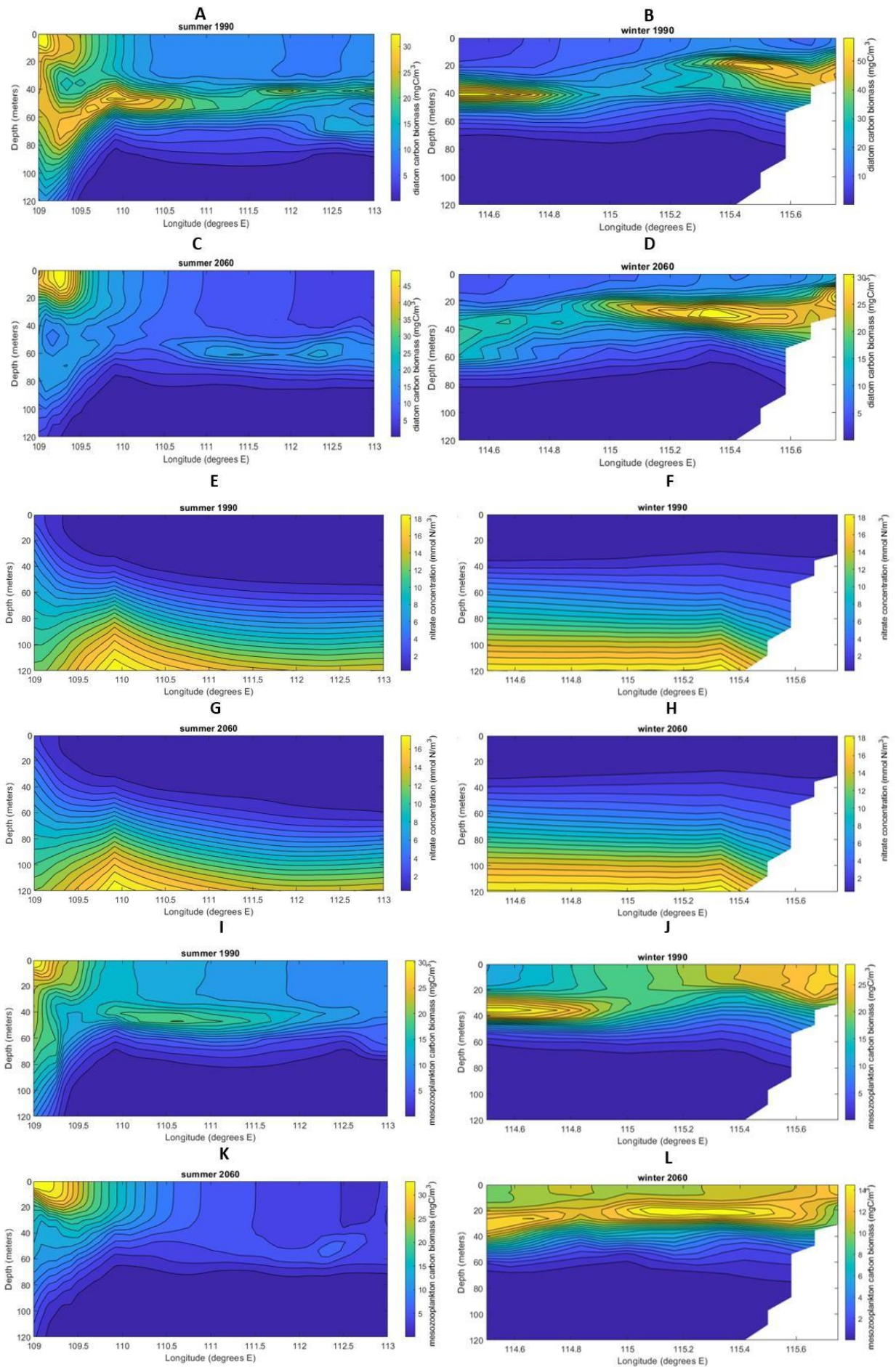


Figure S1: Vertical diatom biomass profiles in the Southeast Vietnam upwelling area in A) summer 1990, C) summer 2060, and Northwest Sabah in B) winter 1990, and D) winter 2060. Vertical nitrate concentration profiles in the Southeast Vietnam upwelling area in E) summer 1990, G) summer 2060, and Northwest Sabah in F) winter 1990, and H) winter 2060. Vertical mesozooplankton biomass profiles in the Southeast Vietnam upwelling area in I) summer 1990, K) summer 2060, and Northwest Sabah in J) winter 1990, and L) winter 2060.

The present analyses were based on estimating the mean dissolved nitrate concentrations in the upper pelagial (> 120 m) during the summer and winter monsoon months in Southeast Vietnam and Northwest Sabah, respectively. However, when analyzing the dissolved nitrate concentrations at a monthly resolution (within the productive upwelling season – *i.e.*, June, July and August for Southeast Vietnam and December, January and February for Northwest Sabah), Southeast Vietnam showed varying trends: increasing in June, slightly increasing in July and decreasing in August (Figure S2). According to Hu & Wang, (2016), the strongest upwelling intensity in the Southeast Vietnam upwelling area can be observed in August. Therefore, the observed decreasing trend in nitrate concentration during August would still support the idea of reducing nutrient availability with projected climate change.

In contrast, Northwest Sabah consistently shows increasing trends of nitrate concentrations in December, January and February (Figure S3). This observation may have resulted from the complex oceanographic conditions associated with the Northwest Sabah upwelling region. The west coast of Northwest Sabah is influenced by winter monsoonal winds, which bring surface waters from the Sulu Sea and the river plume of the Baram River during this season (Abdul-Hadi et al., 2012). In addition, the observed statistically insignificant correlations between diatom biomass and both nitrate and silicate concentrations in Northwest Sabah suggest that other factors may be contributing to the observed decreasing diatom trends.

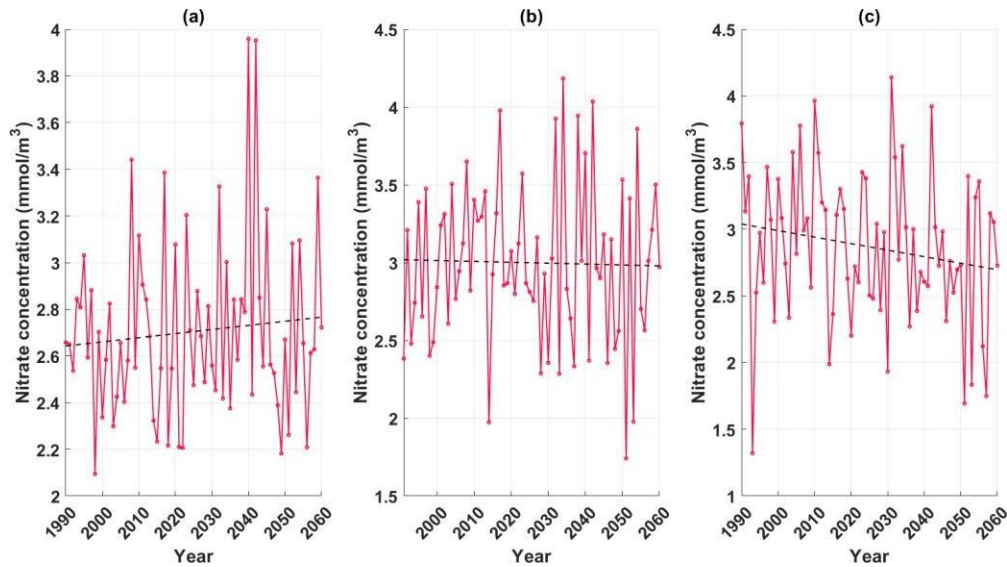


Figure S2: The monthly averages of nitrate concentration in Southeast Vietnam upwelling region in (a) June (b) July and (c) August, presented in mmol m^{-3} . The black dotted line represents the trendline.

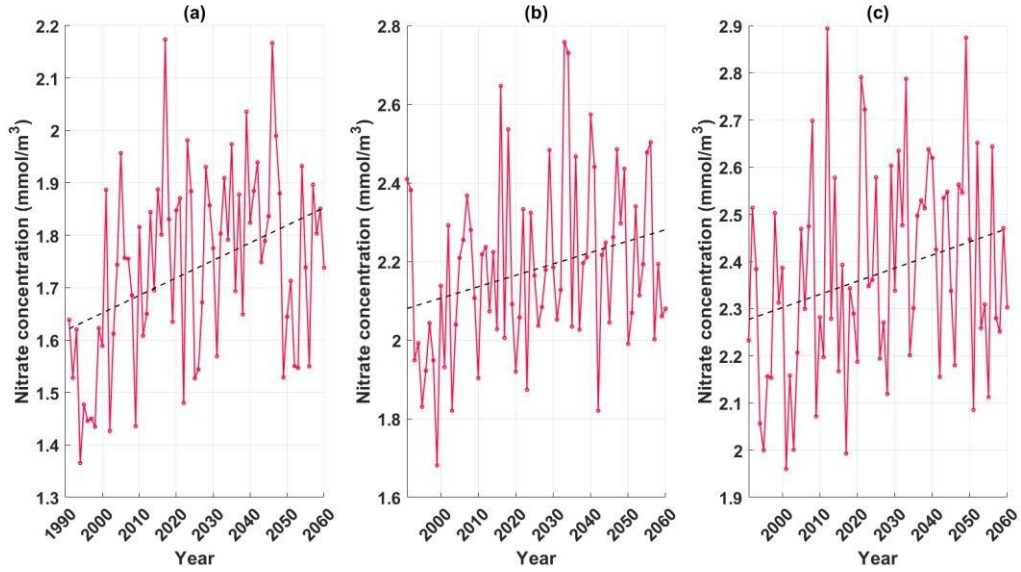


Figure S3: The monthly averages of nitrate concentration in Northwest Sabah upwelling region in (a) December (b) January and (c) February, presented in mmol/m^3 . The black dotted line represents the trendline.

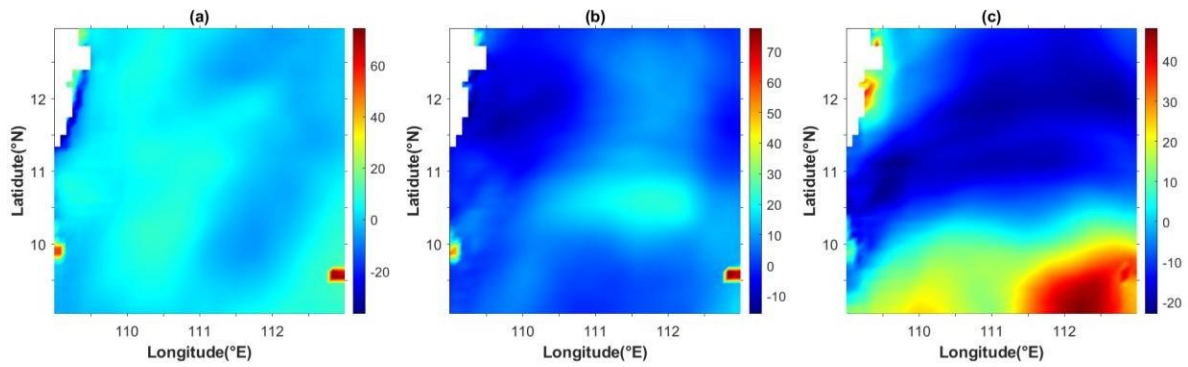


Figure S4: Percentage change in mean nitrate concentration in Southeast Vietnam during (a) June (b) July and (c) August from 2050 to 2060 under RCP8.5 relative to the period 1990-2000.

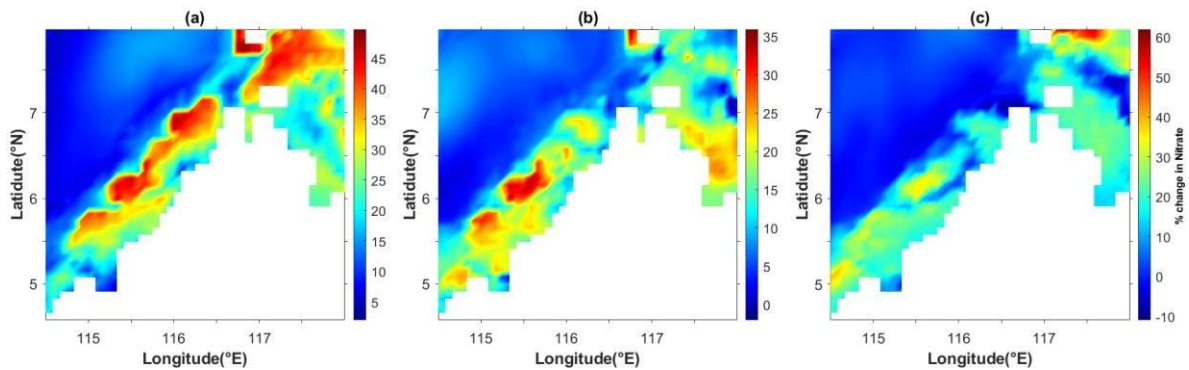


Figure S5: Percentage change in mean nitrate concentration in Northwest Sabah during (a) December (b) January and (c) February from 2050 to 2060 under RCP8.5 relative to the period 1990-2000.