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Atmospheric Chemistry and Physics Discussions

Comment on "Improving the seasonal cycle and interannual variations of biomass burning aerosol sources" by Generoso et al.

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Abstract

Generoso et al. (2003) suggest a method for improving current inventories of aerosol emission from biomass burning based on the Along Track Scanning Radiometer (ATSR) nighttime hot spot product. In order to show the validity and representative of the nighttime burning product for such applications, Genoroso et al. (2003) compared the ATSR nighttime products to the daily fire products from TRMM, AVHRR etc. in nine selected regions. Their analyses demonstrate that in most cases, the nighttime products show a seasonal cycle that is consistent with the daily observations. However, they noticed significant discrepancies in biomass seasonality between ATSR nighttime product and TRMM daily product in Sahel region. In a commentary paper, Giglio and Kendall (2003) clarify that the origin of TRMM fire data used in Generoso et al. (2003) is from TRMM Science Data and Information System (Ji and Stocker, 2002). We thank Giglio and Kendall for such clarifications that provide an opportunity for us to clarify several issues on the applications of TSDIS fire data.

1. Nighttime hot spot

The TSDIS Visible and Infrared Scanner (VIRS) nighttime hot spots are detected based on a simple 315 K threshold on the 3.75 μm channel. VIRS 3.75 μm channel has a resolution of 2.1 km at nadir. Since the ATSR has a saturation brightness temperature of 312 K (Mutlow et al., 1994) and a resolution about 1 km, it is expected that the number of nighttime hot spot pixels would be significantly larger than that of VIRS nighttime hot spot pixels. In Sahel region, the actual ratio is about 7. The time series of normalized nighttime fire count units for three selected regions (Fig. 1) demonstrate that TRMM and ATSR nighttime fire counts show consistent seasonality.

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2. Daytime hot spot

In order to use daily hot spot products, the diurnal cycle must be carefully studied because a large number of false fire pixels may exist in the operational data in either burning season or off-fire season, especially over sand/vegetation mixed land cover (Ji and Stocker, 2002). False fire in off-fire season may impact the fire seasonality significantly. We have looked into a number of fire regions for the past six years and found that in fire seasons, the fires are often observed during nighttime (Fig. 2). During an off-fire season, the satellite observation may show hot spots in daytime but not in nighttime (Fig. 2). Such a clean distinction gives a good opportunity to remove the daytime false alarm for the purpose of seasonality studies. For example, we have used 6 years TRMM data to define the maximum day/night hot spot ratios, and used these ratios to filter out the daytime false fire pixels. After such day/night screening, the discrepancies of seasonality between ATSR nighttime data and TRMM daily data noted in Generoso et al. (2003) are avoided (Fig. 3).

References

Generoso, S., Breon, F. M., Balkanski, Y., Boucher, O., and Schulz, M.: Improving the seasonal cycle and interannual variations of biomass burning aerosol sources, Atmos. Chem. Phys., 3, 1211–1222, 2003.

Giglio, L. and Kendall, J. D.: Commentary on "Improving the seasonal cycle and interannual variations of biomass burning aerosol sources" by Generoso et al., Atmos. Chem. Phys. Discuss., 6019–6027, 2003.

Ji, Y. and Stocker, E.: An overview of the TRMM/TSDIS fire algorithm and products, Int. J. of Remote Sensing, 23, 3285–3303, 2002.

Mutlow, C. T., Llewwllyn-Jones, D. T., Zavody, A. M., and Barton, I. J.: Sea surface temperature measurements by the ATSR on the ERS-1 satellite: Early Results, J. Geophys. Res., 99, 22 575–22 588, 1994.

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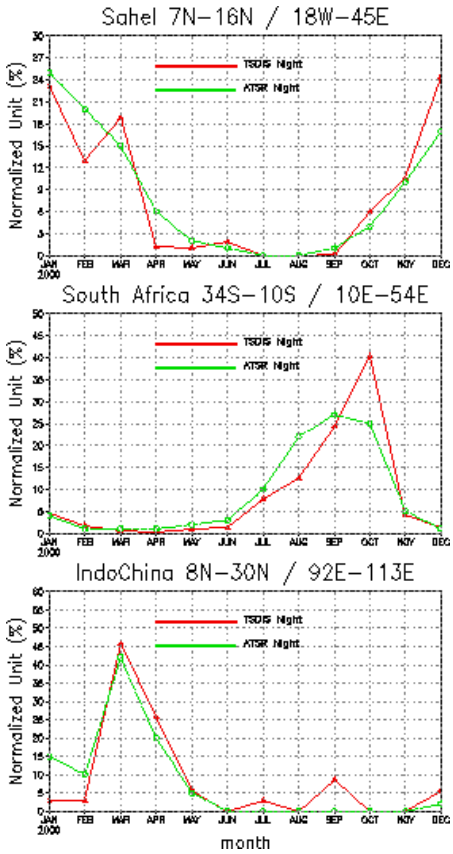

Fig. 1. Comparison between ATSR and TRMM nighttime fire counts (in normalized units) in Sahel area (upper), South Africa (middle), and Indo China (lower).

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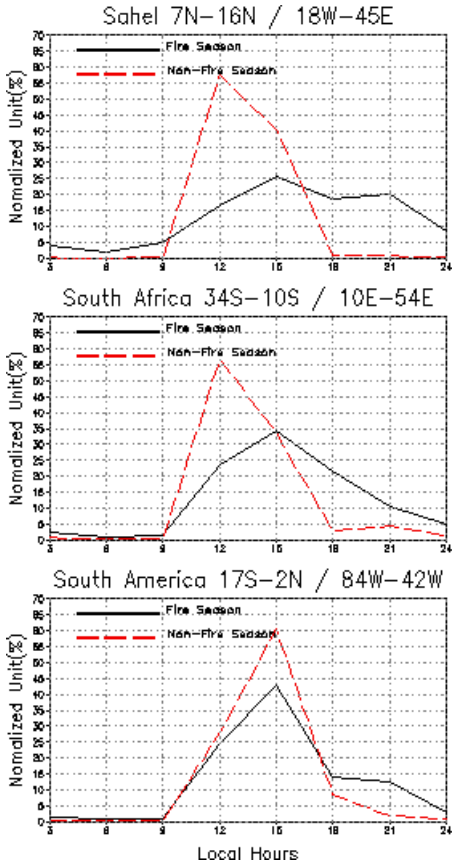

Fig. 2. Comparison of TRMM fire diurnal cycle in fire and non-fire seasons in Sahel area (upper), South Africa (middle), and Indo China (lower).

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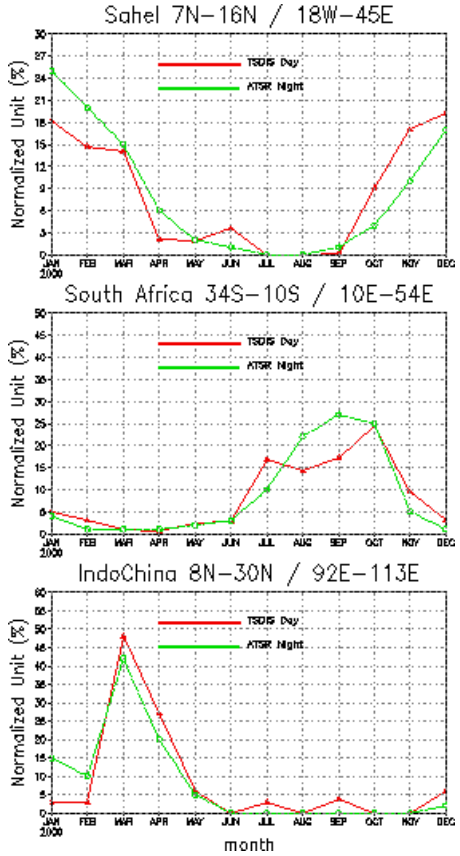

Fig. 3. Comparison between ATSR nighttime and TRMM daily fire counts (in normalized units) in Sahel area (upper), South Africa (middle), and Indo China (lower).

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