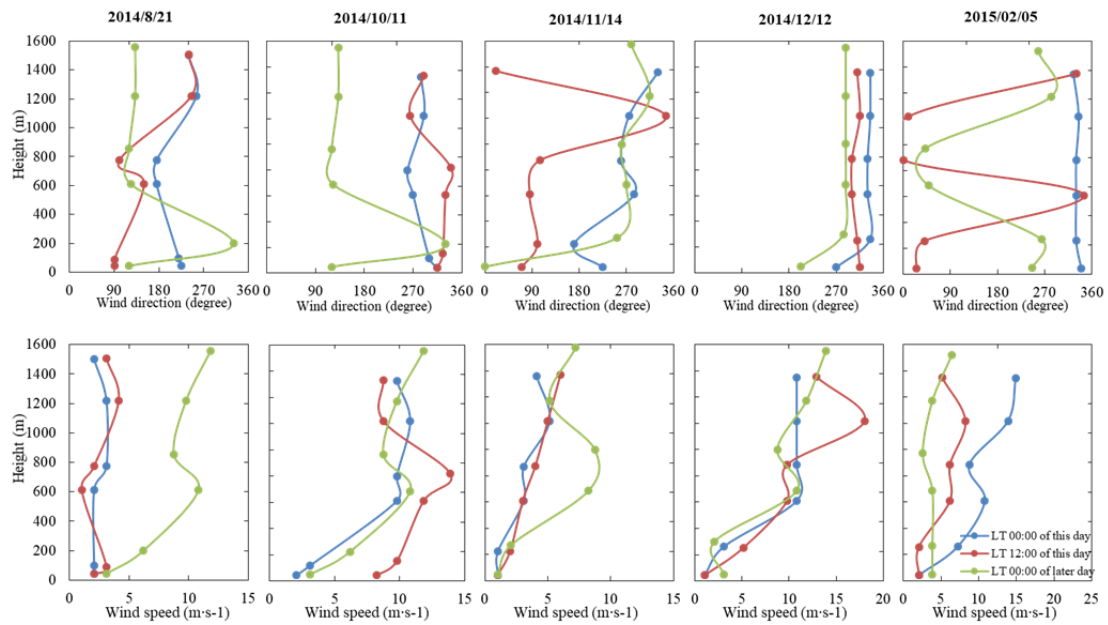


**Fig. S1** Comparison of Rotronic sensor mounted on Bolloon and HOBO sensor mounted on UAV for synchronously measuring air temperature and relative humidity within the 1000 m lower atmosphere of Shanghai at 10:30–11:00 on Dec. 18, 2017.



**Fig. S2** Sounding wind speed and wind direction at 0–1800 m altitude. (a) 2014/08/21; (b) 2014/10/11; (c) 2014/11/14; (d) 2014/12/12; (e) 2015/02/05. The sounding data were sampled at a sounding station located in Hangzhou (Station identifier: ZSHC; Station number: 58457; 30°13'N, 120°10'E), about 40 km from the UAV experiment site. The sounding was operated twice at local time (LT) 0:00 and 12:00 every day, and the sampling dataset was downloaded from website of University of Wyoming (available at: <http://weather.uwyo.edu/upperair/sounding.html>).