

## Estimates of CO and BC emissions from open biomass burning in Southern Africa

# Akinori Ito[1]; Akihiko Ito[2]; Hajime Akimoto[3]

[1] JAMSTEC, FRCGC; [2] NIES; [3] FRCGC/JAMSTEC

Biomass burning releases many trace gases and aerosols, such as carbon monoxide, oxygenated volatile organic compounds and carbonaceous aerosols, into the atmosphere, which have a significant influence on ambient air quality and climate. Most of the biomass burning takes place in the tropical belt. In southern Africa, the apparent inconsistency of the results was found between the commonly held understanding maximum burning seasons of August and September and the satellite measurements of burned areas, which indicated that the largest burned areas were observed during June and July. The 1 - 2 month offset was also reported between the peak in the MODIS fire counts and the peaks in the MOPITT and the SCIAMACHY CO retrievals in southern Africa.

The purpose of this paper is to improve the mismatch of 1 - 2 month, by incorporating the seasonal variations of burned areas with fuel loads, combustion factors, and emission factors at a fine resolution. For this purpose, satellite information and a biogeochemical model are used to estimate CO and BC emissions from open biomass burning in southern Africa during the 8 year period from 1998 to 2005.

Monthly burned areas at a 0.5-degree resolution are estimated from the VIRS fire count product and the MODIS burned area data set associated with the MODIS tree cover imagery in grasslands and woodlands. The monthly fuel load distributions are derived from a 0.5-degree terrestrial carbon cycle model in conjunction with satellite data. The monthly maps of combustion factors and emission factors are estimated using empirical models that predict the effects of fuel conditions on these factors in grasslands and woodlands.

Our annually averaged effective CO and BC emissions per area burned are consistent with the products of fuel consumption and emission factors typically measured in southern Africa. The monthly averaged burned areas from VIRS fire counts peak earlier than modeled CO emissions. This characteristic delay between burned areas and emissions is mainly explained by significant changes in combustion factors for woodlands in our model. Consequently, the peaks in CO and BC emissions from our bottom-up approach are identical to those from previous top-down estimates using the MOPITT and the TOMS AI data.

### Reference

Ito, A., A. Ito, and H. Akimoto (2007), Seasonal and interannual variations in CO and BC emissions from open biomass burning in Southern Africa during 1998 - 2005, *Global Biogeochem. Cycles*, in press.