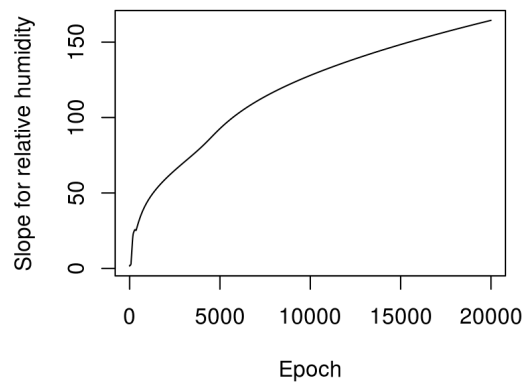
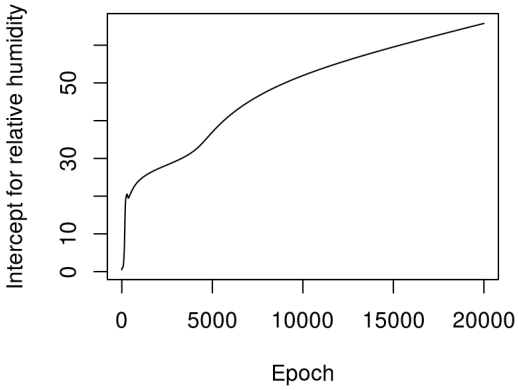
remote sensing

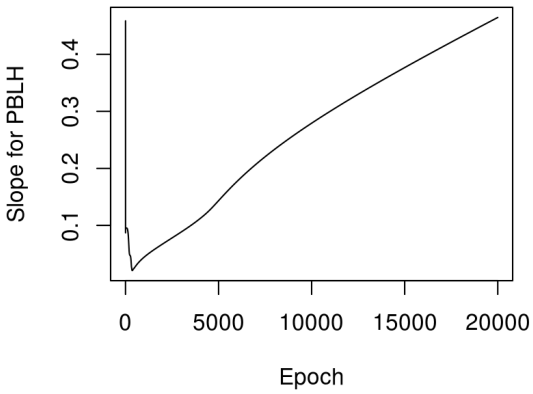
Supplementary Materials



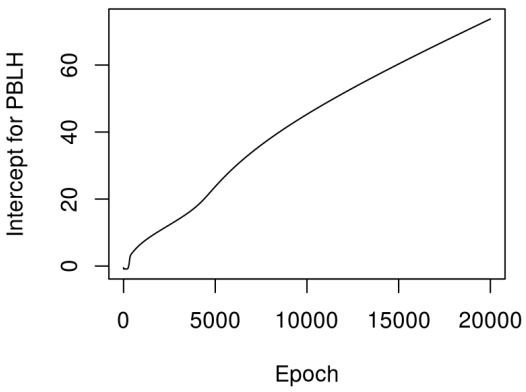
(a). Slope learning curve for RH



(b). Intercept learning curve for RH

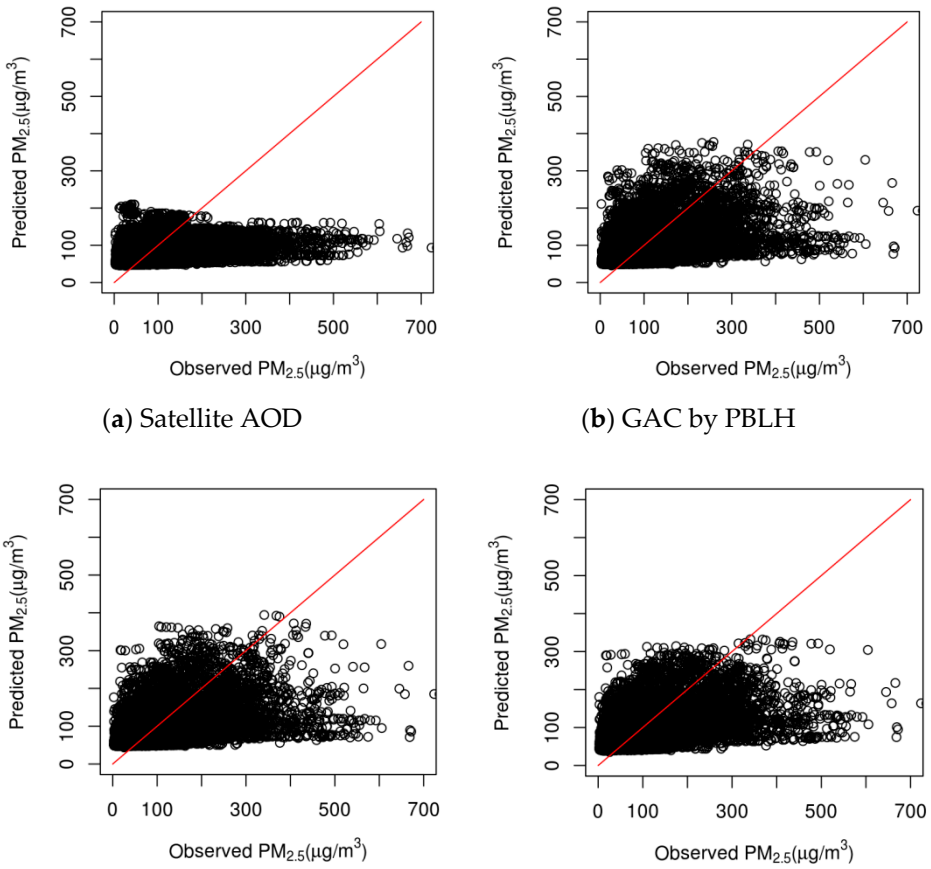


(c). Slope learning curve for PBLH



(d). Intercept learning curve for PBLH

Figure S1. Learning curves of scaling (slope) and shift (intercept) factors for RH and PBLH.



(**a**) Satellite AOD (**b**) GAC by PBLH

(**c**) Empirical GAC (**d**) Optimal GAC by AD

Figure S2. Scatter plots of the observed vs. predicted $PM_{2.5}$ in univariate linear regression, illustrating improvement of the optimal ground-based aerosol (extinction) coefficient (GAC) by automatic differentiation.