Geophysical Research Abstracts
Vol. 14, EGU2012-3934, 2012
EGU General Assembly 2012


# Sensitivity study on the impacts of biogenic VOC on the Asian monsoon climate in dry and wet seasons using MIROC5

H. G. Takahashi (1,2), H-J. Kim (2), K. Tanaka (2), K. Takata (2), K. Saito (2), T. Yasunari (2,3)

(1) Tokyo Metropolitan University(TMU), Japan (hiroshi3@tmu.ac.jp), (2) Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Japan, (3) Nagoya University, Japan

Biogenic volatile organic compounds (BVOC) are a major source of secondary organic aerosol (SOA), which probably affects regional and global climates. Over the Asian monsoon region, land-use and land-cover (LULC) has been artificially changed from natural vegetation to cropland in the last 300 years. Due to the LULC changes, biomass has significantly reduced, which in turn has reduced BVOC emission. This study estimates the sensitivity of the impacts of BVOC changes induced by LULC in the Asian monsoon region. Because wet deposition process is generally dominant for atmospheric burden of aerosols in rainy season, it is possible that the impacts in wet and dry seasons are different. Thus, we also focus on the differences between the two seasons. We conducted two experiments. One is with a standard concentration of SOA from BVOC attached to the GCM (B1), while the other is with our new estimation (B2), on the basis of Guenther et al. (2006) and Sakulyanontvittaya et al. (2008). The SOA concentration in B2 is 1.5–2 times higher than that in B1.

The changes (B2-B1) in direct effects of aerosols showed a localized cooling signal over the Indochina Peninsula where the concentration of organic carbon (OC) aerosol is significantly increased in dry season (April), while a wide-spread cooling was calculated over the Asian region and north Indian Ocean in rainy season (July). Cloud characteristics showed the changes in dry season that the radius of cloud droplets reduced and that the number of cloud droplets increased. Those probably induced long-lived clouds. Consequently, cooling effect of cloud was found over the Indochina Peninsula. In the rainy season, changes in cloud characteristics are not predominant. We roughly estimated direct and indirect effects (changes in surface radiation through the changes in cloud characteristics) of all species of aerosols due to the BVOC changes are 1–2 $Wm^{-2}$ and 5–8 $Wm^{-2}$ over the Indochina Peninsula in April. On the other hand in July, the direct effect was increased over the whole Asian monsoon region, although the change was small.