Figure S1. Variation of monthly *d* value at the GNIP Lanzhou station.
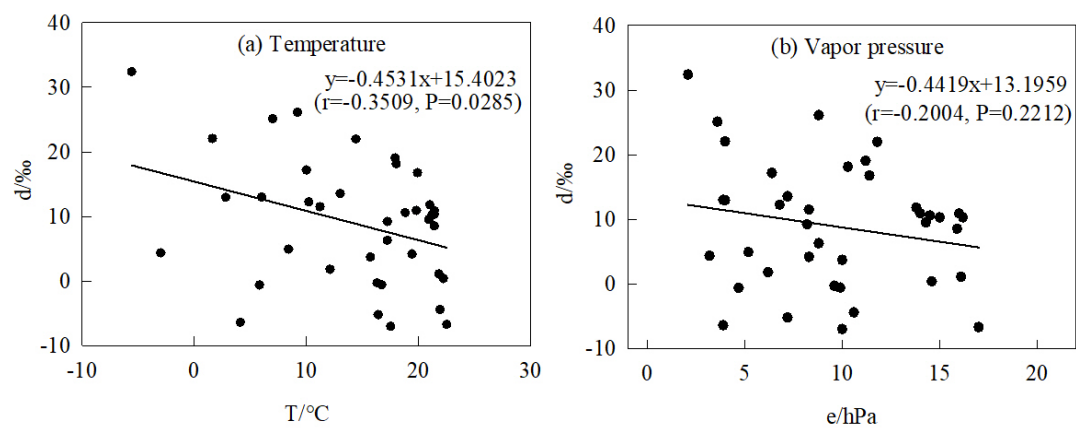

Figure S2. Correlations between *d* value and air temperature (a) or water vapor pressure (b) at the GNIP
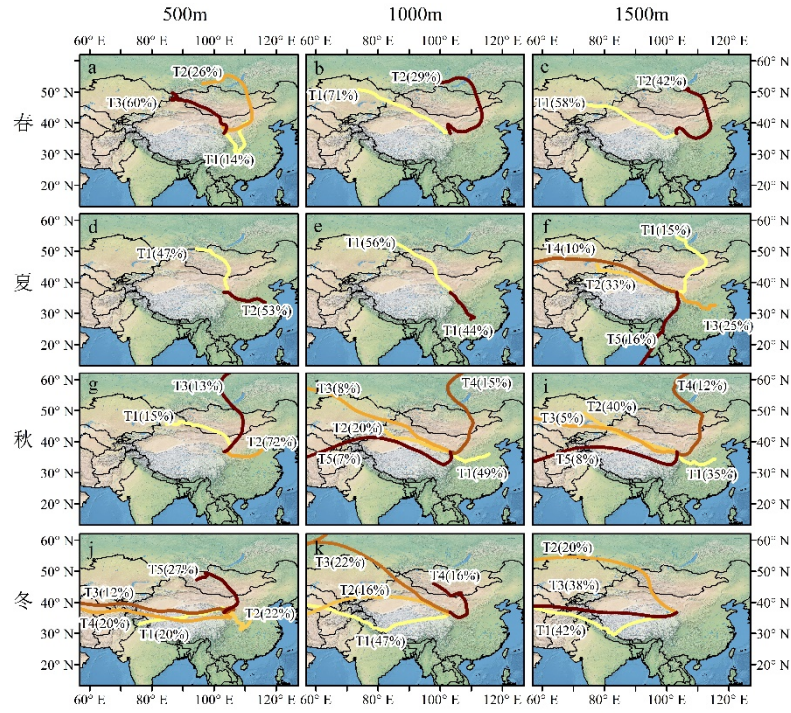
Lanzhou station.

Figure S3. Clustered backward trajectories during different seasons to the Lanzhou city in 2011.
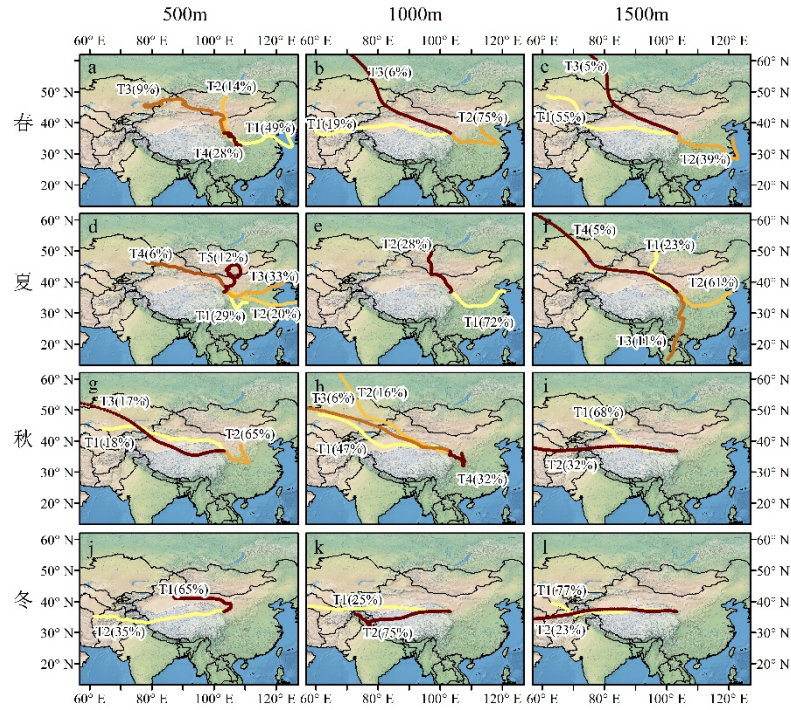

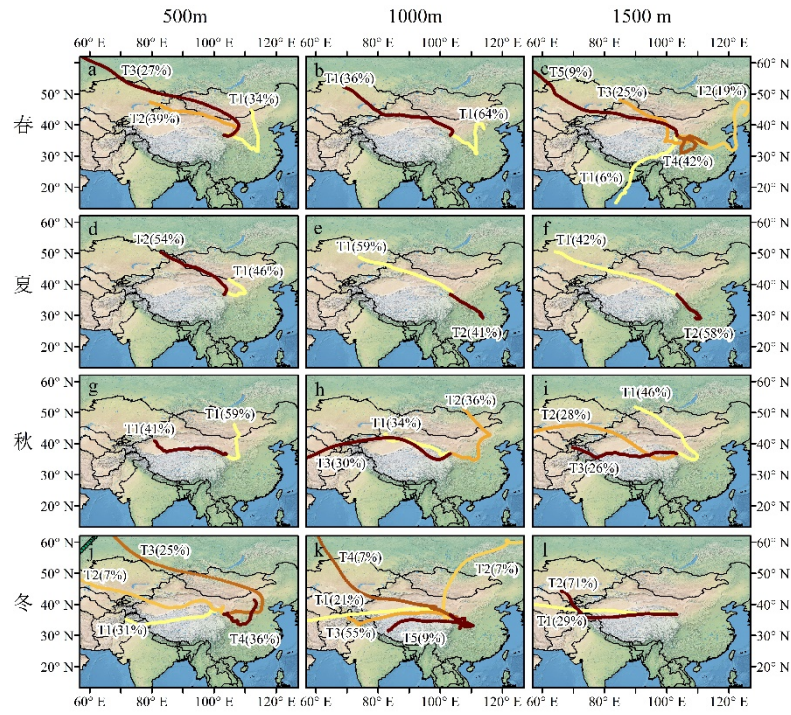**Figure S4.** Clustered backward trajectories during different seasons to the Lanzhou city in 2012.

Figure S5. Clustered backward trajectories during different seasons to the Lanzhou city in 2013.
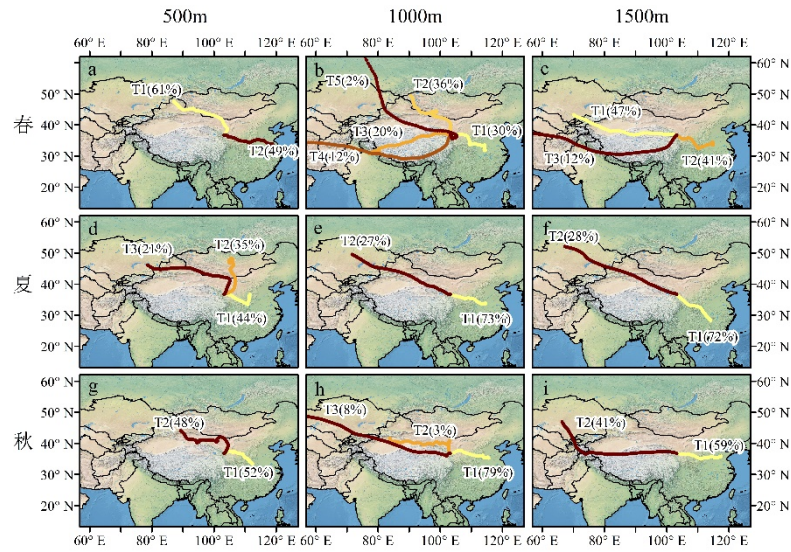

Figure S6. Clustered backward trajectories during different seasons to the Lanzhou city in 2014.