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赤道大気上下結合研究のためのオゾンライダー観測
Lidar observations of ozone profile in the tropopause region for study of coupling processes over the equatorial region

阿保 真[1*] ; 長澤 親生[1] ; 柴田 泰邦[1]
ABO, Makoto[1*] ; NAGASAWA, Chikao[1] ; SHIBATA, Yasukuni[1]

[1] 首都大学東京
[1]Tokyo Metropolitan University

Tropospheric ozone in the tropics zone is significant in terms of the oxidizing efficiency and greenhouse effect. However, in the upper troposphere, the ozone budget in the tropics has not been fully understood yet because of the sparsity of the range-resolved observations of vertical ozone concentration profiles.

We have constructed the lidar facility for survey of atmospheric structure over troposphere, stratosphere, mesosphere and low thermosphere over Kototabang (100.3E, 0.2S), Indonesia in the equatorial region. The lidar system consists of the Mie and Raman lidars for tropospheric aerosol, water vapor and cirrus cloud measurements, the Rayleigh lidar for stratospheric and mesospheric temperature measurements and the Resonance lidar for metallic species such as Na, Fe, Ca ion measurements and temperature measurements in the mesopause region. The lidar observations started from 2004, and routine observations of clouds and aerosol in the troposphere and stratosphere are continued now.

We have installed DIAL (differential absorption lidar) system for high-resolution measurements of vertical ozone profiles in the equatorial tropopause region over Kototabang. There were many ozone DIAL systems in the world, but their systems are almost optimized for stratospheric ozone layer measurement or tropospheric ozone measurement. Because of deep ozone absorption in the UV region, the wavelength selection is important. Over the equatorial region, the tropopause height is almost 17km. So we use 314nm for on-line and 355nm for off-line using second harmonics of dye laser and third harmonics of Nd:YAG laser.

We have observed large ozone enhancement in the upper troposphere, altitude of 13-17km in June 2014, concurring with a zonal wind oscillation associated with the equatorial Kelvin wave around the tropopause[1] at equatorial region.

REFERENCES
1. Fujiwara, M. et al., JGR, 103, D15, 19,173-19,182, 1998.

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