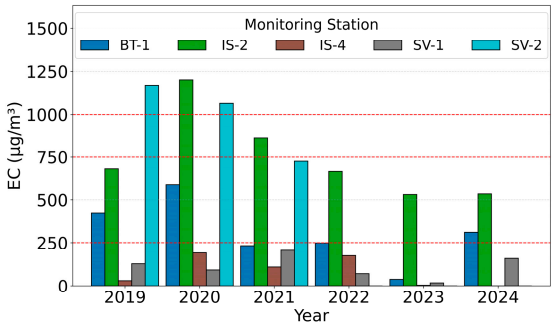
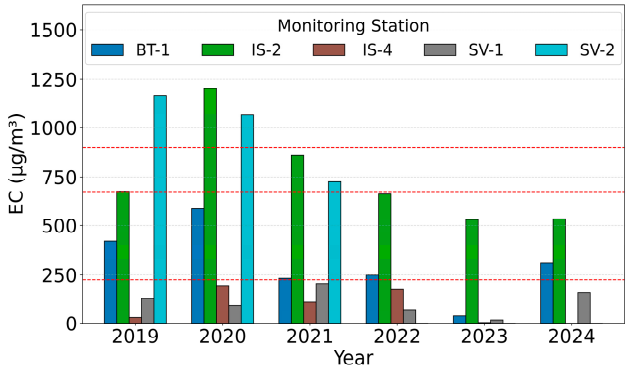
Supplementary Material

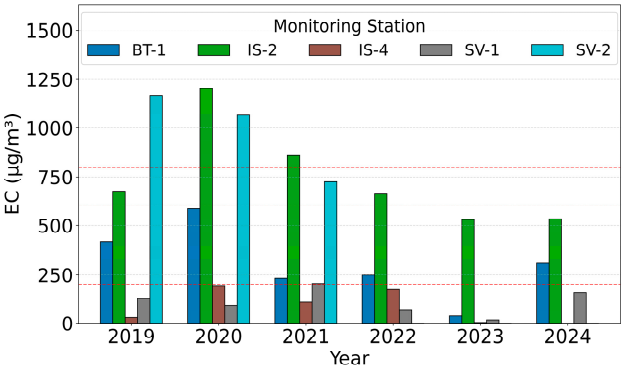
This supplementary material provides additional figures illustrating the annual EC and EI values of PM10 and PM2.5 under the sensitivity analysis scenarios discussed in Sections 3.3.1 and 3.3.2.



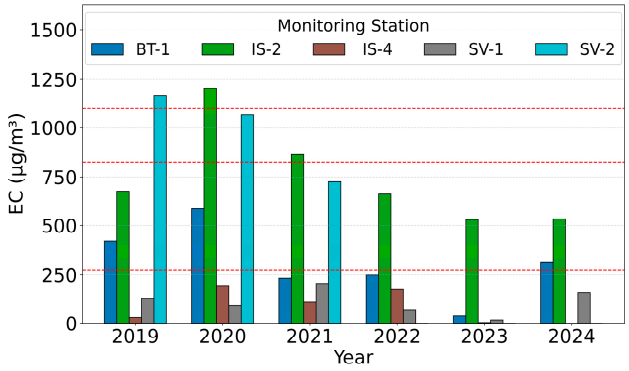
(a) Reference thresholds



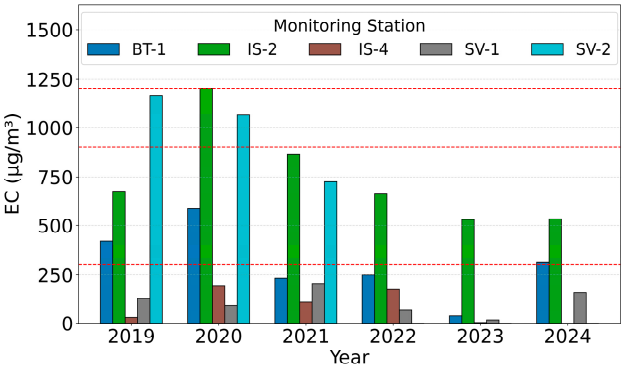
(b) Threshold -10%



(c) Threshold -20%

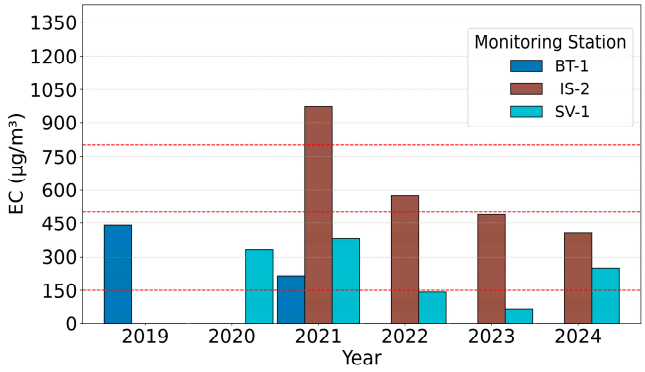


(d)Threshold +10%s

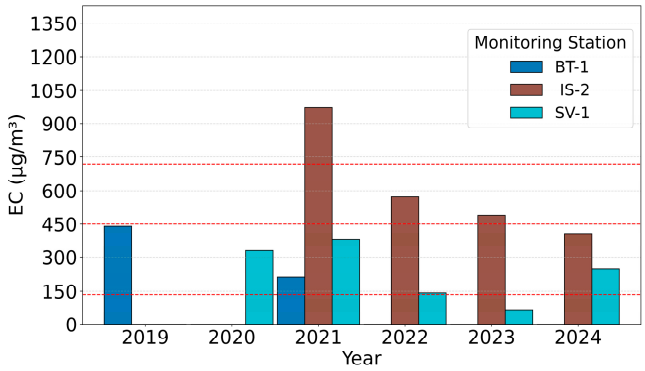


(e)Threshold +20%

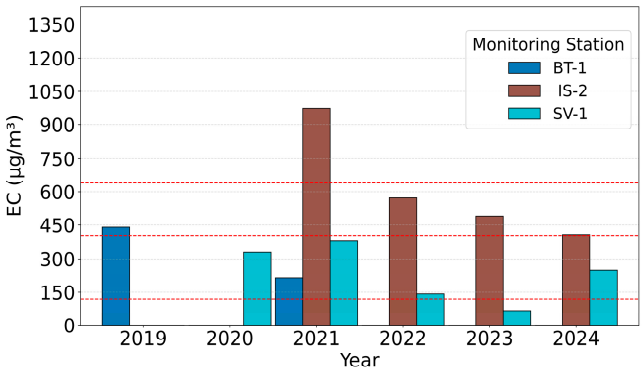
Figure S1. Annual EC values of PM_{10} under reference thresholds and sensitivity scenarios (–10%, –20%, +10%, +20%). Red dashed lines represent the proposed classification thresholds. The results illustrate that most classifications remain unchanged, with reclassifications occurring mainly at stations close to category boundaries.



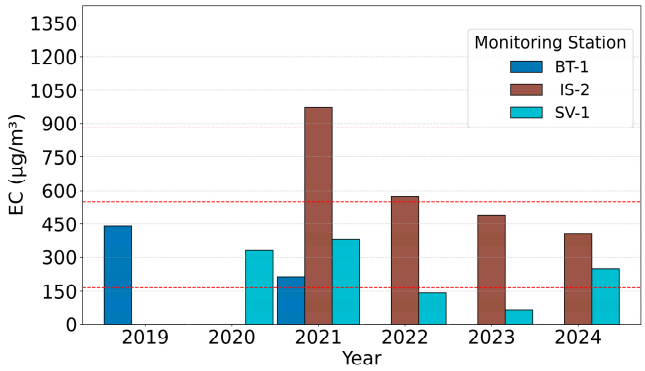
(a) Reference thresholds



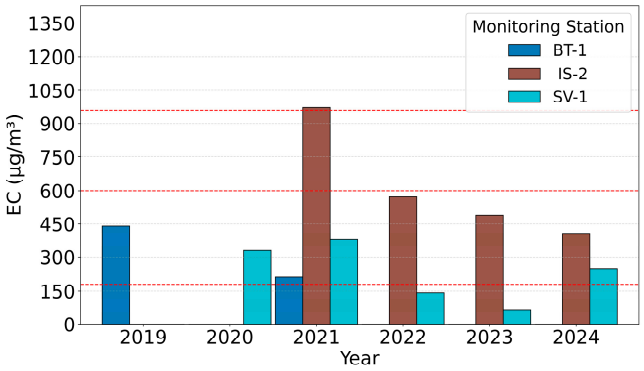
(b) Threshold -10%



(c) Threshold -20%



(d)Threshold +10%s



(e)Threshold +20%

Figure S2. Annual EC values of $PM_{2.5}$ under reference thresholds and sensitivity scenarios (–10%, –20%, +10%, +20%). Red dashed lines represent the proposed classification thresholds. Classifications remain largely stable, with reclassifications primarily occurring near category limits. There is a clear drop in stability only for the -20% scenario.

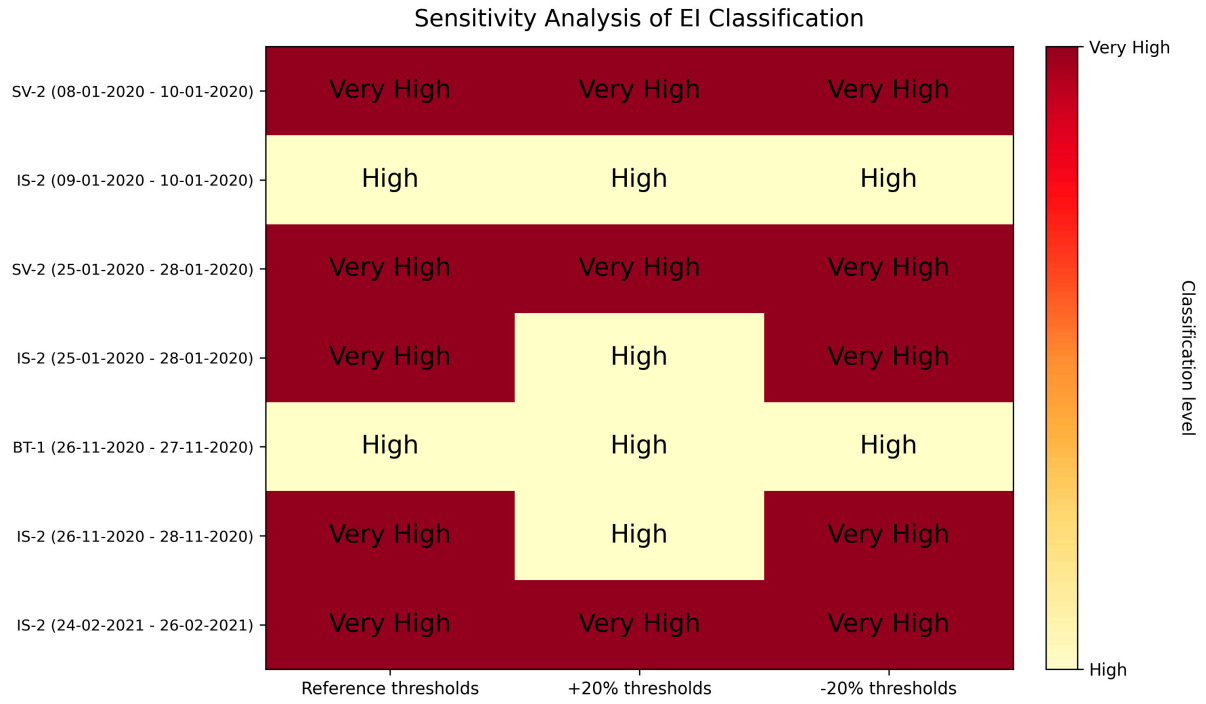


Figure S3. Sensitivity analysis of EI classification for PM_{10} under reference thresholds and adjusted thresholds (±20%). The results indicate that almost all episodes retain their category, with only one reclassification, confirming the robustness of the proposed EI thresholds.

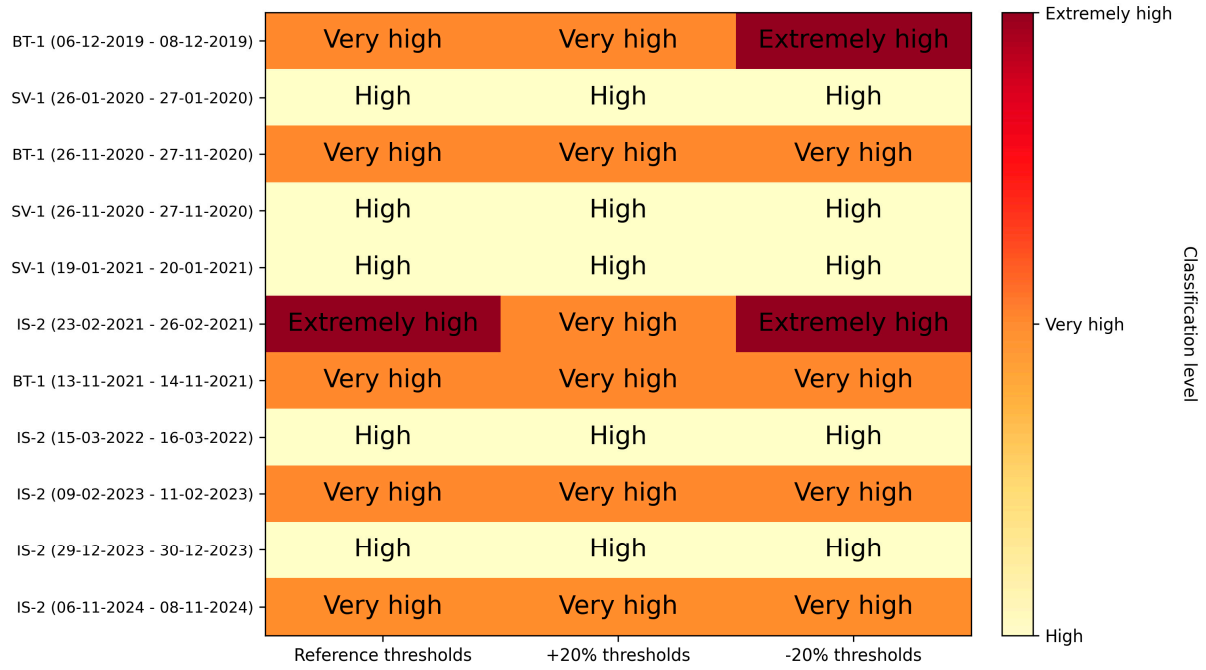


Figure S4. Sensitivity analysis of EI classification for $PM_{2.5}$ under reference thresholds and adjusted thresholds (±20%). The results indicate that most episodes retain their category, with only one case shifting between Extremely high and Very high, confirming the robustness of the proposed EI thresholds.