# Effect of Increasing Co2 on the Natural Phytoplankton Community from Bay of Bengal, Visakhapatnam Coast, India

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Increasing emission of anthropogenic $CO_2$ to the atmosphere is considered as a threat to our planet and if it will continue to increase in the current rate, it will reach 750 ppm at the end of this century from its present value of 390 ppm (IPCC 2007). In parallel, the surface ocean is also absorbing anthropogenic $CO_2$ in an alarming rate which is calculated to be one third of the total emitted $CO_2$ (Sabine, 2007). Injection of the anthropogenically emitted $CO_2$ to the surface ocean is changing surface ocean carbonate chemistry by lowering the pH, popularly called as ocean acidification. Under the IPCC scenario, the surface seawater pH is going to be affected in such a level which has not been experienced in last hundred million years by the world ocean, Consequently, the marine ecosystem already faced a major problem, in particular the calcifiers who are already under a threat due to rapidly alteration in calcium carbonate saturation states of the word's major ocean (Riebesell, 2000). Marine and estuarine phytoplankton are the key group responsible for ocean primary production and therefore has a great control on the global carbon sink of atmospheric carbon dioxide. But ongoing ocean acidification coupled with increasing sea surface temperature might potentially affect their biology, distribution and ecology (Rost et al., 2008; Hare et al, 2007). Many research works both in microcosm and mesocosom level on natural phytoplankton have been conducted from subtropics to the polar, but their responses to increasing $CO_2$ are distinctly unlike. Numerous studies have been done so far and several are under progress, but the huge diversity of marine ecosystem makes it unfeasible to extrapolate the results for global ocean. Particularly, from the tropical ocean very less information is available till yet. We have conducted a bottle experiment during July 2009, with the natural phytoplankton population of Bay of Bengal to test the effect of increasing $CO_2$ on them and our study showed very interesting results which has not been shown before. The diatom dominated population was found to be replaced by cyanobacteria under high $CO_2$ and nutrient limited condition. HPLC pigment analysis revealed presence of comparatively higher quantity of Zeaxanthin (marker pigment of Cyanobacteria) over Fucoxanthin (marker pigment of Diatom) in high $CO_2$ treated cells. Particulate organic matter, dissolved oxygen, dissolved organic carbon was found to be increased with increasing carbon dioxide. A maximum of 20% increase in POC was found in high $CO_2$ treated cells than control. Almost 2.7 times higher total bacterial count was observed in the highest $CO_2$ treated cells than control and community respiration was also high under high $CO_2$ condition. $\delta^{13}C$ (‰) and $\delta^{15}N$ (‰) also showed significant differences in between different $CO_2$ conditions. We conclude,

Bay of Bengal phytoplankton are quite sensitive to increasing carbon dioxide and future change in surface seawater carbonate chemistry might significantly affect the eco-physiology of the natural phytoplankton which can have a significant impact on the biogeochemistry of this part of the tropical ocean.

Key words: Tropical Ocean. Response of phytoplankton, increasing carbon dioxide, diatom, cyanobacteria,

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