

**SUPPLEMENTARY MATERIAL FOR Prediction of
the Breeding and Wintering Ranges of *Pomacea
canaliculata* in China Using Ensemble Models**

Z. Qin¹, J. H. Yang², T. Gan¹, J. E. Zhang^{1*}, Y. M. Liu³, J. M. Liu¹,
F. C. Yao¹, and B. L. Zhao¹

¹*Department of Ecology, College of Natural Resources and Environment, South
China Agricultural University, Guangzhou 510642, China*

²*Institute of Agricultural Economics and Development, Chinese Academy of
Agricultural Sciences, Beijing 100081, China*

³*Wuhan Academy of Agricultural Sciences, Wuhan 430070, China*

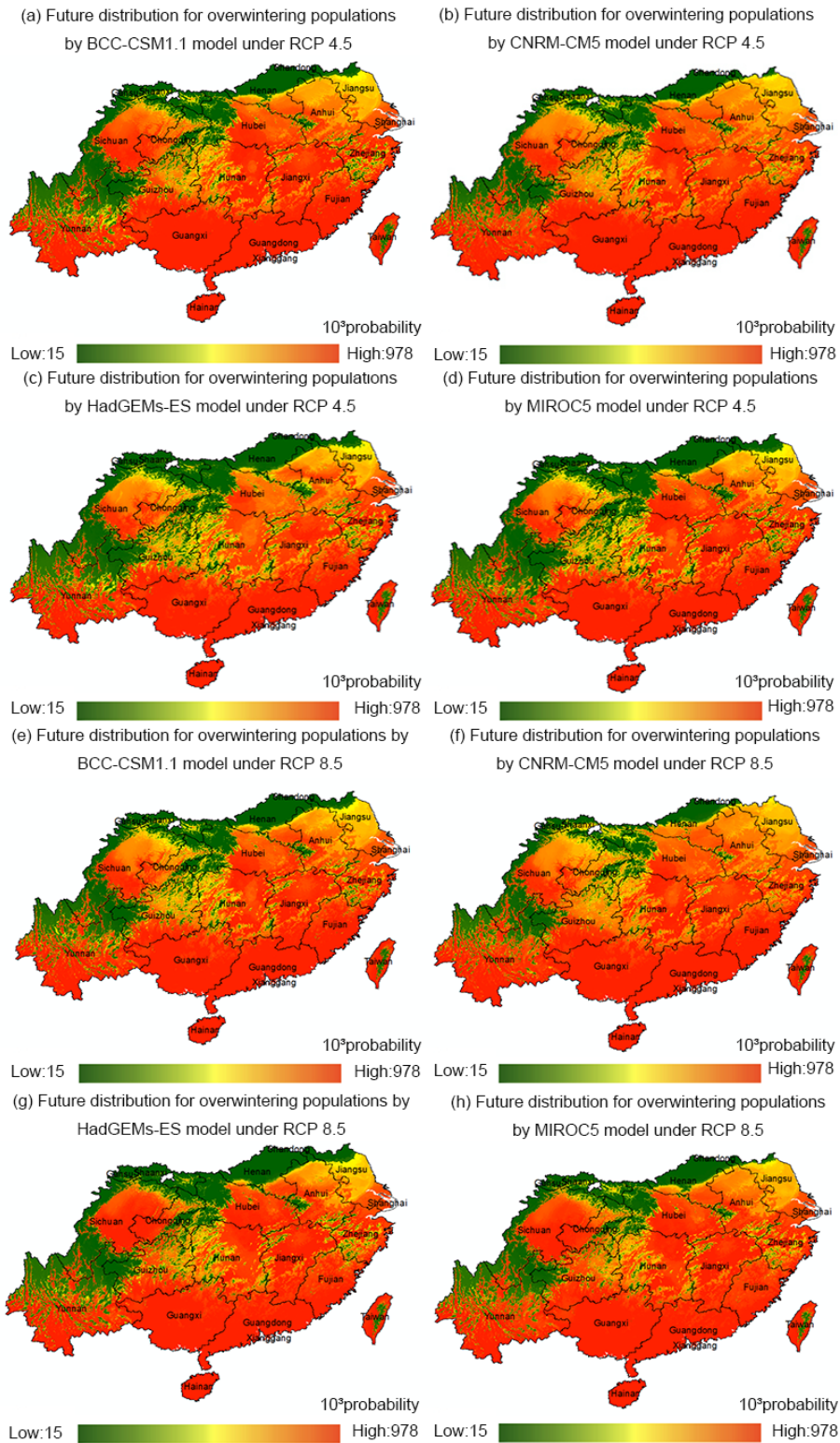
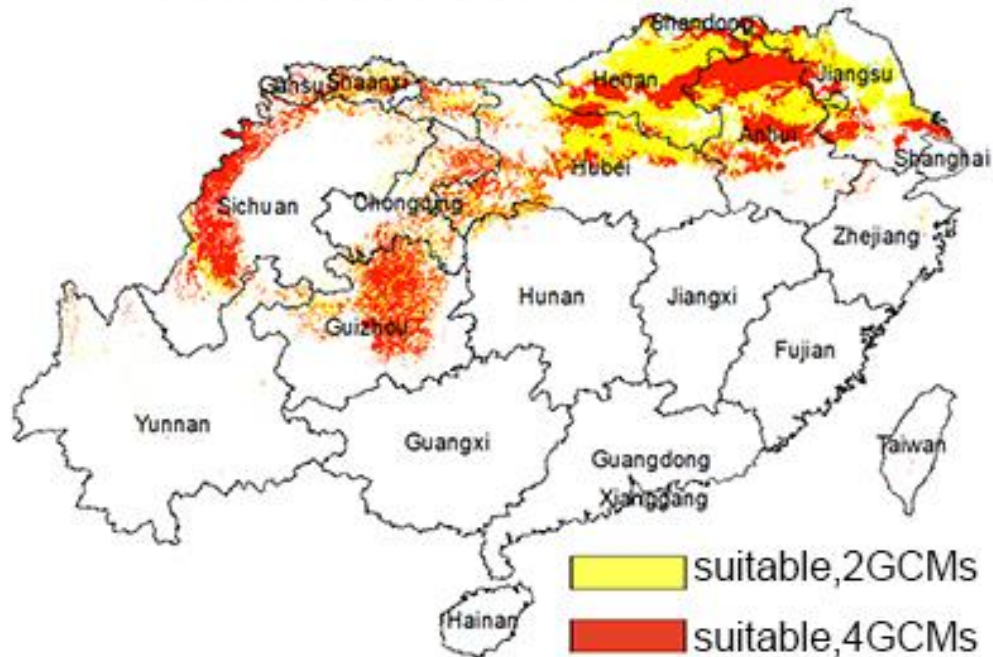


Figure S1. Projected future of *Pomacea canaliculata* overwintering distributions under the two representative concentration pathways RCP 4.5 and RCP.5 [corresponding to a–d and to e–h, respectively]. In the two RCP scenarios, maps in turn show the probability of the spatial distribution in 2050 predicted by four global climate models (BCC-CSM1.1, CNRM-CM5, HadGEMs-ES, and MIROC5). Higher values in small maps suggest a higher climatic suitability for *P. canaliculata* overwinterings.

(a) Model agreement in suitability changes for *P. canaliculata* breeding under RCP 4.5



(b) Model agreement in suitability changes for *P. canaliculata* breeding under RCP 8.5

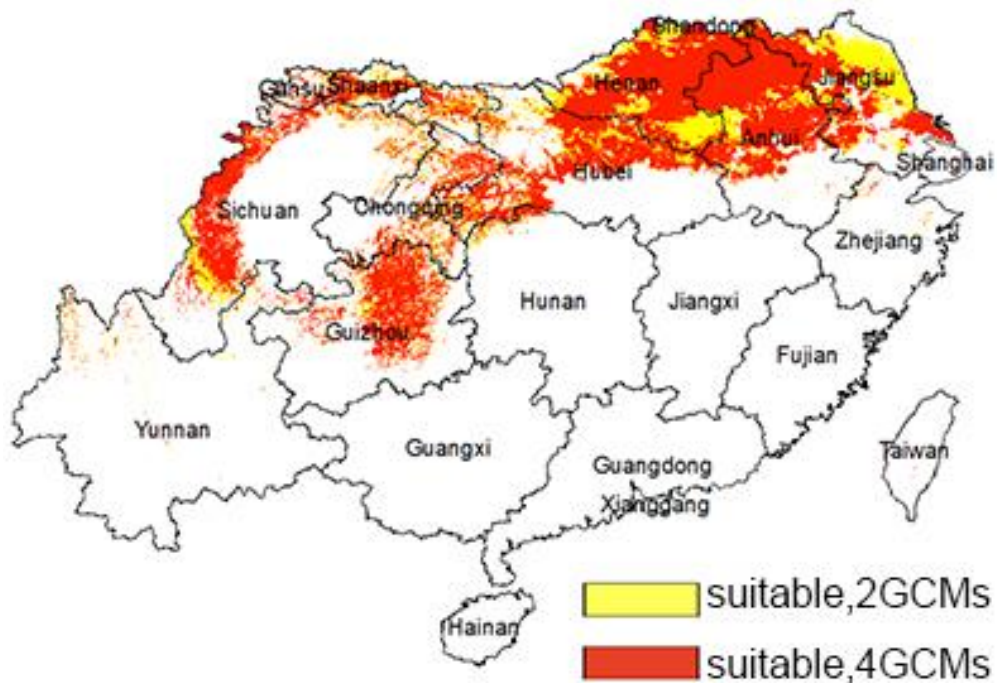
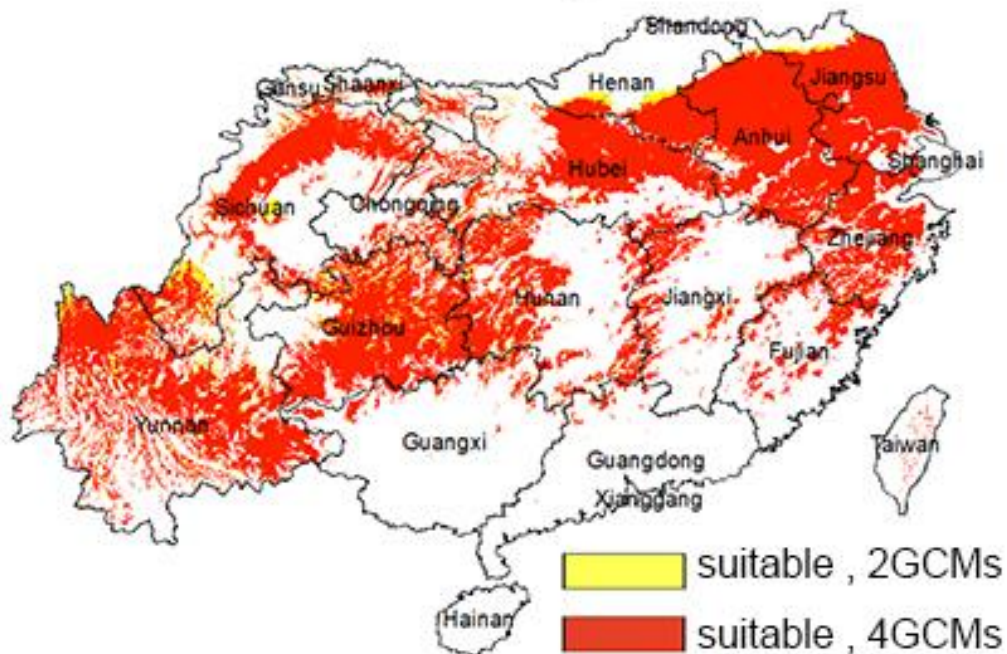


Figure S2. Model agreement in suitability changes among the four GCM combinations under (a) RCP 4.5 and (b) RCP 8.5 for *P. canaliculata* breeding populations. Red and yellow color indicated full agreement and two-GCM agreement in increased suitability.

(a) Model agreement in suitability changes for *P.canaliculata* overwintering under RCP 8.5



(b) Model agreement in suitability changes for *P.canaliculata* overwintering under RCP 8.5

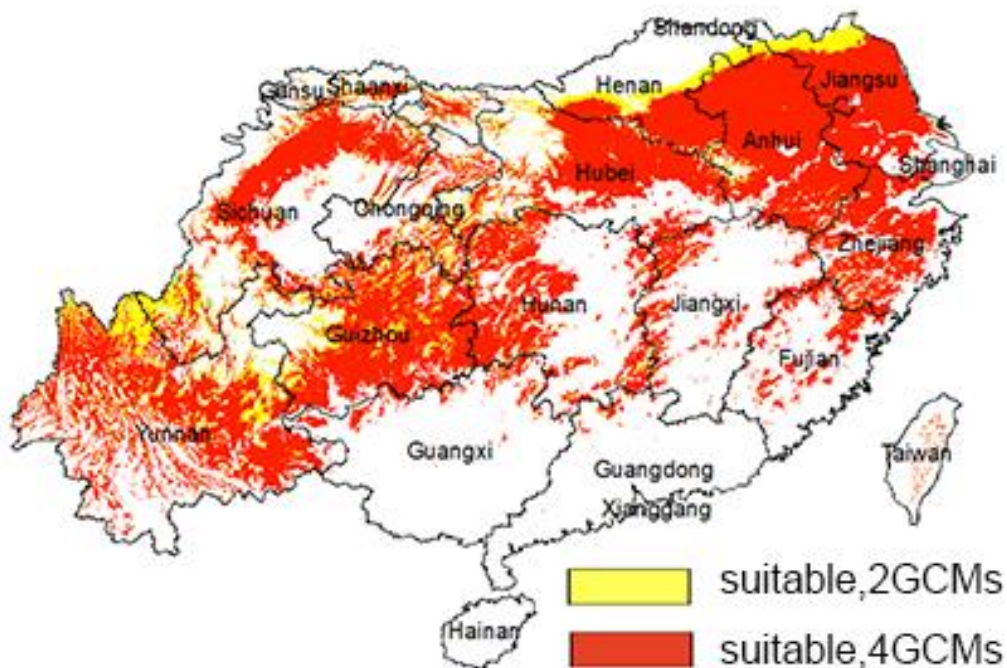


Figure S3. Modeled agreement in suitability changes among the four GCM combinations under (a) RCP 4.5 and (b) RCP 8.5 for *P. canaliculata* overwintering populations. Map color represent the similar information for *P. canaliculata* overwintering populations as in Figure S2.

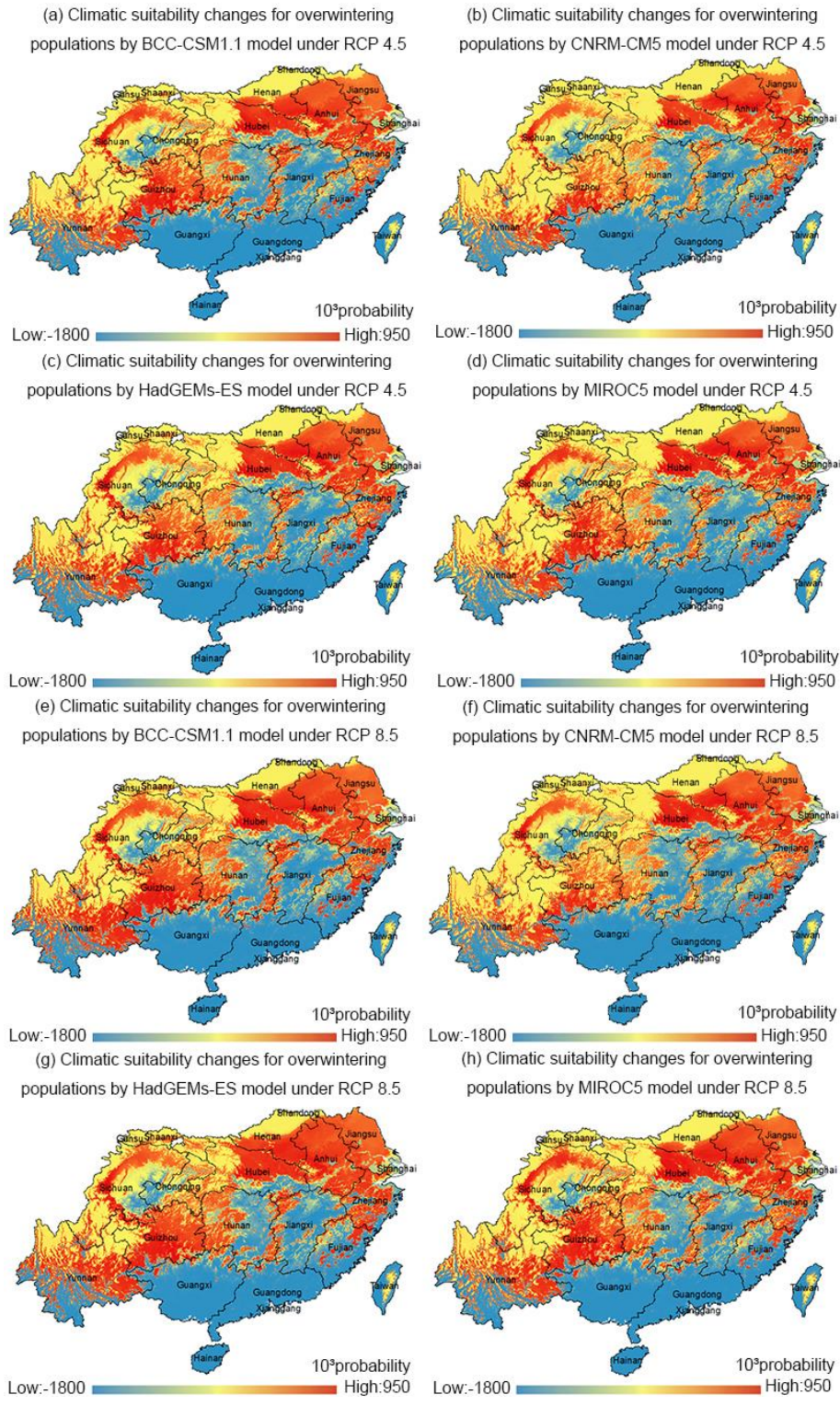
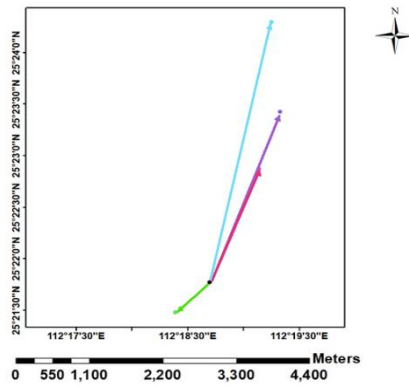


Figure S4. Climatic suitability changes for *P. canaliculata* overwintering distributions under the two representative concentration pathways RCP 4.5 and RCP.5 [corresponding to a–d and to e–h, respectively]. by 2050. In the two RCP scenarios, maps in turn show the suitability changes predicted by four global climate models (BCC-CSM1.1, CNRM-CM5, HadGEMs-ES, and MIROC5). Negative and positive values represent the decrease and increase of climatic suitability respectively.

(a) Centroid shift of future climate suitability for overwintering populations under RCP 4.5



(b) Centroid shift of future climate suitability for overwintering populations under RCP 9.5

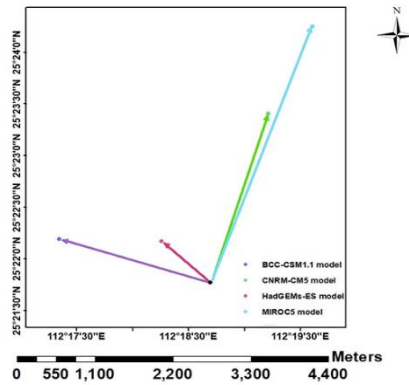
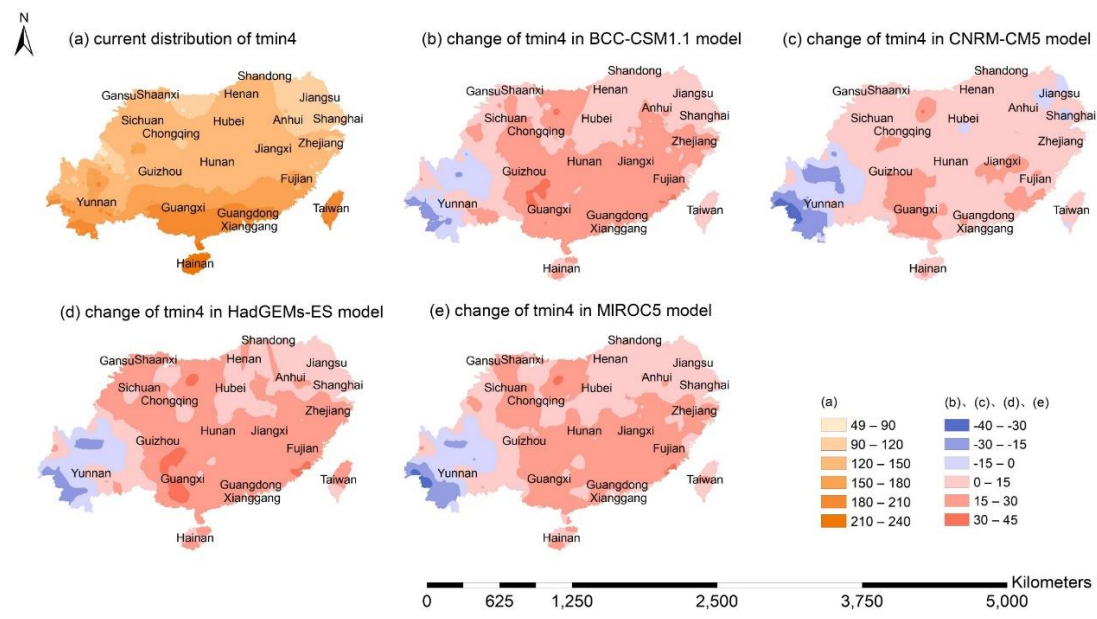


Figure S5. The shift of centroid of future climate suitability for *P. canaliculata* overwinterings with respect to current distribution under the two representative concentration pathways (a) RCP 4.5 and (b) RCP 8.5. Vector color represent the results using the four GCMs.

(A) Current distribution and future changes of tmin4 under RCP 4.5



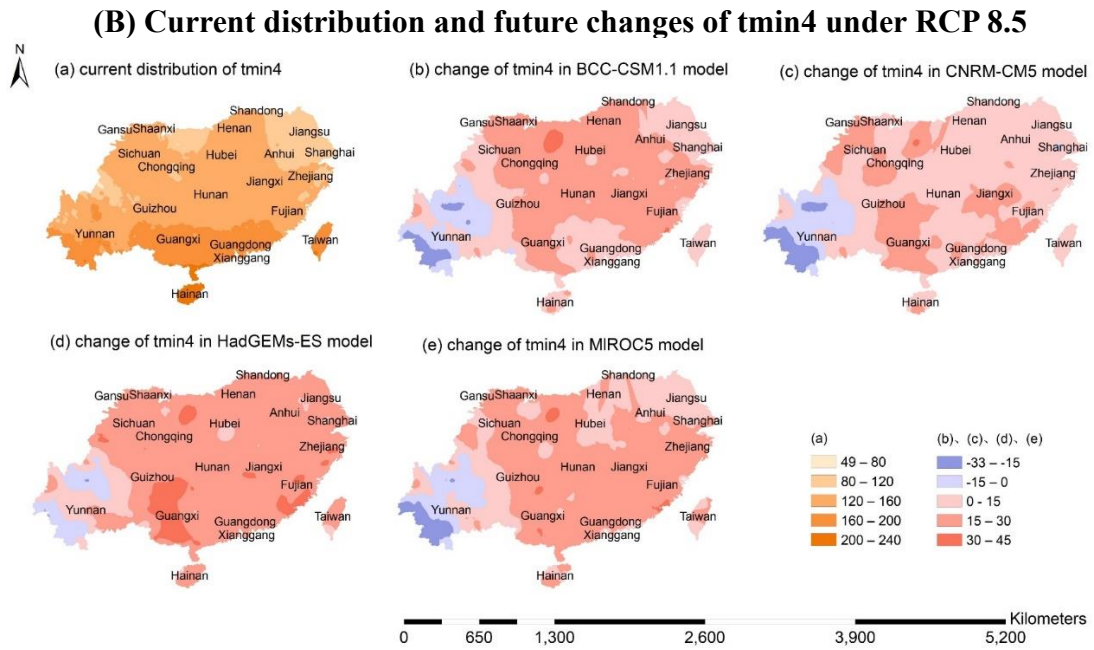
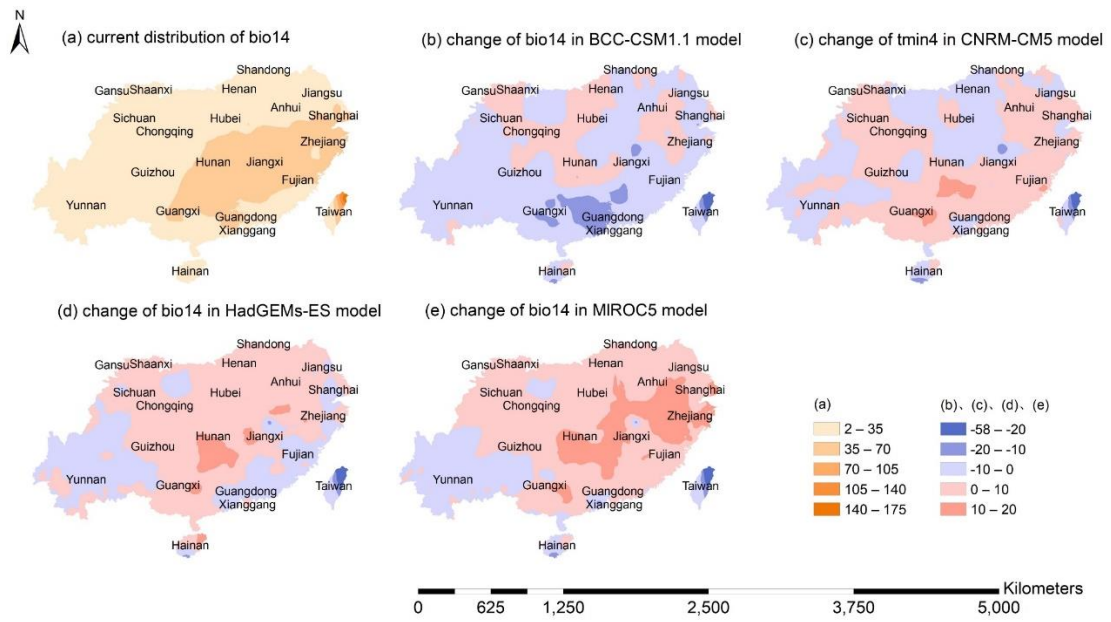


Figure S6. Current spatial distribution and future changes of the minimum temperature of April (tmin4; $10 \times ^\circ\text{C}$) under RCP 4.5 and RCP 8.5 (Corresponding to panel (A) and to panel (B) respectively) for *P. canaliculata* breeding distributions. In the two panels, the first small map (a) shows the current distribution of tmin4, the other four maps (from map (b) to map (d)) in turn show its future spatial changes in the four GCMs (BCC-CSM1.1, CNRM-CM5, HadGEMs-ES, and MIROC5).

(A) Current distribution and future changes of bio14 under RCP 4.5



(B) Current distribution and future changes of bio14 under RCP 8.5

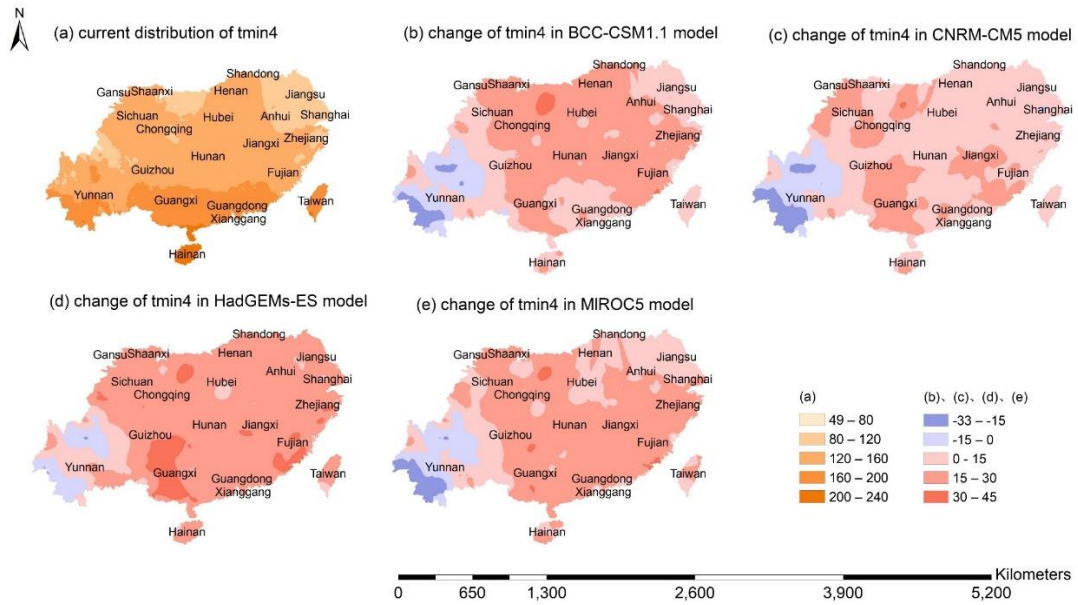


Figure S7. Current spatial distribution and future changes of precipitation of driest month (bio14; mm) for *P. canaliculata* breeding distributions. Both the panels and small maps represent the similar information as in Figure S6.

(A) Current distribution and future changes of tmin10 under RCP 4.5



(a) current distribution of tmin10



(b) change of tmin10 in BCC-CSM1.1 model



(c) change of tmin10 in CNRM-CM5 model



(d) change of tmin10 in HadGEMs-ES model



(e) change of tmin10 in MIROC5 model



(B) Current distribution and future changes of tmin10 under RCP 8.5

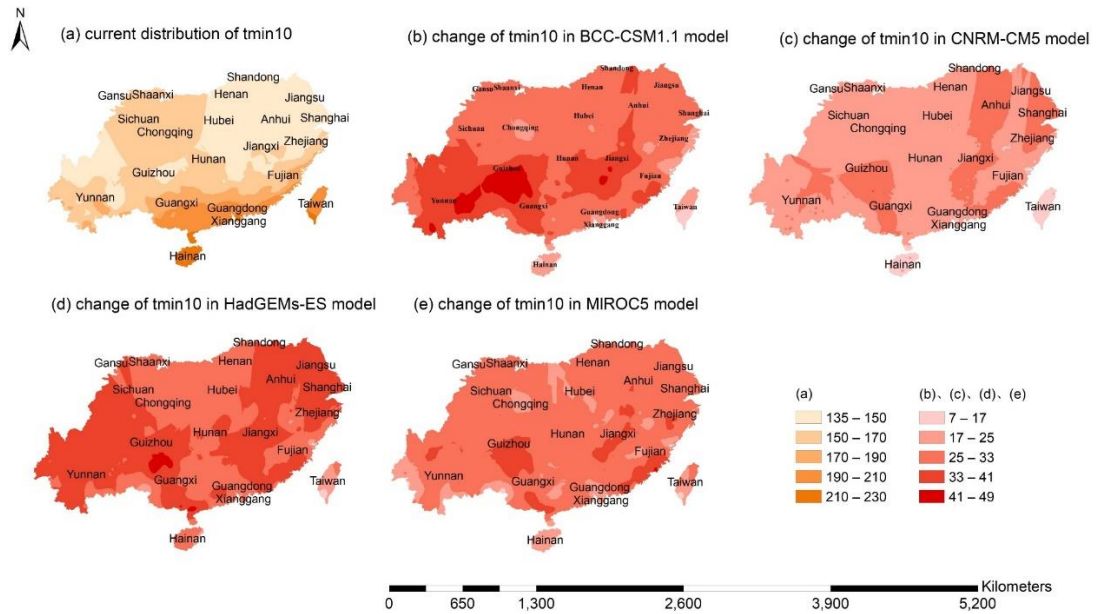
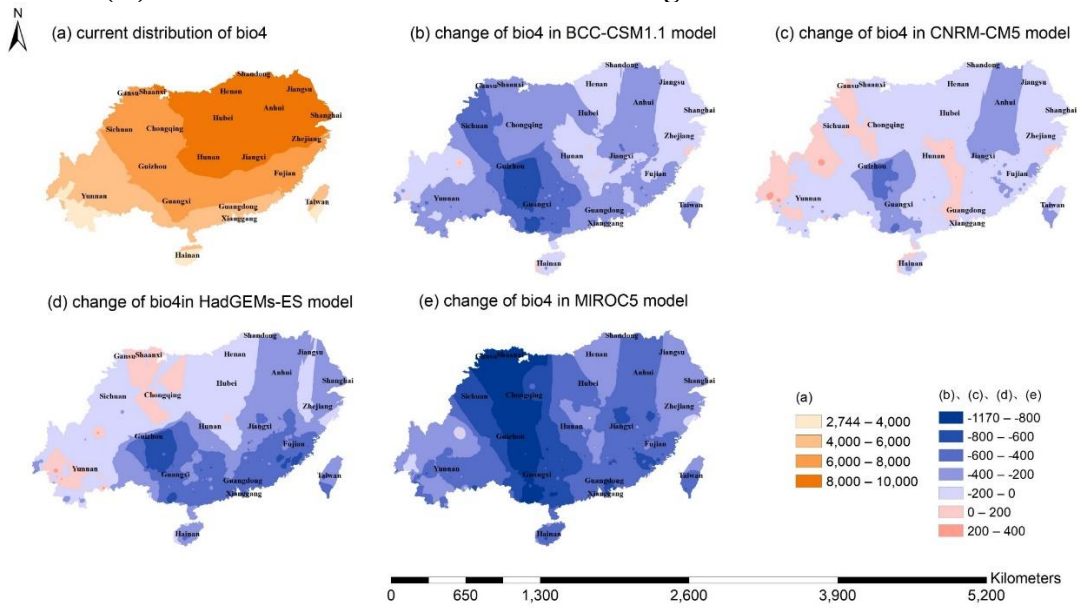


Figure S8 Current spatial distribution and future changes of the minimum temperature of October (t_{min10} ; $10 \times ^\circ\text{C}$) for *P. canaliculata* overwintering distributions. Both the panels and small maps represent the similar information as in Figure S6.

(A) Current distribution and future changes of bio4 under RCP 4.5



(B) Current distribution and future changes of bio4 under RCP 8.5

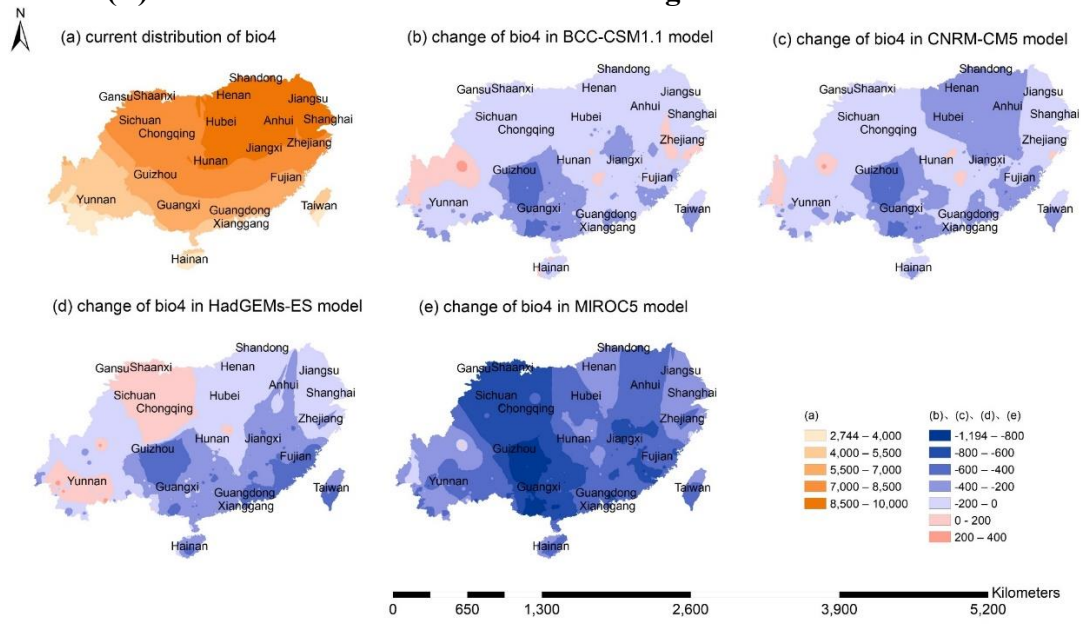


Figure S9. Current spatial distribution and future changes of temperature seasonality (bio4) for *P. canaliculata* overwintering distributions. Both the panels and small maps represent similar information as in Figure S6.