Supplementary material for

An ensemble method for improving the estimation of planetary boundary layer height from radiosonde data

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Three-point smoothing

1–2–1 smoother was applied in this paper. As shown in Figure S1, the 75th percentile values of q, RH, and N methods are 150-250 m higher for smooth data than original data. Besides, surface-based inversion (SI) method fails when using smooth data. For different cases, the data with better performance is different (Figure S2). The PBLH defined by the smooth data shown in Figure S2(a) is 269m, which is more reasonable than 492 m derived from original data. However, in the other case illustrated in Figure S2(b), the original profile retained the characteristics of the boundary layer, while the smooth data overestimated the PBLH by 255 m. Thus, using both original and smooth data is necessary for the integrated method to improve accuracy.

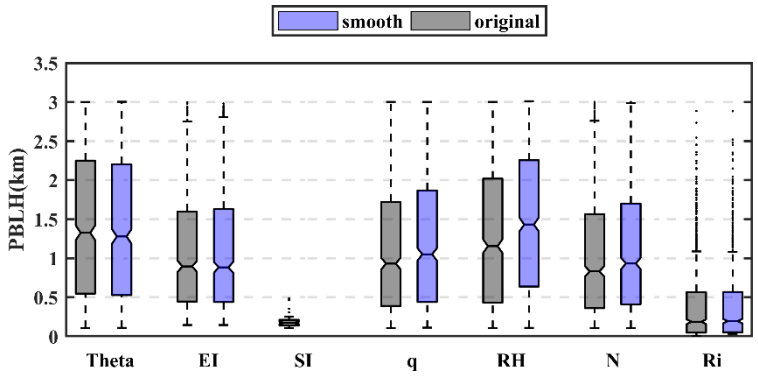

Figure S1. Box-and-whisker plots of PBLH calculated by different methods using original data and 1-2-1 smooth data.

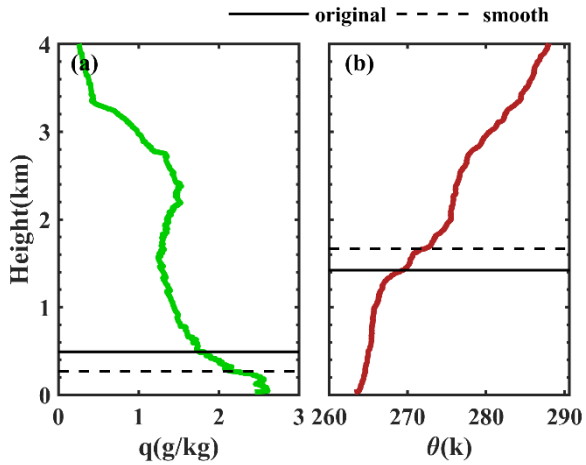

Figure S2. Comparison of PBLH derived from original data and smooth data at (a) 08:00 BJT on 27 February and (b) 08:00 BJT on 20 January.

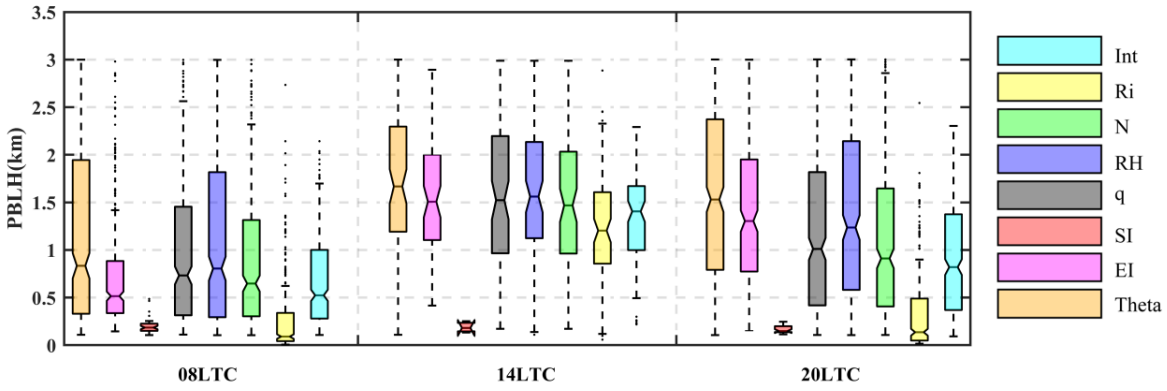

Figure S3. Box-and-whisker plots of PBLH calculated by different methods at 08:00, 14:00, and 20:00 LTC. The results from each single method were calculated by the original data and the comparison with 75% quantiles for gradient methods was not conducted.

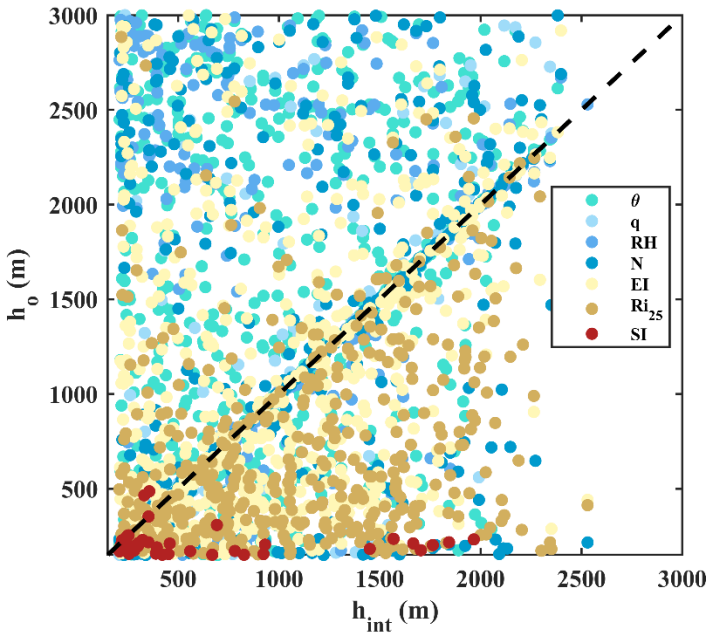

Figure S4. Comparison of the hint and ho for each single observation time. h_0 is the PBLH derived from each individual method and h_{int} is the PBLH estimated by the integrated method.