

Impacts of different types and intensities of El Niño events on winter aerosols over China

*Xiaochao Yu^{1,2}, Zhili Wang^{2,1}, Hua Zhang², Shuyun Zhao³

1. Collaborative Innovation Center on Forecast and Evaluation of Meteorological Disasters, Nanjing University of Information Science and Technology, Nanjing, 210044, China, 2. State Key Laboratory of Severe Weather and Key Laboratory of Atmospheric Chemistry of CMA, Chinese Academy of Meteorological Sciences, Beijing, 100081, China., 3. National Climate Center, China Meteorological Administration, Beijing, 100081, China

El Niño is a strong signal of interannual climate variability. The occurrence of an El Niño event may have an important impact on atmospheric pollutant concentrations in China through changes to the regional climate. This study quantitatively examines the differences among the effects of different types and intensities of El Niño events on winter mean aerosol concentration and severe haze days in China. It is found that Central Pacific (CP) El Niño events lead to larger increases in the aerosol burden over southern China relative to the same intensity of Eastern Pacific (EP) events. For El Niño events of the same type but with different intensities, moderate events induce large increases in surface aerosol concentrations over the entire eastern China, while strong and weak events lead to obvious decreases in the surface aerosol concentration over northern China. These differences are mainly attributed to changes in atmospheric circulation, with the resulting changes in aerosol mass transport occurring in response to the different types of El Niño event. Except for moderate CP events, all kinds of El Niño events lead to an increase in severe haze days in winter over northern China. Strong and weak EP El Niño events and weak CP El Niño events lead to an increase in severe haze days in winter over southern China. A change in the south-north transport of aerosols caused by El Niño events also play a dominate role in changing the occurrence of winter haze days in China.

Keywords: Eastern Pacific El Niño, Central Pacific El Niño, aerosol concentration, severe haze day

