Impact of monsoon circulations on oceanic emissions of light alkenes over Bay of Bengal

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表面水平测量的乙烯（C₂H₄）和丙烯（C₃H₆）在孟加拉湾（BOB）的海洋边界层（MBL）中进行。在夏季和冬季季风活动中，乙烯和丙烯的混合比因风速的增加而增加，而与其他气象参数没有明显的关系。在夏季，乙烯和丙烯的昼夜变化与太阳辐射强度的日照比夜间高约45%有关。冬季测量的乙烯和丙烯没有表现出任何本地时间依赖性。乙烯和丙烯的混合比在夏季的飓风和对流活动期间特别升高。混合比的测量显示，在冬季和夏季的上层海洋中，生物磷脂的吸收速率显示出相似的趋势，表明在中央BOB区的高初级生产力。乙烯和丙烯的混合比显示出冬季的最低值和夏季的最高值，与全球海洋报道的季节性模式相似，但在BOB海域的变异性较小。乙烯/丙烯的比值与全球海洋数据库中2.3 pptv/pptv的平均比值相似，这表明BOB海域的轻非甲烷烃（NMHCs）的海洋排放。

1. Introduction

Light nonmethane hydrocarbons (NMHCs) play a significant role in the photochemistry of remote troposphere. They are oxidized by hydroxyl (OH) radicals and subsequently lead to the formation of peroxy radicals, which have a crucial role in the budget of tropospheric ozone. In the remote marine troposphere, oceanic emission is a predominant source of alkenes, particularly of ethene and propene [Bonsang and Lambert, 1985, Rudolph and Johnen, 1990]. A database of C₂-C₄ NMHCs from about 40 field campaigns shows contributions of ~85% due to alkenes species, and 40% due to ethene alone [Plass-Dülmer et al., 1995]. The emission estimates of global hydrocarbons are derived from the regionally and seasonally limited data sets therefore these are highly uncertain [Ratte et al., 1993]. A large range of global sea-to-air fluxes has been estimated, from 5 to 50 Mtons yr⁻¹, with variability of an order of magnitude [Plass-Dülmer et al., 1995, and reference therein]. The emission rate of C₂-C₄ NMHCs is about 2.1 × 10^{12} g yr⁻¹ from the global ocean [Plass-Dülmer et al., 1995]. These estimates of global oceanic alkenes are still very uncertain, because the links of emissions with local meteorology and photochemically related parameters are not yet completely understood. Ratte et al. [1993] have investigated several parameters affecting the production of NMHCs and the role of dissolved organic carbon (DOC). Pszenny et al. [1999] report negative correlations of various NMHCs with temperature and positive correlations with nitrate, but few significant relationships with solar radiation in a majority of biogeographically regimes. Emissions of alkenes from global oceans show large spatial and temporal variability and distinct relationships with the meteorological parameters [Bonsang et al., 1990; Plass-Dülmer et al., 1995; Broadgate et al., 1997; Gist and Lewis, 2006], which have implications for annual global flux estimates. In this study, for the first time we present the characteristics of diurnal and seasonal