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Elevated aerosol layers within the daytime mixed layer over ecologically sensitive areas of northwest China: diurnal variation, formation mechanisms and regional effects

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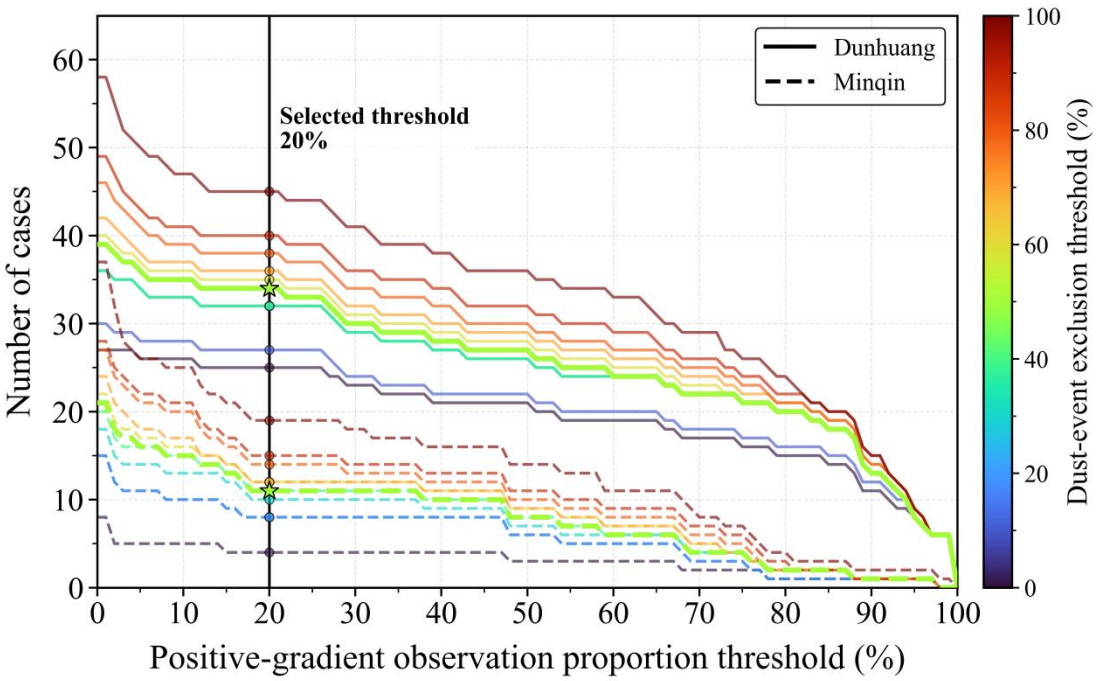

Fig. S1. Sensitivity of elevated aerosol layer classification to threshold combinations at Dunhuang and Minqin. Solid and dashed lines represent the Dunhuang and Minqin sites, respectively, and line colour denotes the dust-event exclusion threshold. The black vertical line marks the selected positive-gradient observation-proportion threshold of 20%, while the star markers indicate the final threshold combination of 50% for dust-event exclusion and 20% for elevated aerosol layer identification. The selected thresholds correspond to relatively stable classification results across different threshold combinations.

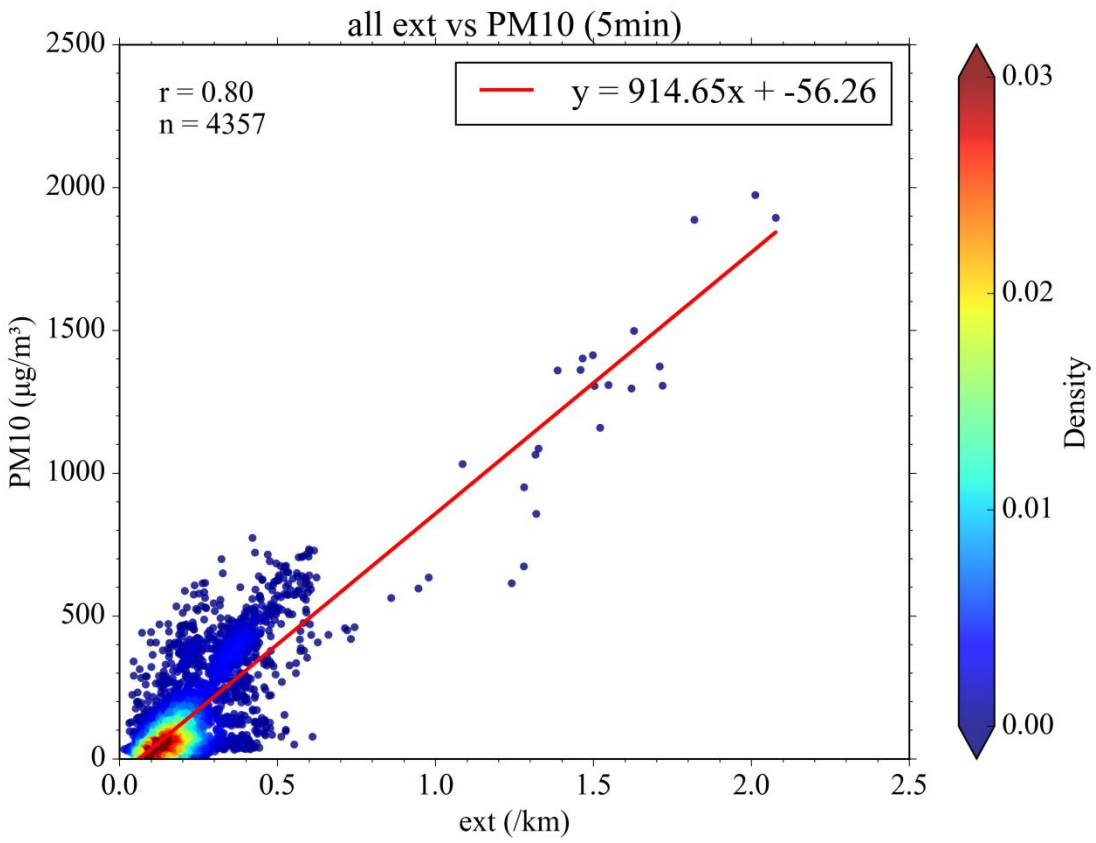

Fig. S2. Relationship between ground-level PM_{10} mass concentration and the temporally collocated MPL-derived aerosol extinction coefficient from the lowest two valid sampling bins near ~600 m during the intensive observation period. The red line represents the linear regression used to derive Eq. (1). Regression-derived PM_{10}-equivalent estimates should be interpreted empirically, and values predicted below zero under very low-extinction conditions are treated as outside the physically meaningful range of the relationship.

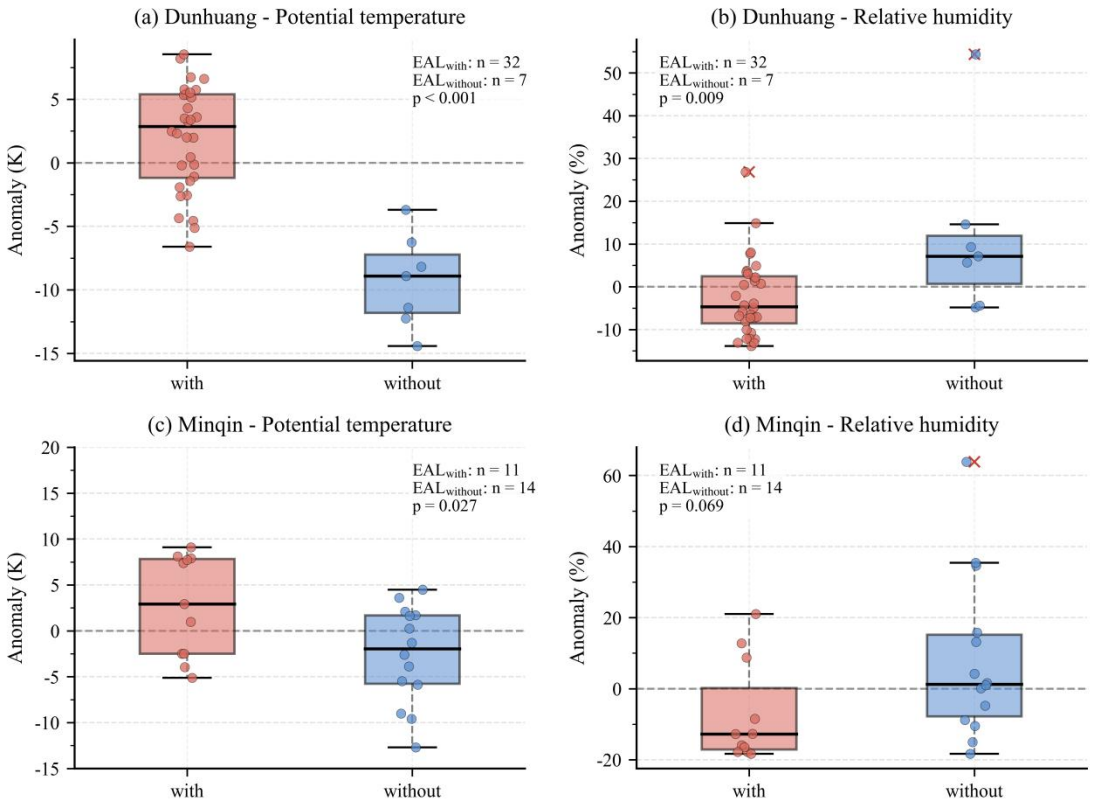

Fig. S3. Boxplots of daily potential temperature and relative humidity anomalies at the Dunhuang and Minqin sites under conditions with and without elevated aerosol layers (EALs). The black lines represent the medians, circles indicate individual daily values, the box edges denote the 25th and 75th percentiles (Q1 and Q3), and the whiskers represent non-outlier data points. Outliers (values beyond Q3 + 1.5 × IQR or below Q1 − 1.5 × IQR) are marked with red crosses. Under a normal distribution, the whiskers encompass approximately 99% of the data. Reported p values are based on non-parametric tests comparing EAL and non-EAL days.