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## **Climatological study of the Boundary-layer air Stagnation Index for China and its relationship with air pollution**

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The Air Stagnation Index (ASI) is a vital meteorological measure of the atmosphere's ability to dilute air pollutants. The original metric adopted by the US National Climatic Data Center (NCDC) is found to be not very suitable for China, because the decoupling between the upper and lower atmospheric layers results in a weak link between the near-surface air pollution and upper-air wind speed. Therefore, a new threshold for the ASI–Boundary-layer air Stagnation Index (BSI) is proposed, consisting of daily maximal ventilation in the atmospheric boundary layer, precipitation, and real latent instability. In the present study, the climatological features of the BSI are investigated. It shows that the spatial distribution of the BSI is similar to the ASI; that is, annual mean stagnations occur most often in the northwestern and southwestern basins, i.e., the Xinjiang and Sichuan basins (more than 180 days), and least over plateaus, i.e., the Qinghai–Tibet and Yunnan plateaus (less than 40 days). However, the seasonal cycle of the BSI is changed. Stagnation days under the new metric are observed to be maximal in winter and minimal in summer, which is positively correlated with the air pollution index (API) during 2000–2012. The correlations between the BSI and the concentration of fine particulate matter (PM<sub>2.5</sub>) during January 2013 and November to December in 2015–2017 of Beijing are also investigated. It shows that the BSI matches the day-by-day variation of PM<sub>2.5</sub> concentration very well and is able to catch the haze episodes.