

Supplementary Information

Limited production of sulfate and nitrate on front-associated dust storm particles moving from desert to distant populated areas in northwestern China

Feng Wu¹, Daizhou Zhang², Junji Cao^{1,3}, Xiao Guo^{1,4}, Yao Xia^{1,4}, Ting Zhang¹, Hui Lu⁵, Yan Cheng³

¹ Key Laboratory of Aerosol Chemistry & Physics, and State Key Laboratory of Loess and Quaternary Geology, Institute of Earth Environment, Chinese Academy of Science, Xi'an, China

² Faculty of Environmental and Symbiotic Sciences, Prefectural University of Kumamoto, Kumamoto, Japan

³ Institute of Global Environmental Change, Xi'an Jiaotong University, Xi'an, China

⁴ School of Tropical Eco-Environment Protection, Hainan Tropical Marine University, Sanya, China

⁵ Institute of Desert Meteorology, China Meteorological Administration, Urumqi, China

Figure S1: Geographical features of North China. The elevation dataset was from NASA Shuttle Radar Topography Mission. (<http://vterrain.org/Elevation/SRTM/>)

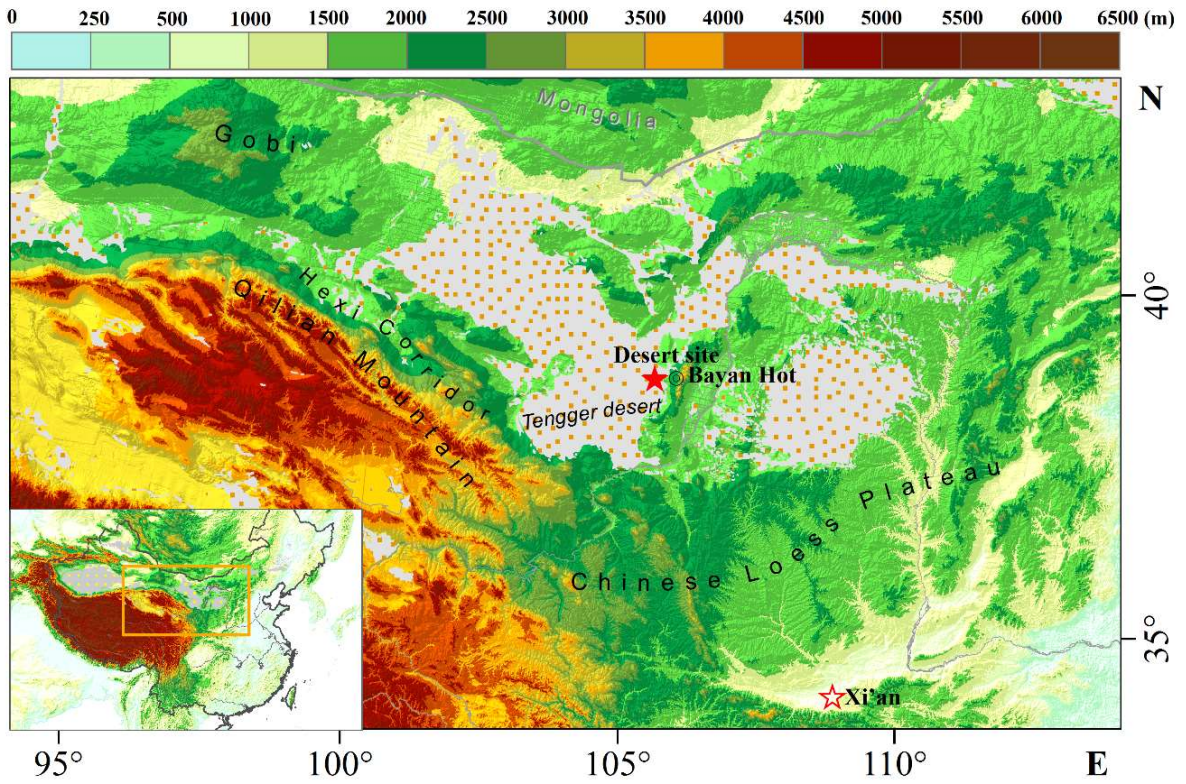


Figure S2: Backward trajectories from the desert site (2014/04/24) and Xi'an site (2014/05/01) from the HYSPLIT model (www.arl.noaa.gov/HYSPLIT.php). (BST = GMT + 08:00)

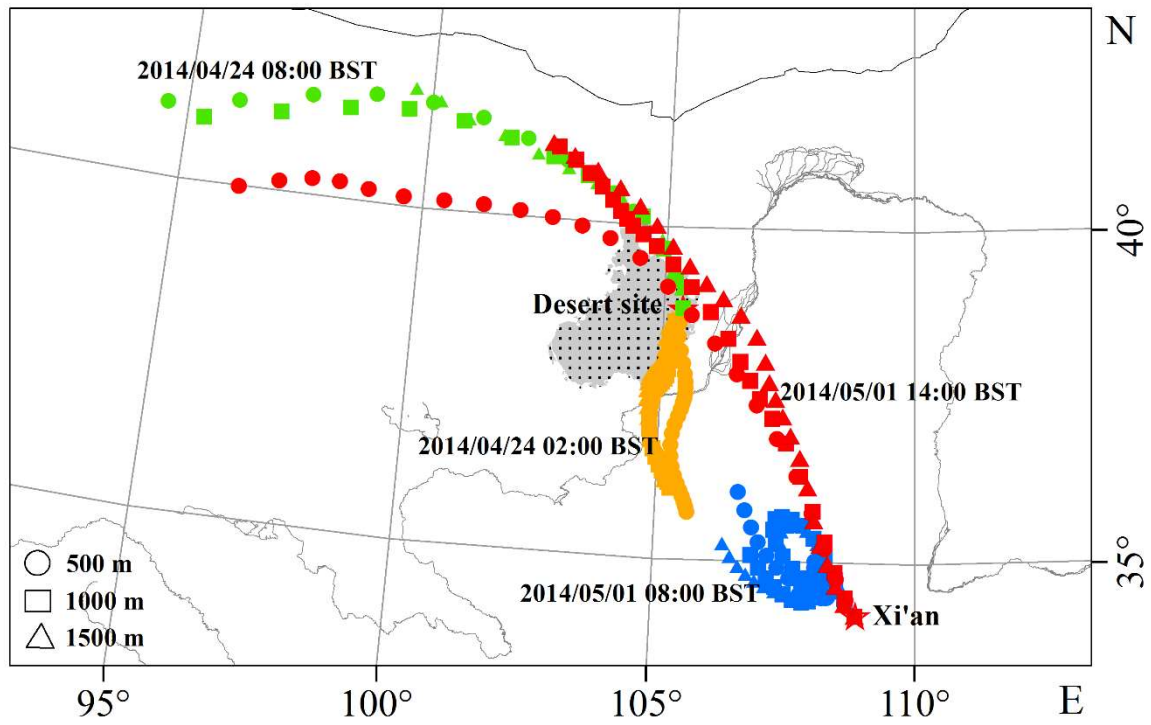


Figure S3: CFORS model output for boundary layer (surface - 1000m) dust concentration ($\mu\text{g}/\text{m}^3$, color in log scale) and wind vector at 1000m of East Asia during the sampling periods at desert site (a) and Xi'an (b). (<http://www-cfors.nies.go.jp/~cfors/index-j.html>) (JST = GMT + 09:00)

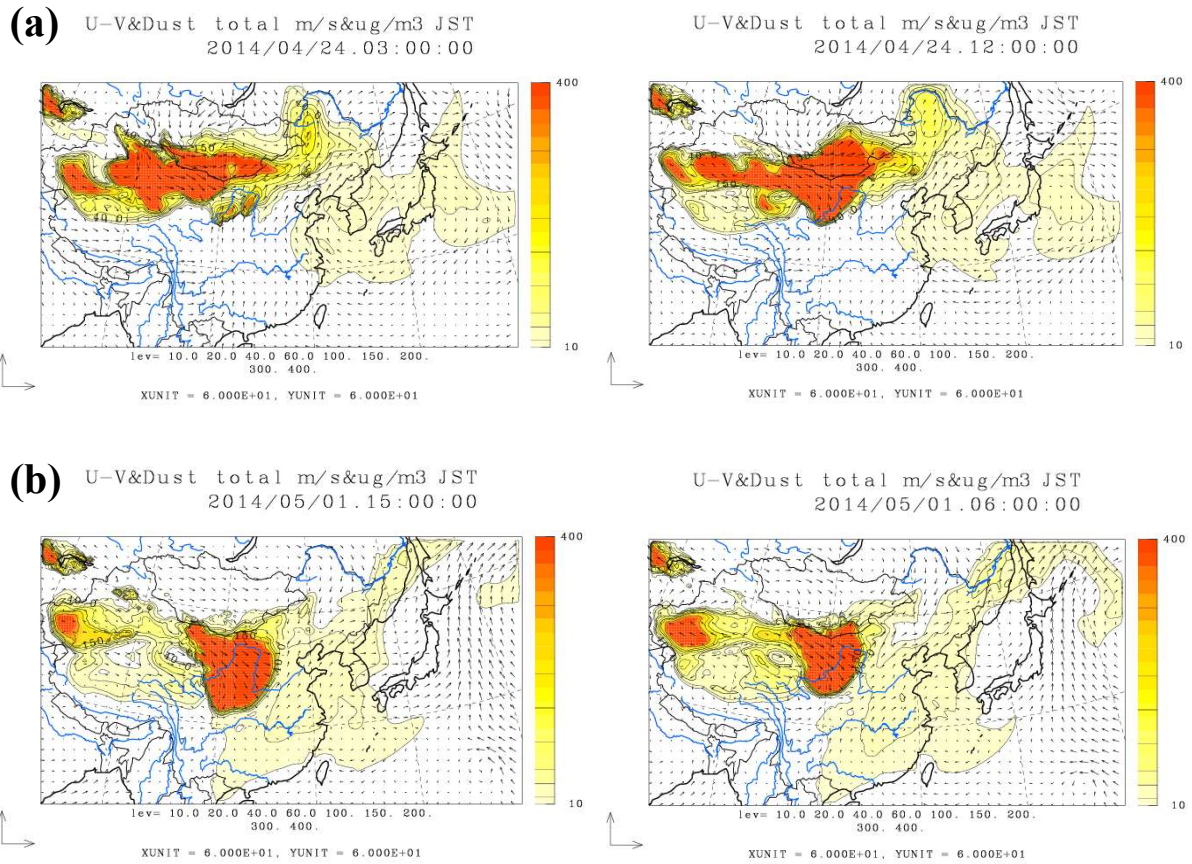


Figure S4: Emission distributions of SO₂ at 0.25°×0.25° resolution during April-May, 2014. Data were from (<http://www.meicmodel.org/>). The emission sources were composed of four types: industry, power, transportation and residential sources.

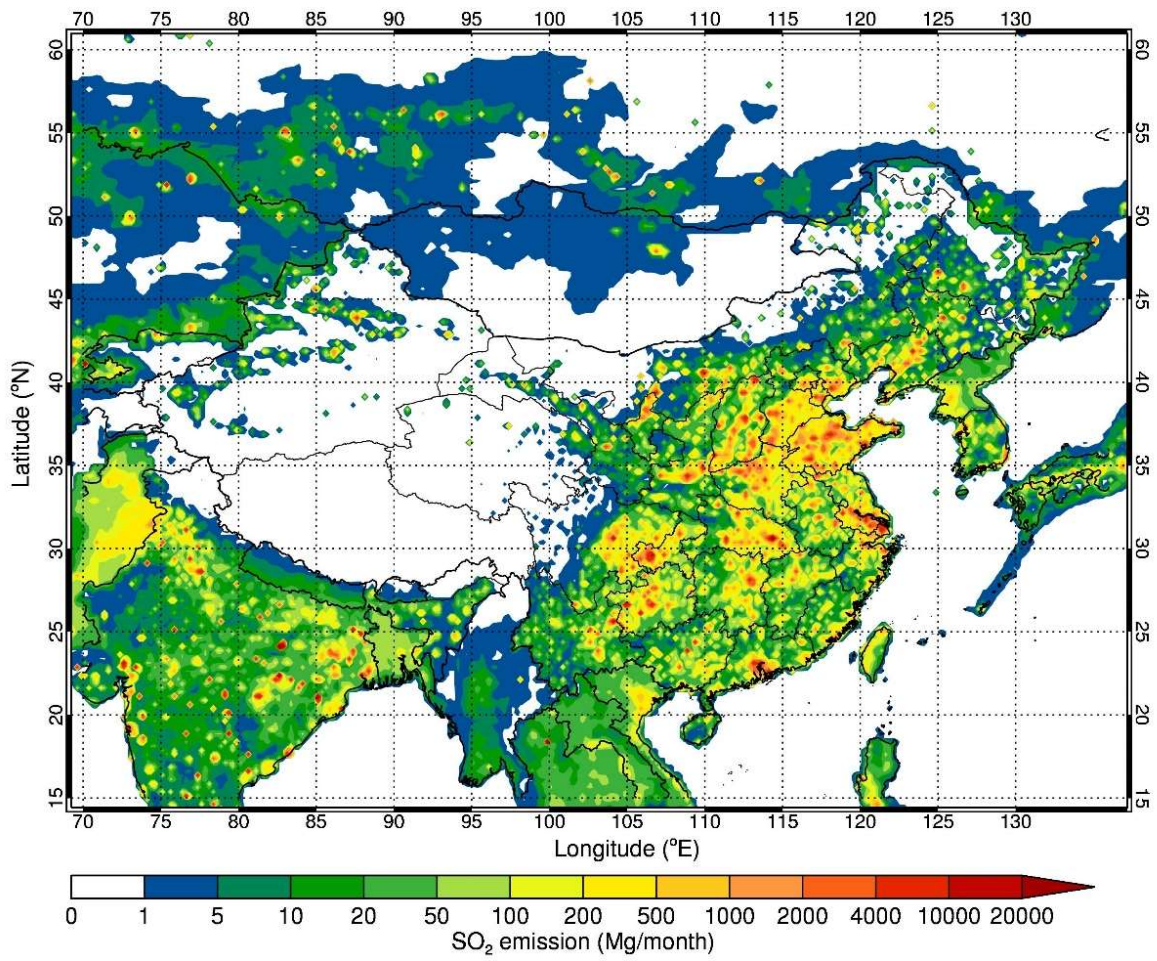


Figure S5: Concentrations of SO₂ and NO₂ at Xi'an site during the dust passage on May 1, 2014.

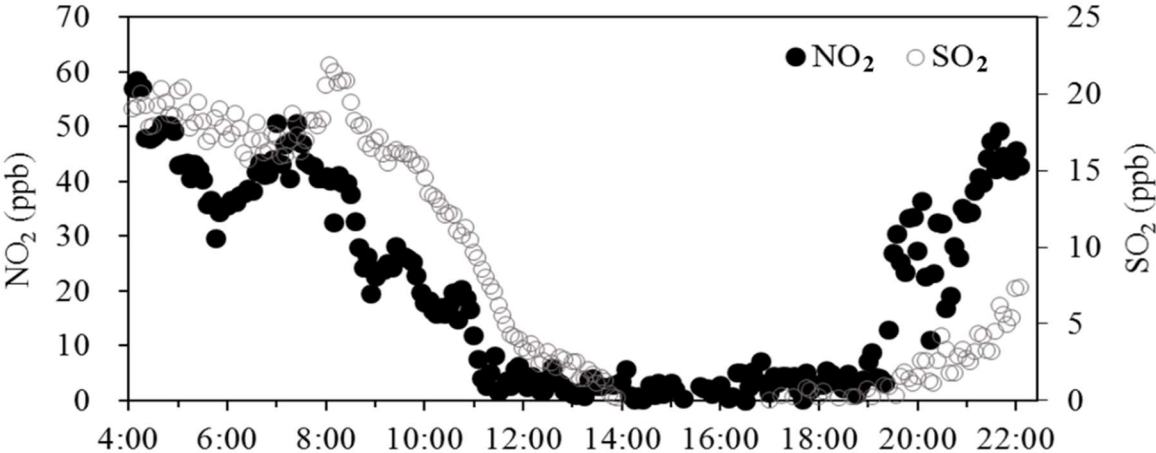


Figure S6: Vertical profiles of virtual potential temperature near the surface at Yinchuan (38.48°N, 106.21°E), the WMO sounding station closest to the desert site, and at Jinhe (34.43°N, 108.97°E), a suburb place of Xi'an, before and after dust occurrence at the two places. The profiles were from the homepage of Atmospheric Soundings of the University of Wyoming (<http://weather.uwyo.edu/upperair/sounding.html>). Dust occurred at the desert site on the morning of April 24, 2014, and the sample collection was held between 06:30 and 15:00 BST on April 24. Dust occurred at Xi'an site on the morning of May 1, 2014, and the sample collection was held between 07:00 and 19:00 BST on May 1.

