

## 4.033 The impact of long-range transport of African ozone on tropospheric ozone over Asia.

Early Career Scientist

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Abstract:

Regional tropospheric ozone is greatly influenced by ozone transport from upwind areas. Studies on ozone source-receptor relationships among the continents are significant in improving air quality and understanding climate change. Based on 20-year simulations from a global chemical transport model, GEOS-Chem, and a trajectory model, HYSPLIT, the contribution of ozone produced in the African troposphere to Asia is quantified and the possible transport mechanisms are analyzed. Governed by the Hadley circulation and subtropical westerlies, imported African ozone over Asia peaks in the middle and upper troposphere around 25°N, being the largest in Northern Hemisphere (NH) winter and early spring (15 ppbv). The seasonality of the influence of African ozone on Asia is resultant from the integrated impacts of ozone precursor emissions in Africa and the meteorology and chemistry in Africa, Asia, and along the transport pathways. Overall, imported African ozone can account for 2-18% of tropospheric ozone over Asia, varying with season and altitude. Ozone from the Northern Hemisphere Africa contributes over 80% of the total African ozone in most altitudes and seasons over Asia. The convective divergence in the upper troposphere over the Intertropical Convergence Zone (ITCZ) in NH winter and the Somali jet in NH summer are two important pathways for the interhemispheric transport of Southern Hemisphere African ozone to Asia. Greatly influenced by the proximity of the ITCZ, the uplift of ozone and its precursors from the surface to higher altitudes is most effective in NH winter than in other seasons. The interannual variation of the contribution of African ozone to Asia is found to be positively correlated to the intensity of the African ITCZ in NH winter.