

## 1Supplementary Materials

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3Figure S1: Monthly evolution of the domain averaging soil water content (m) in the  
4upper soil level (0 - 1 m) for the 10-year regional model integration.

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7Figure S2: The annual average evaporation (a) and effective precipitation  
8(precipitation minus evaporation,  $\Delta(P-E)$ ) (b) anomalies (mm/day) between TORT  
9and CTRL. The hatched areas show the significant anomalies with a Student's *t*-test  
10( $p=0.05$ ). The green contour denotes the extent of the present-day Tibetan Plateau ( $>$   
113000 m). Note that the negative values of evaporation anomalies indicate increased  
12evaporation, and vice versa.

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15Figure S3: Temperature ( $^{\circ}\text{C}$ ) anomalies of TORTPD and PDTORT to the present-day  
16control run (CTRL). (a)(b)(c) TORTPD minus CTRL; (d)(e)(f) PDTORT minus  
17CTRL. (a)(d) Annual, (b)(e) winter (DJF), (c)(f) summer (JJA). The hatched areas  
18show the significant anomalies with a Student's *t*-test ( $p=0.05$ ). The green contour  
19denotes the extent of the present-day Tibetan Plateau ( $> 3000$  m).