



The impacts of climate change on rice yields in China

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Abstract—This paper assesses the impact of climate change on irrigated rice yield using B2

climate change scenario from the Regional Climate Model (RCM) and CERES-rice model

during 2071–2090. Eight typical rice stations ranging in latitude, longitude, and elevation

that are located in the main rice ecological zones of China are selected for impact assessment.

First, Crop Estimation through Resource and Environment Synthesis (CERES)-rice model

is validated using farm experiment data in selected stations. The simulated results represent

satisfactorily the trend of flowering duration and yields. The deviation of simulation within

$\pm 10\%$ of observed flowering duration and $\pm 15\%$ of observed yield. Second, the errors of the

outputs of RCM due to the difference of topography between station point and grid point is

corrected. The corrected output of the RCM used for simulating rice flowering duration and

yield is more reliable than the not corrected. Without CO₂ direct effect on crop, the results

from the assessment explore that B2 climate change scenario would have a negative impact

on rice yield at most rice stations and have little impacts at Fuzhou and Kunming. To find the

change of inter-annual rice yield, a preliminary assessment is made based on comparative

cumulative probability at low and high yield and the coefficient variable of yield between the

B2 scenario and baseline. Without the CO₂ direct effect on rice yield, the result indicates that

frequency for low yield would increase and it reverses for high yield, and the variance for

rice yield would increase. It is concluded that high frequency at low yield and high variances of rice yield could pose a threat to rice yield at most selected stations in the main rice areas

of China. With the CO₂ direct effect on rice yield, rice yield increase in all selected stations.