4.034 The impacts of long-range transport on the spatial and temporal distribution of black carbon in the Tibetan Plateau.

Early Career Scientist

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Abstract:

Black carbon (BC) over the Tibetan Plateau can cause glacier melting and thus alter atmospheric circulations and global climate. In this study, we characterize the spatial and temporal distributions of black carbon over the Tibetan Plateau, using the simulations from a global atmospheric chemistry transport models, GEOS-Chem, from 1995 to 2004. We also use the NCEP/NCAR reanalysis data and back trajectory data from HYSPLIT to examine the effects of transport on BC distributions over Tibet. Our results show that surface BC concentrations in Tibet generally increase from the central Tibet to the borders of Tibet in the east, south, and southwest. Seasonally, BC concentrations are highest in spring and lowest in summer. In spring, BC is transported from India to the southern Tibet, resulting in high BC there. In summer, BC transport to the southwestern Tibet is enhanced so that BC can cross the Himalayas, resulting in a larger area that is with high BC and is expanded to the east. The direction of winds begins to change in fall. Consequently, BC concentrations in southeastern Tibet are influenced by BC transported from Southeast Asia in fall and by BC transported from central China in winter. The magnitude of transport is larger in winter than in fall. These results can enhance our understanding of the temporal and spatial variations of snow melting caused by BC over the Tibetan Plateau.