**Table S1.** The anomaly map schema for climate variables Best 4 layer lifted index (lftx4) and Vertical velocity (omega)

<table>
<thead>
<tr>
<th>HC</th>
<th>M†</th>
<th>DIF‡</th>
<th>Assigned code</th>
<th>The meaning of lftx4 difference (DIF) §</th>
<th>The meaning of omega difference (DIF) ‖</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-3</td>
<td>Unstable and more unstable during a HC</td>
<td>Ascending and stronger ascending movement during a HC</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-1</td>
<td>Unstable but less unstable during a HC</td>
<td>Ascending but weaker ascending movement during a HC</td>
</tr>
<tr>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-2</td>
<td>Unstable during a HC but stable on average</td>
<td>Ascending movement during a HC but descending on average</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+1</td>
<td>Stable during a HC but unstable on average</td>
<td>Descending movement during a HC but ascending on average</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+2</td>
<td>Stable during a HC but less stable than on average</td>
<td>Descending but weaker descending movement during a HC</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+3</td>
<td>Stable during a HC and more stable than on average</td>
<td>Descending and stronger descending movement during a HC</td>
</tr>
</tbody>
</table>

* Sign of climate variable mean values over heating cycles.
† Sign of climate variable mean values over the whole study period (i.e., July and August).
‡ Sign of the differences of climate variable mean values between heating cycles and overall period, that is, mean of HC minus mean of overall period.
§ The negative values of lftx4 reflect unstable climate conditions near the surface (see Table 1). The wording of this column represents climate conditions near the surface during heating cycles compared to the whole study period.
‖ The negative values of omega reflect ascending air movement above the forest canopy (see Table 1). The wording of this column represents general air movement above the canopy during heating cycles compared to the whole study period.
**Fig. S1.** Climate conditions under the forest canopy by heating cycle type (HC: heating cycle; NHC: head and tail of non-heating cycle; XNHC: gap. See Fig. 1 for the details) at the three time intervals (Pacific Daylight Time) for the period of 1999 – 2010. The boxplots are defined as in Fig. 3.
**Fig. S2.** Climate conditions above the forest canopy by heating cycle type (HC: heating cycle; NHC: head and tail of non-heating cycle; XNHC: gap. See Fig. 1 for the details) at the three time intervals (Pacific Daylight Time) for the period of 1999 – 2010. The boxplots are defined as in Fig. 3.
**Fig. S3.** Overall climate conditions under and above the forest canopy by heating cycle type (HC: heating cycle; NHC: head and tail of non-heating cycle and gap; see Fig. 1 for the details) for the period of 1999 – 2010. The boxplots are defined as in Fig. 3.
Fig. S4. Yearly climate conditions under and above the forest canopy by heating cycle type (HC: heating cycle; NHC: head and tail of non-heating cycle and gap; see Fig. 1 for the details) for the period of 1999 – 2010.
**Fig. S5.** Overall climate conditions under and above the forest canopy by the whole heating cycle type (HC: heating cycle; H: head of non-heating cycle; T: tail of non-heating cycle; XNHC: gap; see Fig. 1 for the details) for the period of 1999 – 2010. The boxplots are defined as in Fig. 3.
**Fig. S6.** Yearly climate conditions under and above the forest by the whole heating cycle type (HC: heating cycle; H: head of non-heating cycle; T: tail of non-heating cycle; XNHC: gap; see Fig. 1 for the details) for the period of 1999 – 2010.
Fig. S7. The canonical discriminant analysis of climate variables under the forest canopy for the target long-distance dispersal areas (see Fig. 8 for locations of target sink and source areas). See the caption of Fig. 3 for the definition of climate variable abbreviations and interpretation of the canonical discriminant analysis plots.
**Fig. S8.** The canonical discriminant analysis of climate variables above the forest canopy for the target long-distance dispersal areas (see Fig. 8 for locations of target sink and source areas). See the caption of Fig. 3 for the definition of climate variable abbreviations and interpretation of the canonical discriminant analysis plots.
Fig. S9. Overall climate conditions under and above the forest canopy for the target long-distance dispersal area in 2003 (see Fig. 8 for the location of the target area). The boxplots are defined as in Fig. 3.
Fig. S10. Yearly climate conditions under and above the forest for the 2003 target long-distance dispersal area for the period of 1999 – 2010 (see Fig. 8 for the location of the target area).
**Fig. S11.** Overall climate conditions under and above the forest canopy for the target long-distance dispersal area in 2006 (see Fig. 8 for the location of the target area). The boxplots are defined as in Fig. 3.
**Fig. S12.** Yearly climate conditions under and above the forest for the 2006 target long-distance dispersal area for the period of 1999 – 2010 (see Fig. 8 for the location of the target area).
**Fig. S13.** Yearly wind directions and speeds under and above the forest canopy for the 2002 target long-distance dispersal area for the period of 1999 – 2010 (see Fig. 8 for the location of the target area). Note that the indicated wind direction is the direction toward which the wind is blowing.
**Fig. S14.** Yearly wind directions and speeds under and above the forest canopy for the 2003 target long-distance dispersal area for the period of 1999 – 2010 (see Fig. 8 for the location of the target area). Note that the indicated wind direction is the direction toward which the wind is blowing.
**Fig. S15.** Yearly wind directions and speeds under and above the forest canopy for the 2006 target long-distance dispersal area for the period of 1999 – 2010 (see Fig. 8 for the location of the target area). Note that the indicated wind direction is the direction toward which the wind is blowing.
**Fig. S16.** Yearly wind directions and speeds under and above the forest canopy for the 2008 target long-distance dispersal area for the period of 1999 – 2010 (see Fig. 8 for the location of the target area). Note that the indicated wind direction is the direction toward which the wind is blowing.
Fig. S17. Wind directions and speeds under (A) and above (B) the forest canopy at the provincial level for the period of 1999 – 2010. Note that the indicated wind direction is the direction toward which the wind is blowing.