Geophysical Research Abstracts
Vol. 15, EGU2013-4820, 2013
EGU General Assembly 2013

Evidence of much more intense land convection in the Southern than in the Northern tropics and tentative explanation

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Convective overshooting over tropical land areas is a key contributor to troposphere-to-stratosphere exchange, shown to inject in the lower stratosphere adiabatically cooled air (Pommereau and Held 2007, Cairo et al., 2011, Khaykin et al., 2012,), trace and chemically active gases (Ricaud et al., 2007, 2010), ice crystals (Corti et al., 2007, Nielsen et al., 2007, Khaykin et al., 2009) and tropospheric clean air diluting the aerosols (Vernier et al., 2011). However, the altitude reached by those events differs dramatically between the hemispheres. Convective overshootings are observed to reach 20-21 km over the southern tropical continents, whereas in the Northern they are limited to altitude below the tropopause. Convection appears much more intense in the South. The suggested explanation for that is the higher albedo and the larger anthropogenic and desert dust tropospheric aerosols AOD of the northern tropical continents limiting the solar heating and thus the daytime increase of Convective Available Potential Energy (CAPE), compared to the low albedo and clean rain forest areas of the southern tropics.
Shown in the presentation will be the experimental evidence from the various observations of the difference of convection intensity between the two hemispheres, the tentative explanation of this feature by the influence of aerosols AOD and albedo on CAPE, and brief conclusions regarding the impact of the difference on the composition of the stratosphere and climate modeling.