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大亚湾海域营养盐的季节变化及微表层对营养盐的富集作用 

Seasonal changes in nutrients and their accumulation in the surface microlayer in Daya Bay, South China Sea

关键词: [营养盐](#) [氮](#) [磷](#) [硅](#) [大亚湾](#) [微表层](#)

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摘要: 于2007年5月~2008年4月对大亚湾海域微表层、次表层和底层氮(N)、磷(P)、硅(Si)营养盐进行了每月一次的周年调查和比较分析.结果表明,大亚湾海域营养盐含量较前期调查略有上升,可溶性无机氮(DIN)、可溶性无机磷(DIP)、可溶性硅酸盐(DSi)的平均值分别为8.93、0.41和9.41 $\mu\text{mol} \cdot \text{L}^{-1}$,养殖区营养盐含量明显较高.DIN组成以 $\text{NH}_4^+\text{-N}$ 和 $\text{NO}_3^-\text{-N}$ 为主,在3个水层中, $\text{NO}_3^-\text{-N}$ 在微表层中的百分比含量相对较高, $\text{NH}_4^+\text{-N}$ 在次表层中的百分比含量较高.大亚湾海域DIN、DSi含量丰富,DIP含量较低,N:P远远高于Redfield比值,浮游植物的生长明显受到P限制.微表层DIP和DSi含量明显较高,且波动明显.大亚湾海域N、P以有机营养物质为主,微表层中DIN百分比含量较低,DIP百分比含量较高.微表层对营养盐具有显著富集作用,平均富集系数在1.31~4.68之间;对磷的富集作用较强,对DIP和总磷(TP)的平均富集系数分别达到4.68和1.95.微表层对不同营养盐的富集概率在47.2%~97.2%之间,其中,对TP和DSi的富集概率最高.调查结果表明,近年来大亚湾水质有进一步恶化的趋势,而微表层营养盐结构的变化可能会导致该水层生物群落结构的改变.

Abstract: A comparison study of the nutrient status in the surface microlayer, sub-surface and bottom water was carried out monthly from May 2007 to April 2008 in Daya Bay, South China Sea. Nutrients included dissolved inorganic nitrogen (DIN, the sum of ammonium, nitrites and nitrates), dissolved inorganic phosphorus (DIP, orthophosphates), and dissolved inorganic silica (DSi, silicate), total nitrogen (TN) and total phosphorus (TP). The nutrient levels were higher than those reported in previous studies, and concentrations of DIN, DIP and DSi were 8.93, 0.41 and 9.41 $\mu\text{mol} \cdot \text{L}^{-1}$ respectively. Nutrient levels in cultural areas were obviously higher. Ammonium and nitrate were the main components of DIN. Within the three water layers, and higher proportions of nitrate and ammonium were in the surface microlayer and sub-surface layer, respectively. DIN and DSi was sufficient in Daya Bay, however DIP was generally low. The N:P ratios were far over the Redfield ratio, and the growth of phytoplankton was mostly limited by phosphorus. TN and TP were dominated by organic nitrogen and phosphorus in Daya Bay. Lower proportions of DIN and higher proportions of DIP were recorded in the surface microlayer. All nutrients were significantly accumulated in the surface microlayer, and the average enrichment factors ranged from 1.31 to 4.68. The strongest enrichment effect was recorded for phosphorus especially for DIP, and enrichment factors were 4.68 and 1.95 for DIP and TP respectively. The enrichment ratio ranged between 47.2% and 97.2%, and the highest ratios were recorded for TP and DSi. Results from this survey suggested that the water quality in Daya Bay tends to further deteriorate, and changes in nutrient structure in the surface microlayer might result in a shift of plankton structure.

Key words: [nutrient](#) [nitrogen](#) [phosphorus](#) [silica](#) [Daya Bay](#) [surface microlayer](#)

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