



Supplement of

The impact of monthly variation of the Pacific–North America (PNA) teleconnection pattern on wintertime surface-layer aerosol concentrations in the United States

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Fig. S1. (a) The correlation coefficients between geopotential height at point B and geopotential heights in other grid cells in the Northern Hemisphere, following Wallace and Gutzler (1981). (b) The average geopotential height in PNA– months minus the average of geopotential height over the months of NDJFM of 1986–2013. (c) The average geopotential height in PNA+ months minus the average of geopotential height in PNA+ months minus the average of geopotential height of 1986–2013. (d) The average geopotential height in PNA+ months minus that in PNA– months. Datasets used are deseasonalized geopotential heights at 700 hPa from NCEP-2 assimilated data in the months of NDJFM during 1986–2013. See Sect. 2.3 in the manuscript for the calculation of PNA index and the definition of PNA+ and PNA– months.

The dotted areas in (a) denote the regions that have passed the two-tail student-t test with 90% significance level. As shown in (b) and (c), the PNA pattern comprises positive (negative) geopotential height anomalies in the vicinity of Hawaii (Point A) and over the intermountain region of North America (Point C), while negative (positive) geopotential height anomalies in the south of the Aleutian Islands (Point B) and over the Gulf Coast region in the United States (Point D). The PNA has large impacts on meteorological variables in the U.S. in wintertime (Leathers et al. 1991, Notaro et al. 2006).



Fig. S2. Correlation coefficient between PNAI and EPA-AQS surface aerosol concentrations at each site for each aerosol species ($PM_{2.5}$, SO_4^{2-} , NO_3^{-} , NH_4^{+} , OC, or BC). The seasonal cycle and trend in observed aerosol concentrations are removed as described in Sect. 2.1. The sites with black dots are those that have passed the two-tail t-test with 90% confidence level.



Fig. S3. The fraction (%) of temporal variability of EPA-AQS surface aerosol concentrations explained by PNA at each site for each aerosol species ($PM_{2.5}$, SO_4^{2-} , NO_3^- , NH_4^+ , OC, or BC). The seasonal cycle and trend in observed aerosol concentrations are removed as described in Sect. 2.1. The sites shown here are those in Fig. S2 with the correlation coefficients passed the two-tail t-test with 90% confidence level.



Fig. S4. The temporal correlation coefficient between EPA-AQS observations and GEOS-Chem model results at each site for each aerosol species ($PM_{2.5}$, SO_4^{2-} , NO_3^{-} , NH_4^{+} , OC, or BC). Datasets used here are the same as those used in Figure 4(c) of the manuscript. The seasonal cycle and trend in observed aerosol concentrations are removed as described in Sect. 2.1. The sites with black dots are those that have passed the two-tail t-test with 90% confidence level.

References

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