Characteristics and Mechanisms of the Interannual Variation of Aerosol Optical Depth in Northern Hemisphere Spring

Seunghee Lee[1], Myong-In Lee[1], and Kyu-Myong Kim[2]

[1] *Climate-Environment Modeling Laboratory, Ulsan National Institute of Science and Technology, Ulsan, South Korea*

[2] *NASA Goddard Space Flight Center, Greenbelt, Maryland, USA*

Aerosols have profound impacts on the regional weather and climate variability as well as on the global-scale radiation balance and climate change in long-term timescale. Particularly due to the data insufficiency and a lack of long-term data, researches have been limited. Since 2000 onward the observations of the aerosol optical depth (AOD) from the MODIS satellites are available to study the characteristics of the interannual variation of aerosols in global scale. In addition, assimilated aerosol data from the MERRAero for the same period help understand the emission and mechanisms of long-range transport of aerosols in 5 different species such as dust, organic carbon, black carbon, sulfate and sea salt. From the data analysis for 2003–2013, the interannual variations of AOD over Northeast Asia and North Pacific have been investigated. The study is focused on the boreal spring when the Siberian biomass burning is in its maximum. It is found that the increase of organic and black carbon is primarily attributed to the biomass burning (Lin et al., 2013). This leads to a significant year-to-year variation of aerosol loading into the atmosphere and pan-Pacific transport. This study hypothesizes that, when the surface pressure over the Northwestern Pacific becomes abnormally low, the upper-level jet stream can be enhanced, which tends to drive cold advection over northeast Asia. Cold advection is favorable condition for more delayed melting of Eurasian snow cover, which provides an unfavorable condition for biomass burning. In the opposite case of abnormally high surface pressure and warm conditions, the snow melting in spring can be expedited and the chance of surface drying and biomass burning can be increasing. In case, the upper-level jet stream becomes weaker due to the anticyclonic circulation, which increase the aerosol concentration in Northeast Asia and the pan-Pacific transport.

Key words: Aerosol, AOD, Biomass burning, Interannual variation, Southeast Asia

References

Lin, N.H. and others, 2013: *Atmos. Environ.*, **78**, 1-19.