**Captions of Supplementary Figures**

**Figure S1**. a) View of forced diffusion (FD) chamber systems at intact (right) and crustose lichen‑infected (left) sphagnum moss communities of tundra ecosystem in western Alaska. Distributions of crustose lichen sphagnum moss within 1.0 × 1.0‑m grids from (b) to (d). Crustose lichen infected intact sphagnum moss, causing withering and death, and suspended the moss’s ecological function of protecting against evaporation of soil water contents within the moss.

**Figure S2**. Times series of a) snow-covered day (Nov 3, 2015) and b) snow-disappearance day (May 5, 2016), as monitored by time-lapse camera at an interval of six hours per day from September 22, 2015 to June 13, 2016. We suggest two criteria: 1) when the length of lingering snowpack cover exceeds thirty consecutive days as the snow-covered day, and 2) the existence of snow cover is the condition in which more than half of the surface is covered by snowpack, and once cover declines to less, this indicates the snow-disappearance day.