

To what extent can the synoptic weather system explain high-PM2.5 episodes in the metropolitan area?



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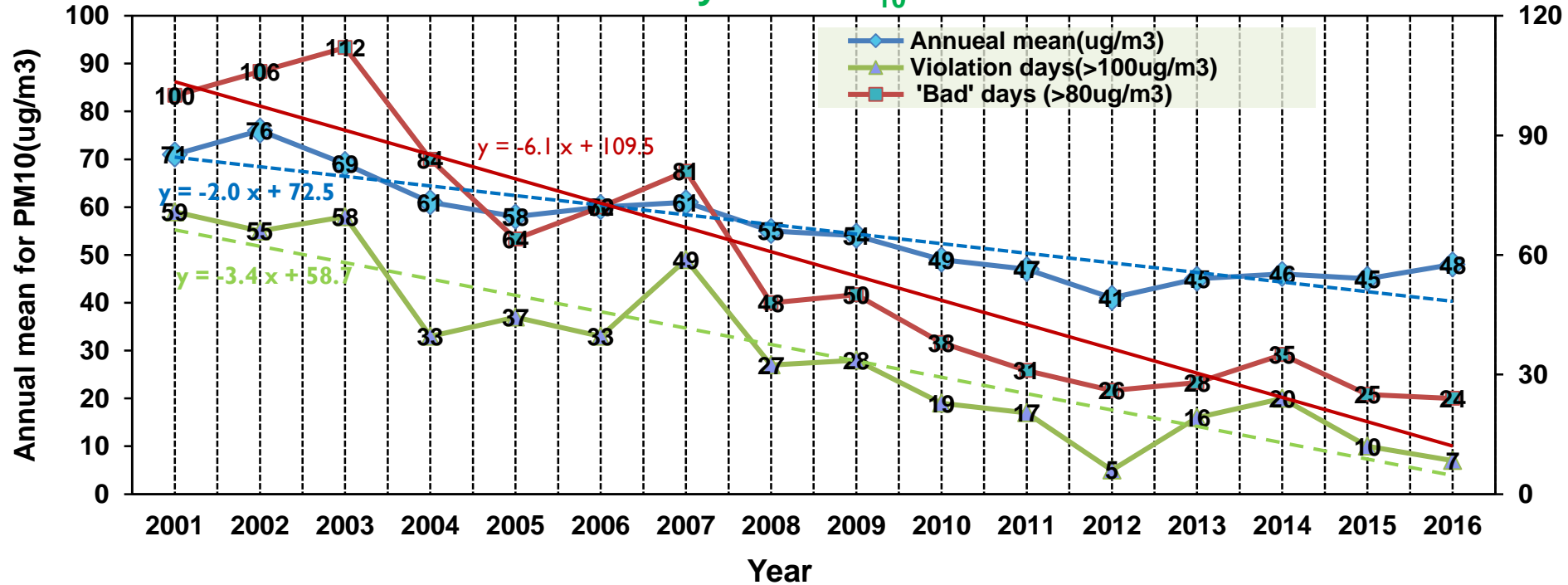
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Long-term trend of PM in Seoul

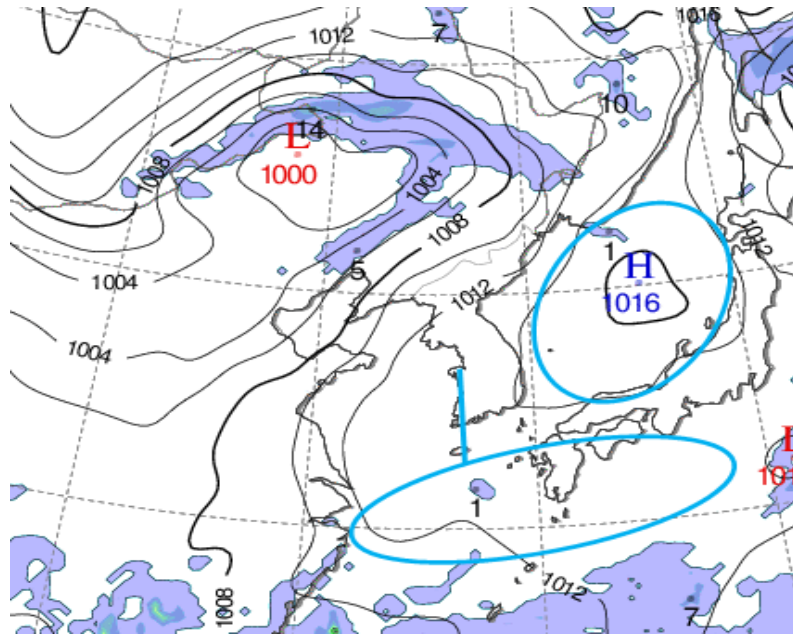
Annual mean and violation days for PM₁₀ in Seoul



PM _{2.5}		2016	2017	2018 (Jan.~Sep.)
Annual mean for PM _{2.5} (μg/m ³)		26	25	23
Violation days	> 35μg/m ³ (after 2018.3.27)	45	48	41
	> 50μg/m ³ (before 2018. 3.27)	8	8	12

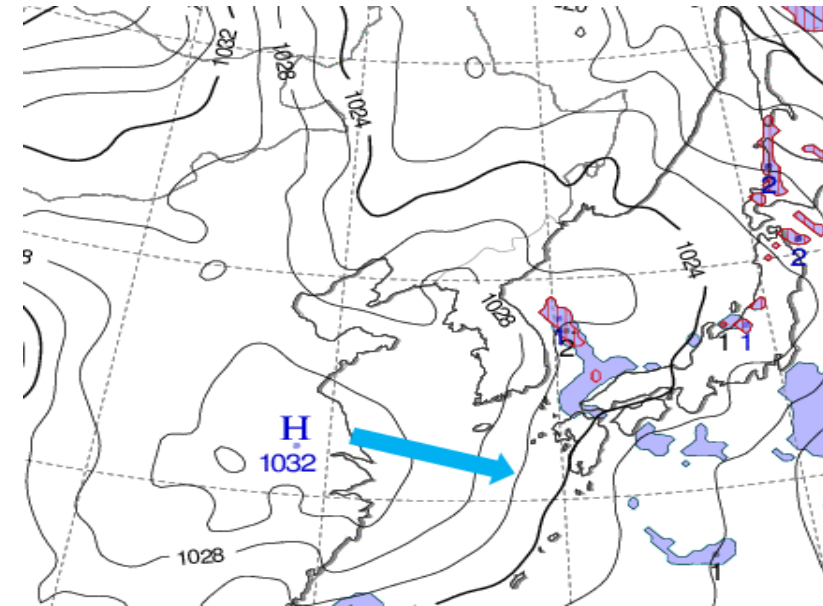
Synoptic weather patterns relevant for high-PM_{2.5} episodes

Southern high pressure



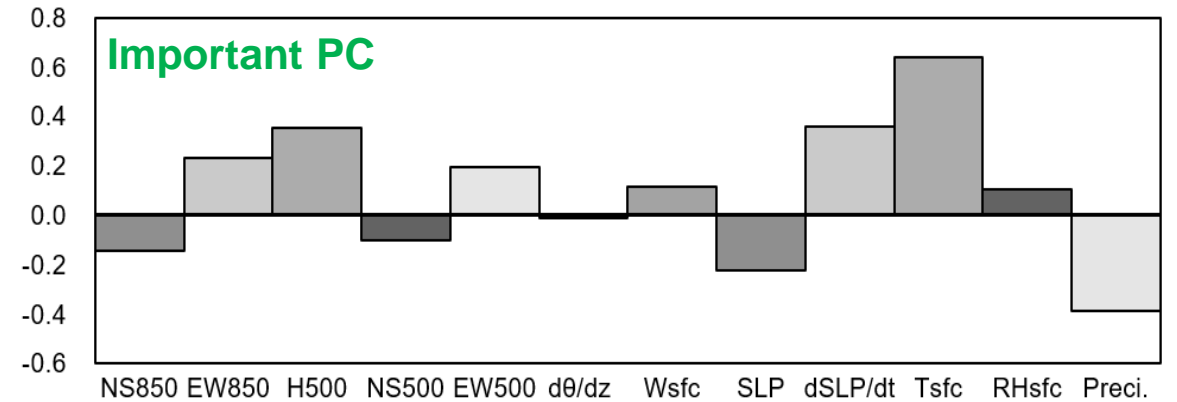
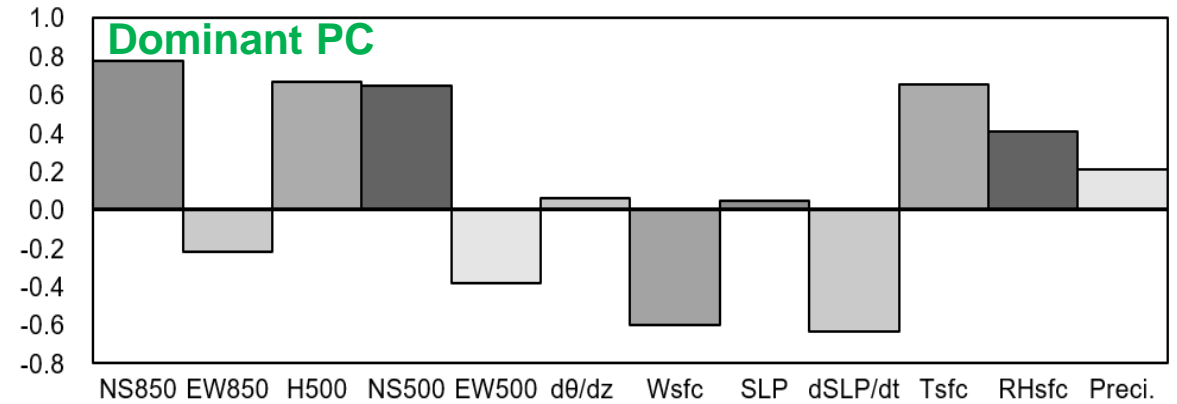
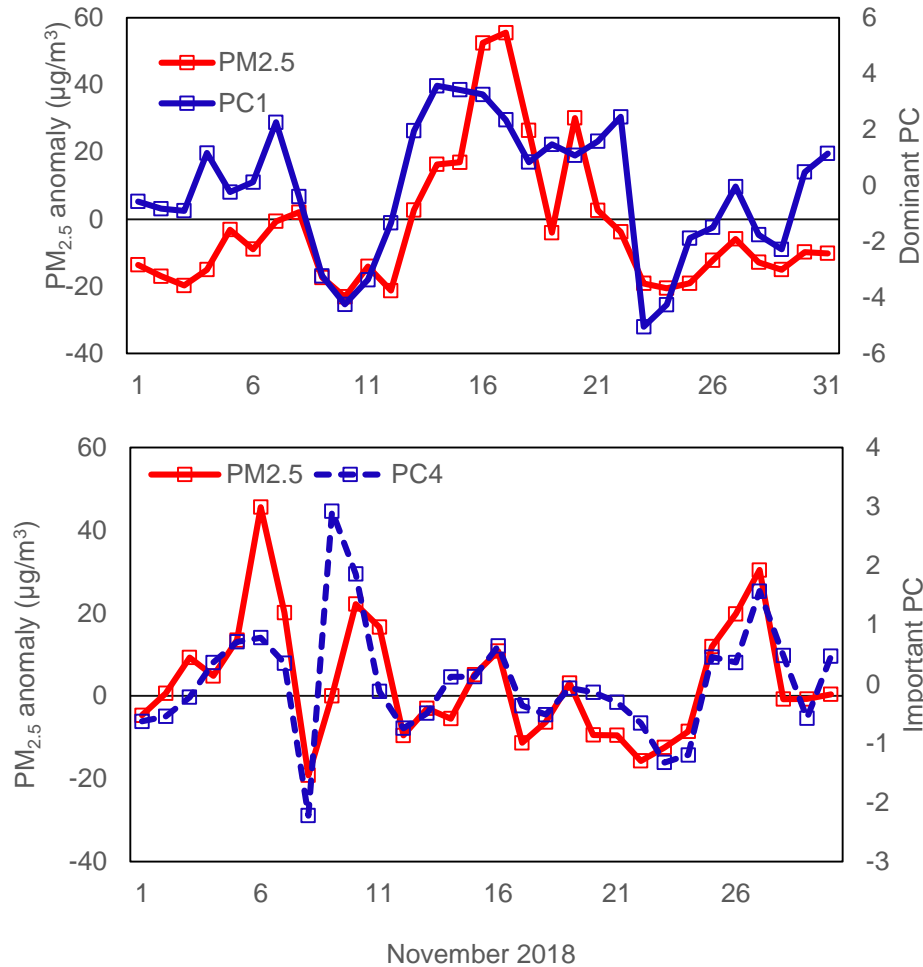
Anticyclone whose center is located in East Sea, Jeju, or Japan -with the ridge extending toward the Korean Peninsula

Travelling high pressure

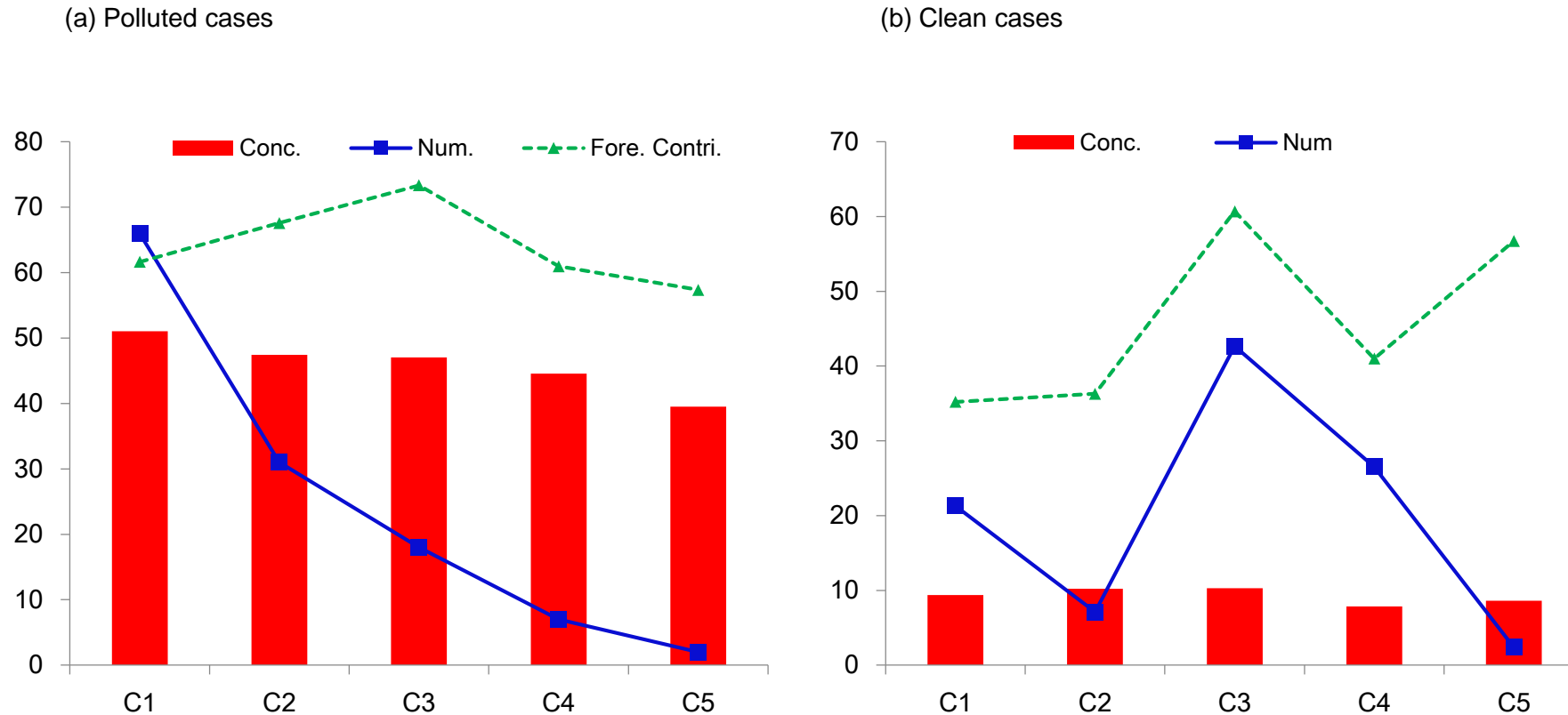


travelling anticyclone off Siberian high moving southwest from China (Northern China–Shandong peninsula) to South Korea through the Yellow sea, or south of Jeju Island

Two meteorological modes extracted by principal component analysis and regression represent the synoptic weather patterns



Two meteorological modes explain 78% of high-PM_{2.5} episodes



The pair of dominant and important modes into five categories: category 1 (C1) is for positive dominant mode dominant, category 2 (C2) for positive important mode dominant, category 3 (C3) for negative dominant mode dominant, and category 4 (C4) for negative important mode dominant, and finally category 5 (C5) if both modes PC4 are statistically not valid (if factor loadings <0.2).