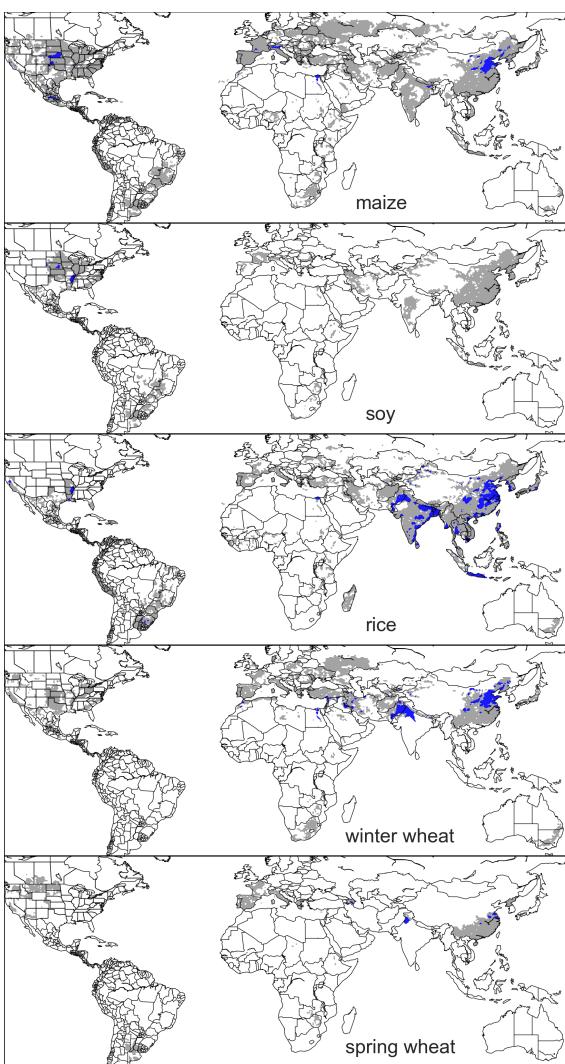


**Supplemental Material**  
**The GGCMI Phase II experiment: global gridded crop model simulations under uniform changes in CO<sub>2</sub>, temperature, water, and nitrogen levels (protocol version 1.0)**

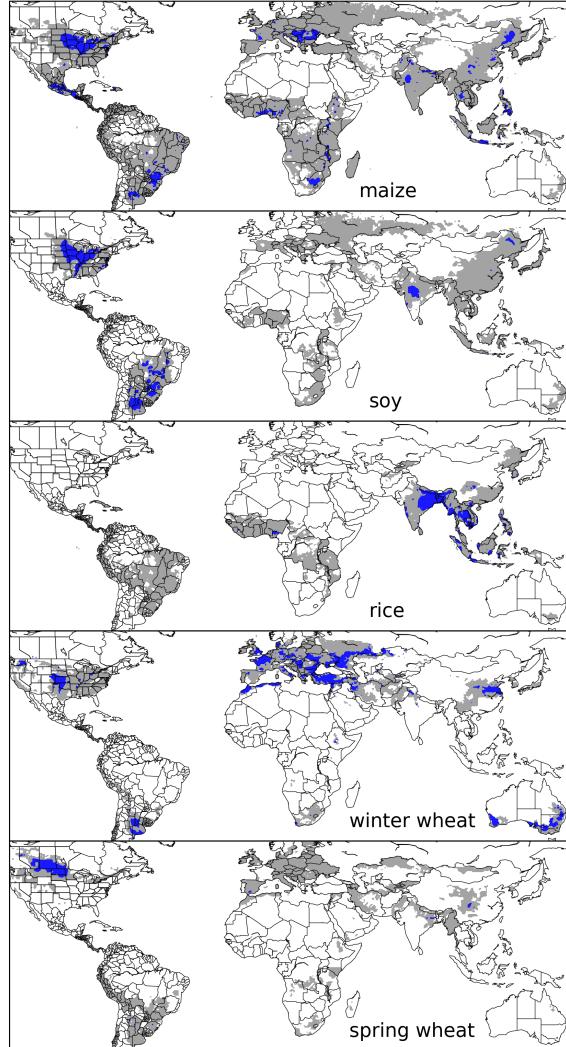
James Franke<sup>1,2</sup>, Christoph Müller<sup>3</sup>, Joshua Elliott<sup>2,4</sup>, Alexander Ruane<sup>5</sup>, Abigail Snyder<sup>6</sup>,  
Jonas Jägermeyr<sup>3,2,4,5</sup>, Juraj Balkovic<sup>7,8</sup>, Philippe Ciais<sup>9,10</sup>, Marie Dury<sup>11</sup>, Pete Falloon<sup>12</sup>,  
Christian Folberth<sup>7</sup>, Louis François<sup>11</sup>, Tobias Hank<sup>13</sup>, Munir Hoffmann<sup>14,23</sup>, Cesar Izaurrealde<sup>15,16</sup>,  
Ingrid Jacquemin<sup>11</sup>, Curtis Jones<sup>15</sup>, Nikolay Khabarov<sup>7</sup>, Marian Koch<sup>14</sup>, Michelle Li<sup>2,17</sup>, Wenfeng Liu<sup>18,9</sup>,  
Stefan Olin<sup>19</sup>, Meridell Phillips<sup>5,20</sup>, Thomas Pugh<sup>21,22</sup>, Ashwan Reddy<sup>15</sup>, Xuhui Wang<sup>9,10</sup>,  
Karina Williams<sup>12</sup>, Florian Zabel<sup>13</sup>, and Elisabeth Moyer<sup>1,2</sup>

1. Department of the Geophysical Sciences, University of Chicago, Chicago, IL, USA
2. Center for Robust Decision-making on Climate and Energy Policy, University of Chicago, Chicago, IL, USA
3. Potsdam Institute for Climate Impact Research, Leibniz Association (Member), Potsdam, Germany
4. Department of Computer Science, University of Chicago, Chicago, IL, USA
5. NASA Goddard Institute for Space Studies, New York, NY, United States
6. Joint Global Change Research Institute, Pacific Northwest National Laboratory, College Park, MD, USA
7. Ecosystem Services and Mgm. Prg., International Institute for Applied Systems Analysis, Laxenburg, Austria
8. Department of Soil Science, Comenius University in Bratislava, Bratislava, Slovak Republic
9. Laboratoire des Sciences du Climat et de l'Environnement, CEA-CNRS-UVSQ, 91191 Gif-sur-Yvette, France
10. Sino-French Institute of Earth System Sciences, Peking University, Beijing, China
11. Unité de Modélisation du Climat et des Cycles Biogéochimiques, University of Liège, Belgium
12. Met Office Hadley Centre, Exeter, United Kingdom
13. Department of Geography, Ludwig-Maximilians-Universität, Munich, Germany
14. Georg-August-University Göttingen, Tropical Plant Production and Ag. Sys. Modelling, Göttingen, Germany
15. Department of Geographical Sciences, University of Maryland, College Park, MD, USA
16. Texas AgriLife Research and Extension, Texas A&M University, Temple, TX, USA
17. Department of Statistics, University of Chicago, Chicago, IL, USA
18. EAWAG, Swiss Federal Institute of Aquatic Science and Technology, Dübendorf, Switzerland
19. Department of Physical Geography and Ecosystem Science, Lund University, Lund, Sweden
20. Earth Institute Center for Climate Systems Research, Columbia University, New York, NY, USA
21. Karlsruhe Institute of Technology, IMK-IFU, 82467 Garmisch-Partenkirchen, Germany
22. School of Geography, Earth and Environmental Science, University of Birmingham, Birmingham, UK
23. Leibniz Centre for Agricultural Landscape Research (ZALF), D-15374 Müncheberg, Germany

## S1 Cultivation Areas

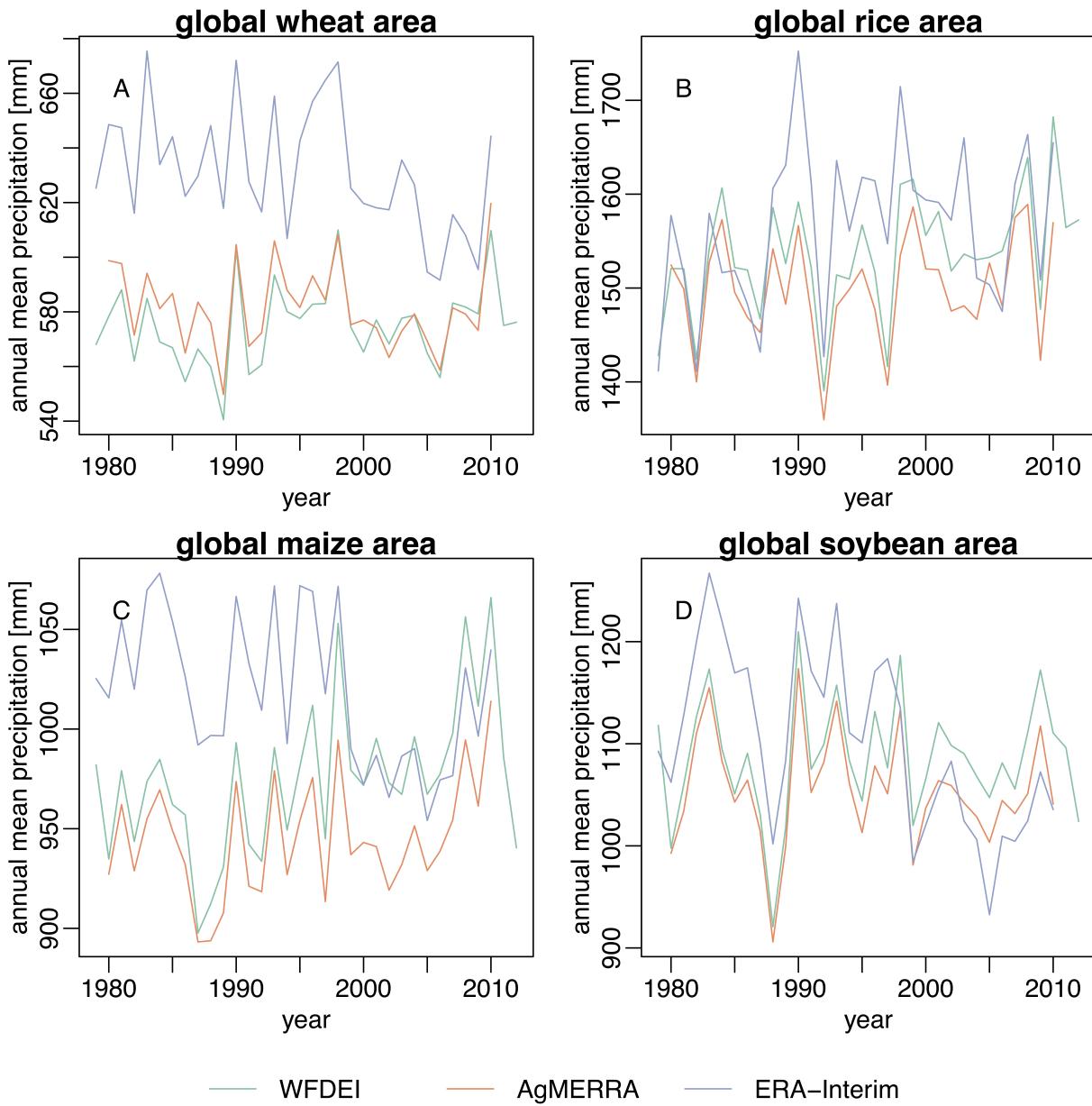


**Figure S1:** Presently cultivated area for irrigated crops in the real world. The blue contour area indicates grid-cells with more than 20,000 hectares of crop cultivated. The gray contour shows area with more than 10 hectares cultivated. Data from the MIRCA2000 data set for maize, rice, and soy. Winter and spring wheat areas are adapted from MIRCA2000 data and sorted by growing season.

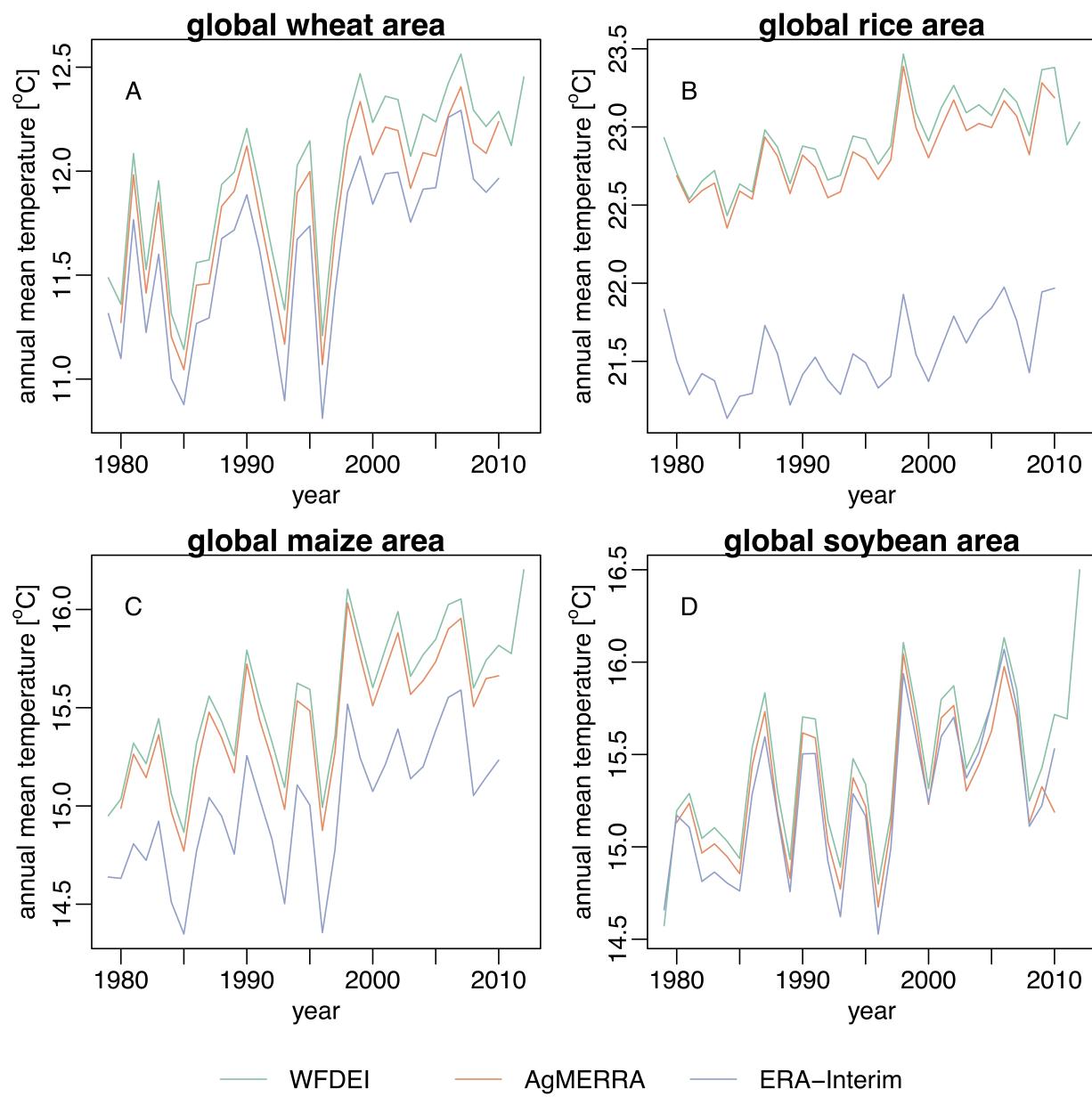


**Figure S2:** Presently cultivated area for rain fed crops in the real world. Conventions as in Figure S1. This figure repeats manuscript Figure 1 for ease of comparison.

## S2 Reanalysis Climate Products

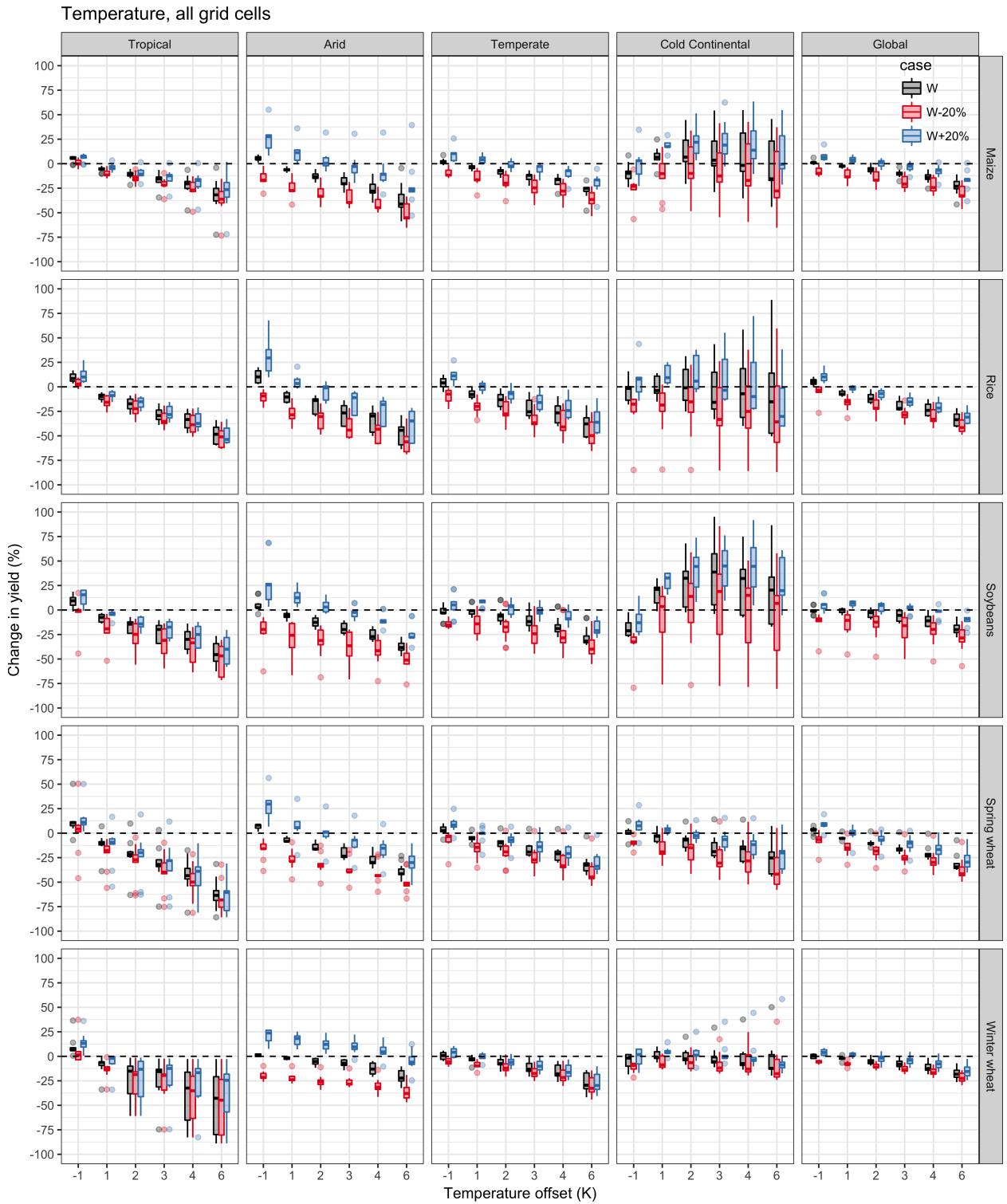


**Figure S3:** Depreciation comparison across the three reanalysis products used in GGCMI Phase II. Values are aggregated across cultivation area based on the MIRCA2000 dataset.

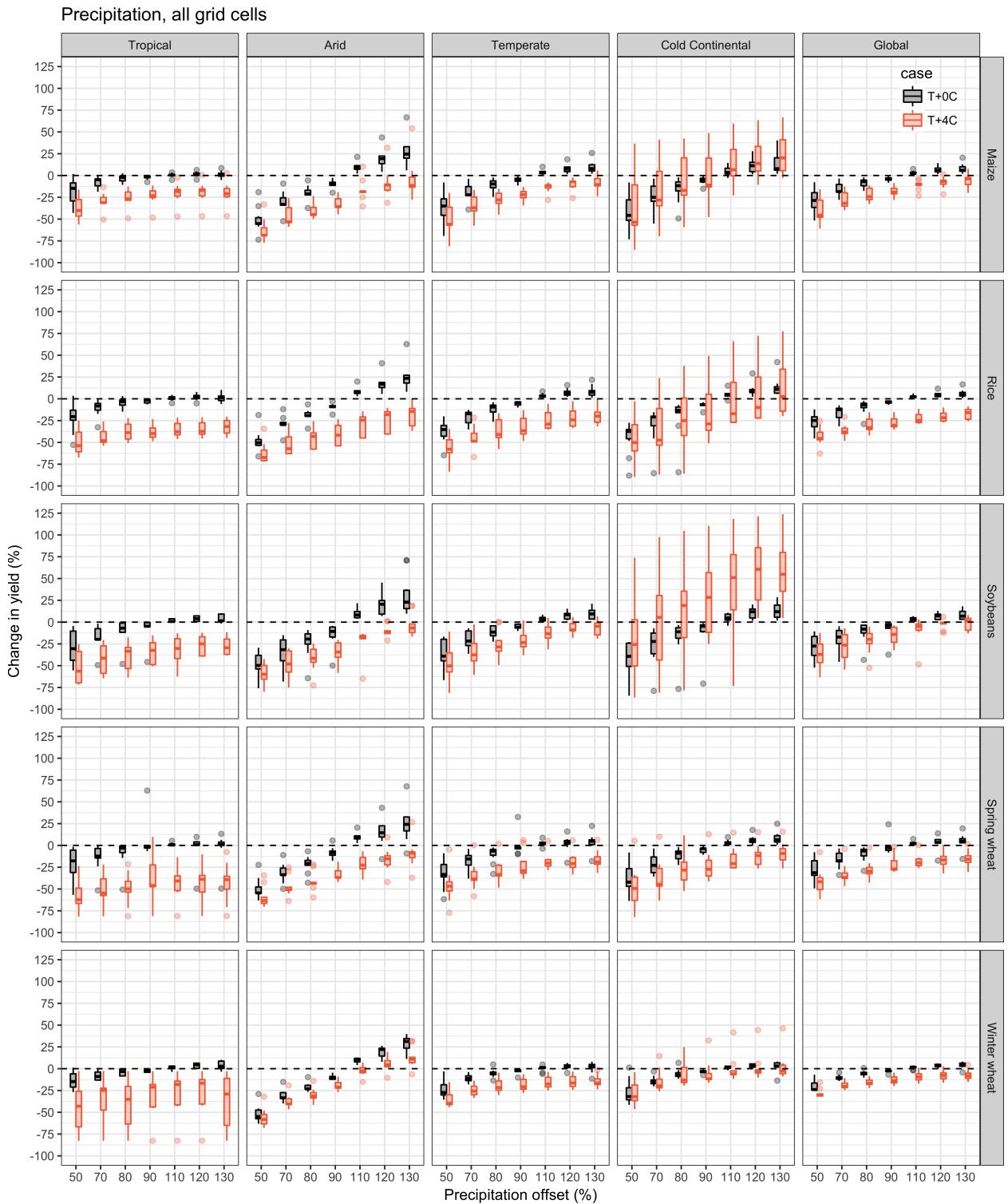


**Figure S4:** Same as S3 but for temperature.

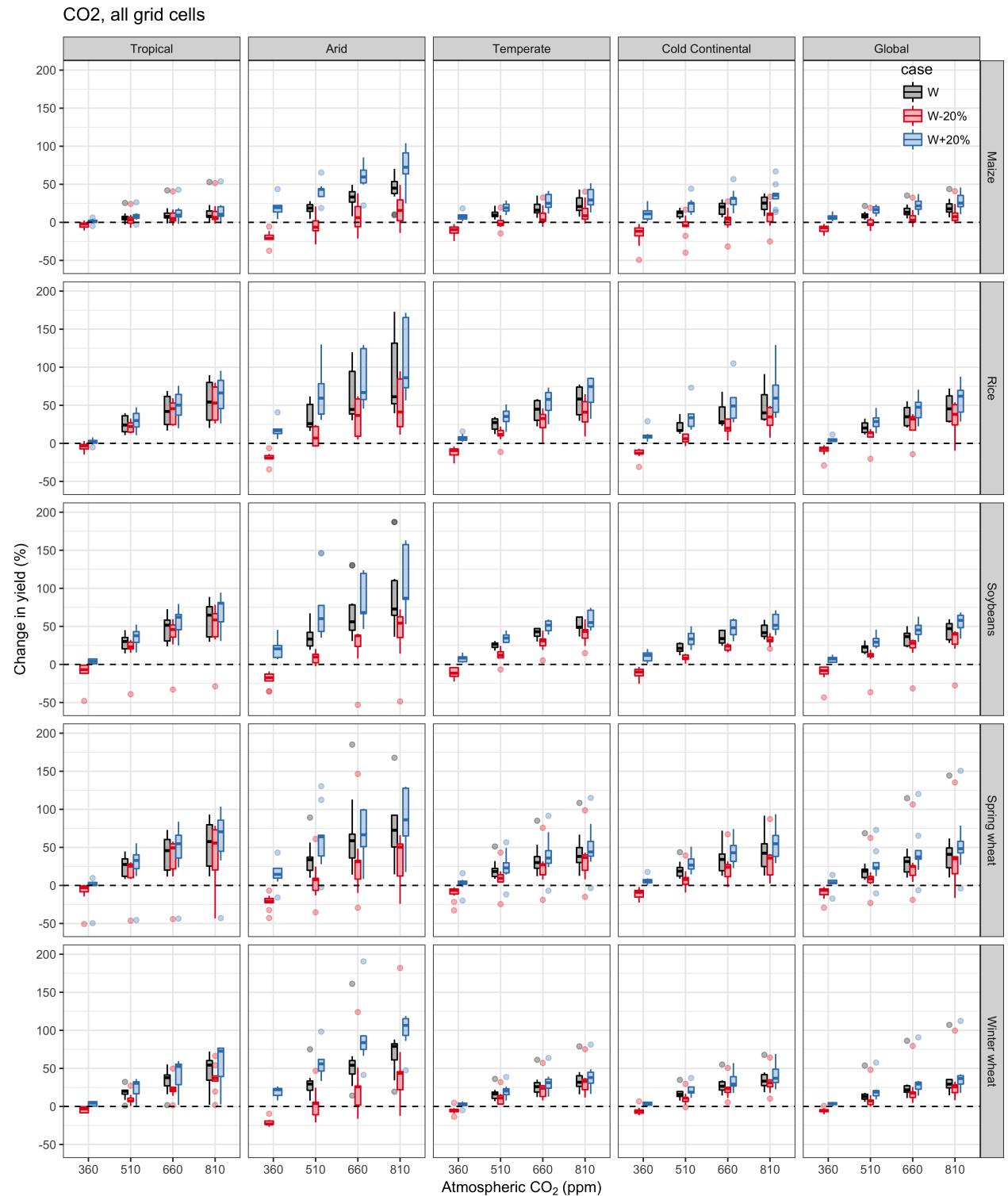
## S3 Results



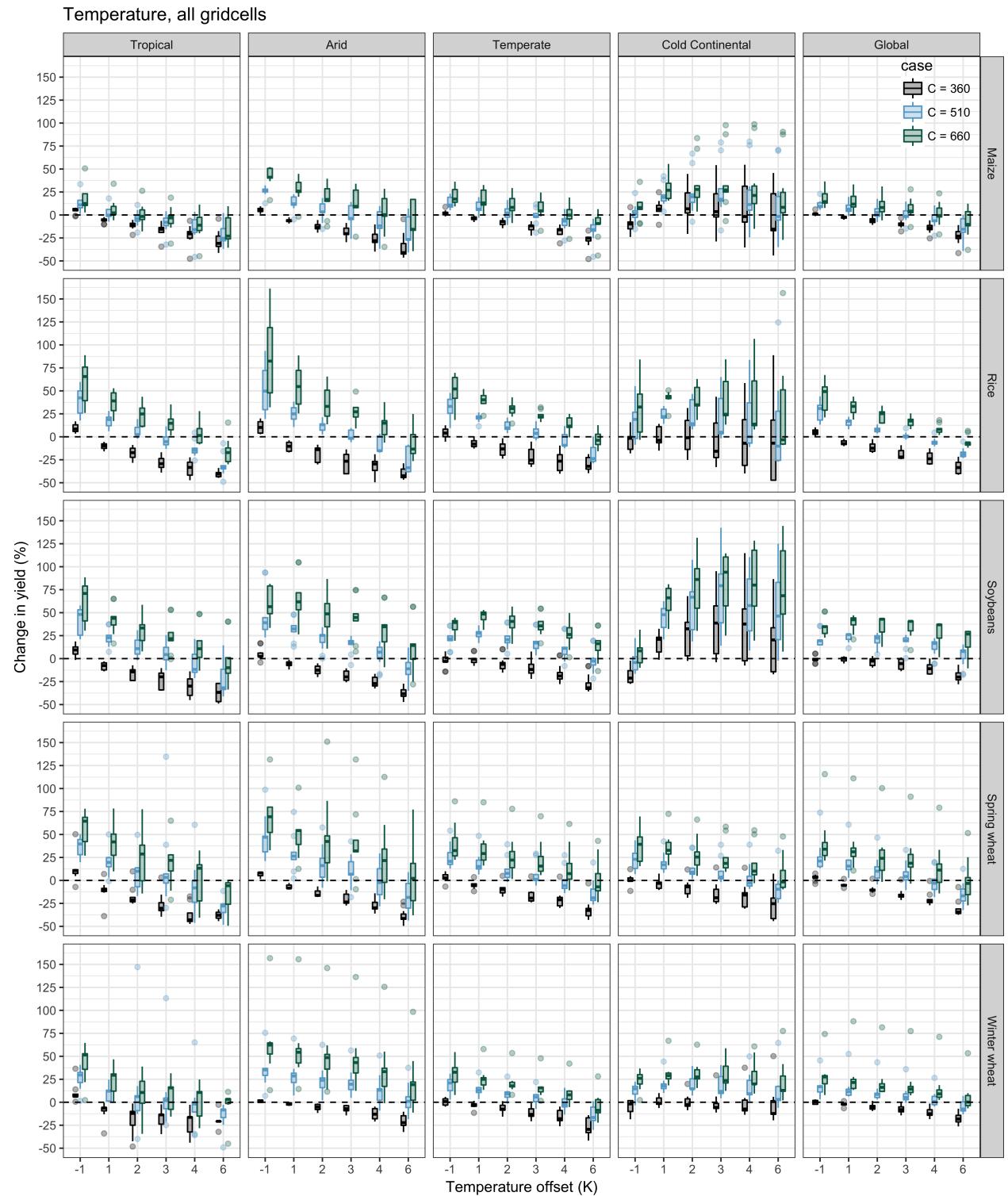
**Figure S5:** Same as main Figure 5a for all crops.



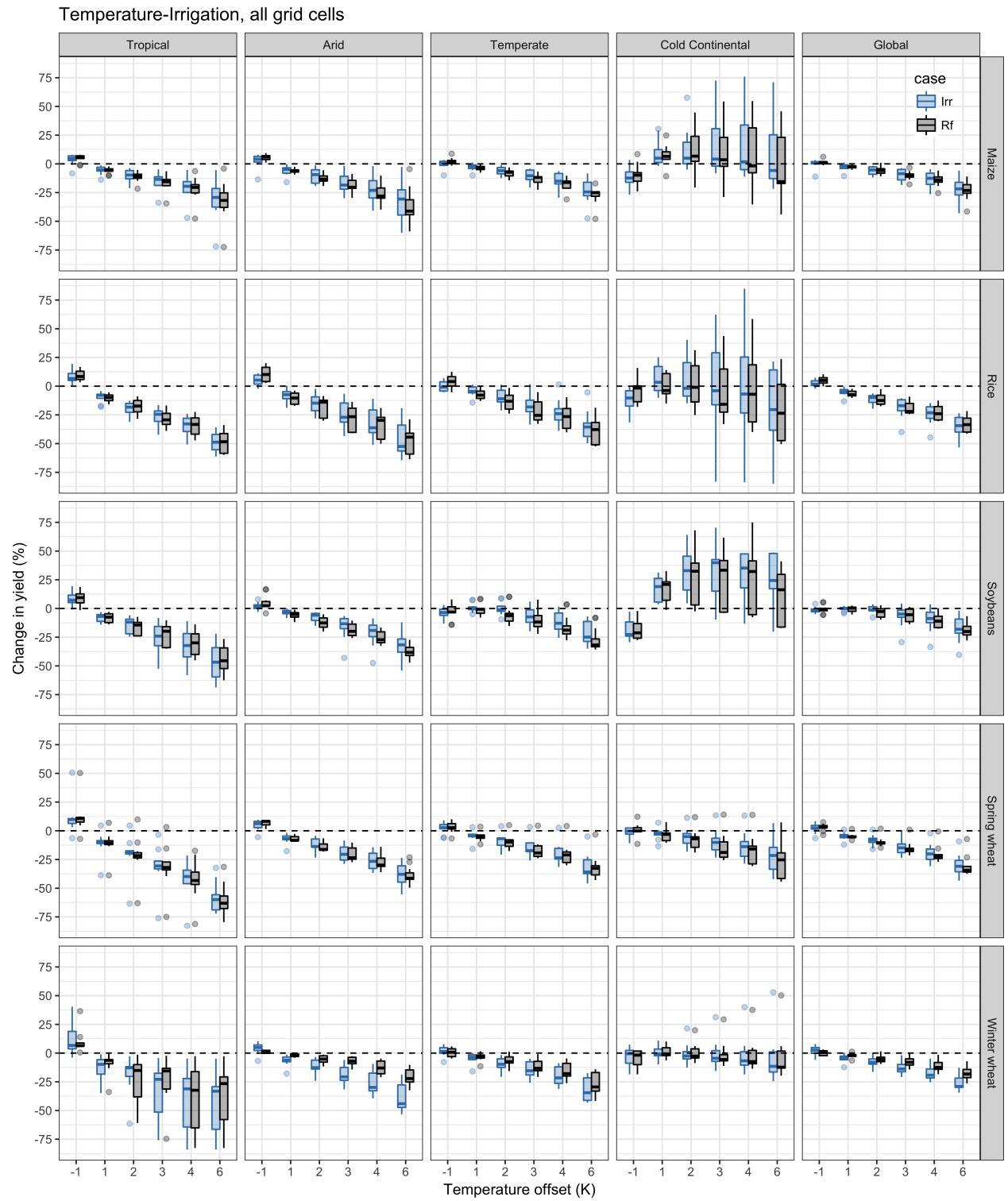
**Figure S6:** Same as main Figure 5b for all crops.



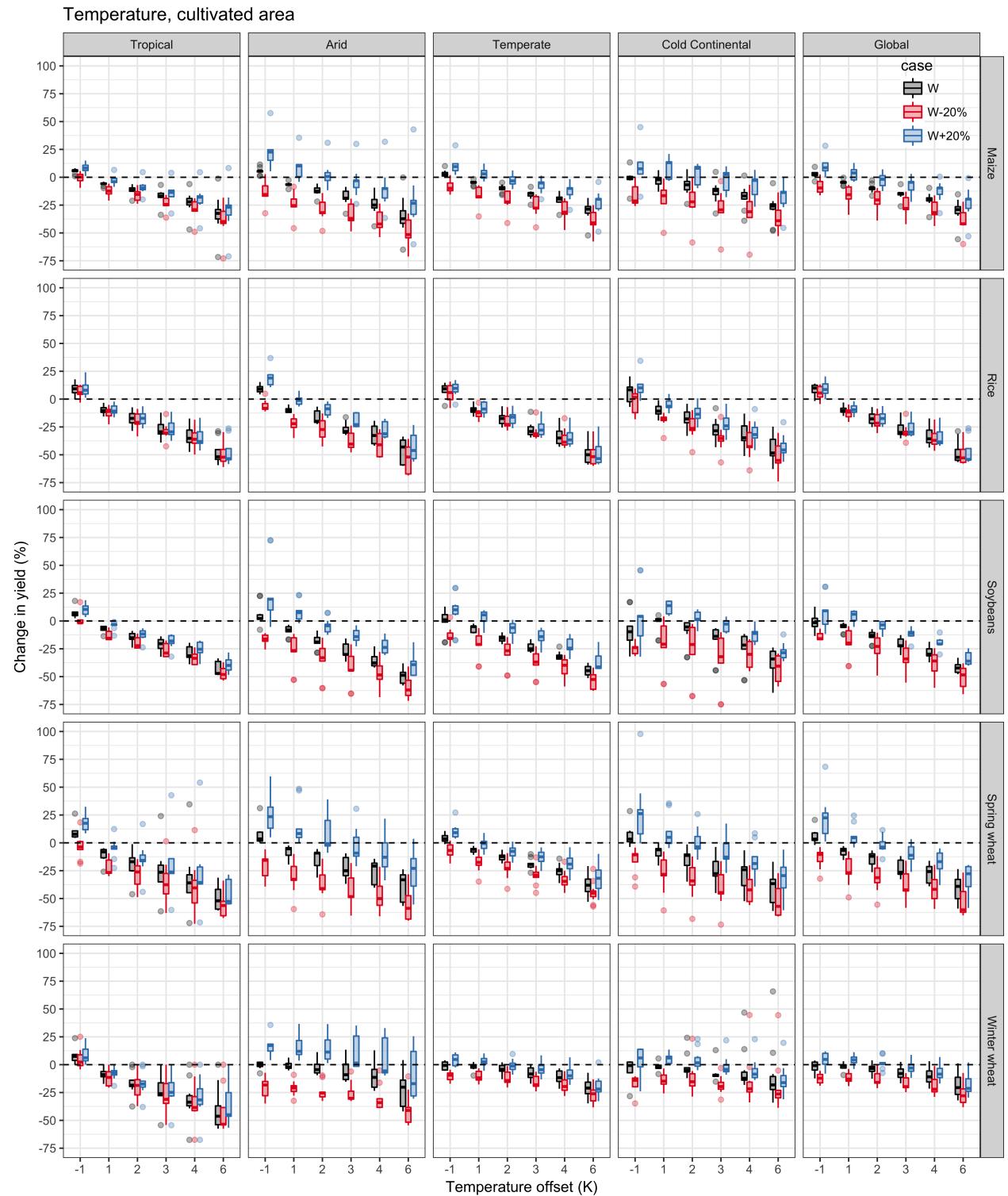
**Figure S7:** Same as main Figure 6a for all crops.



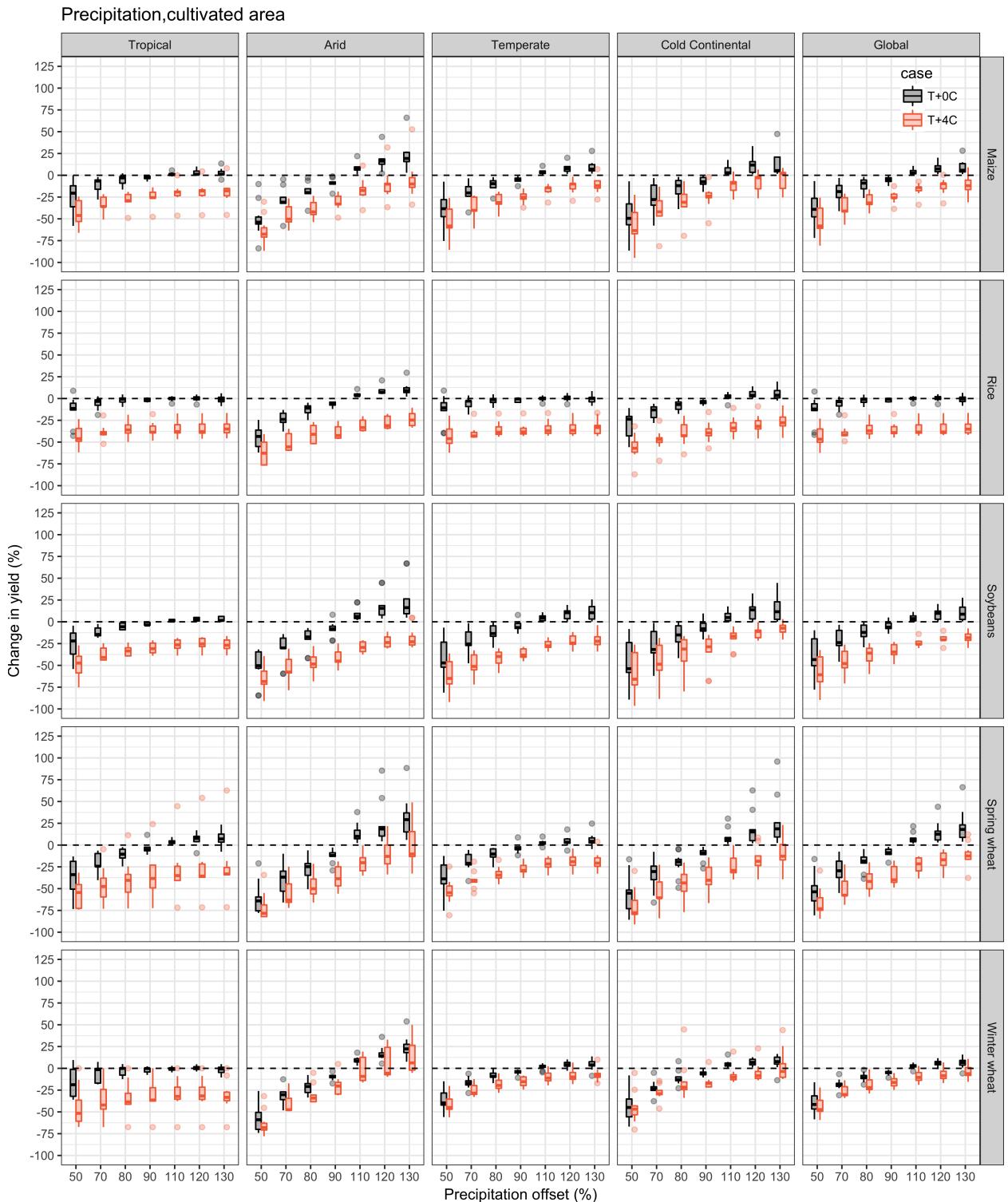
**Figure S8:** Same as main Figure 6b for all crops.



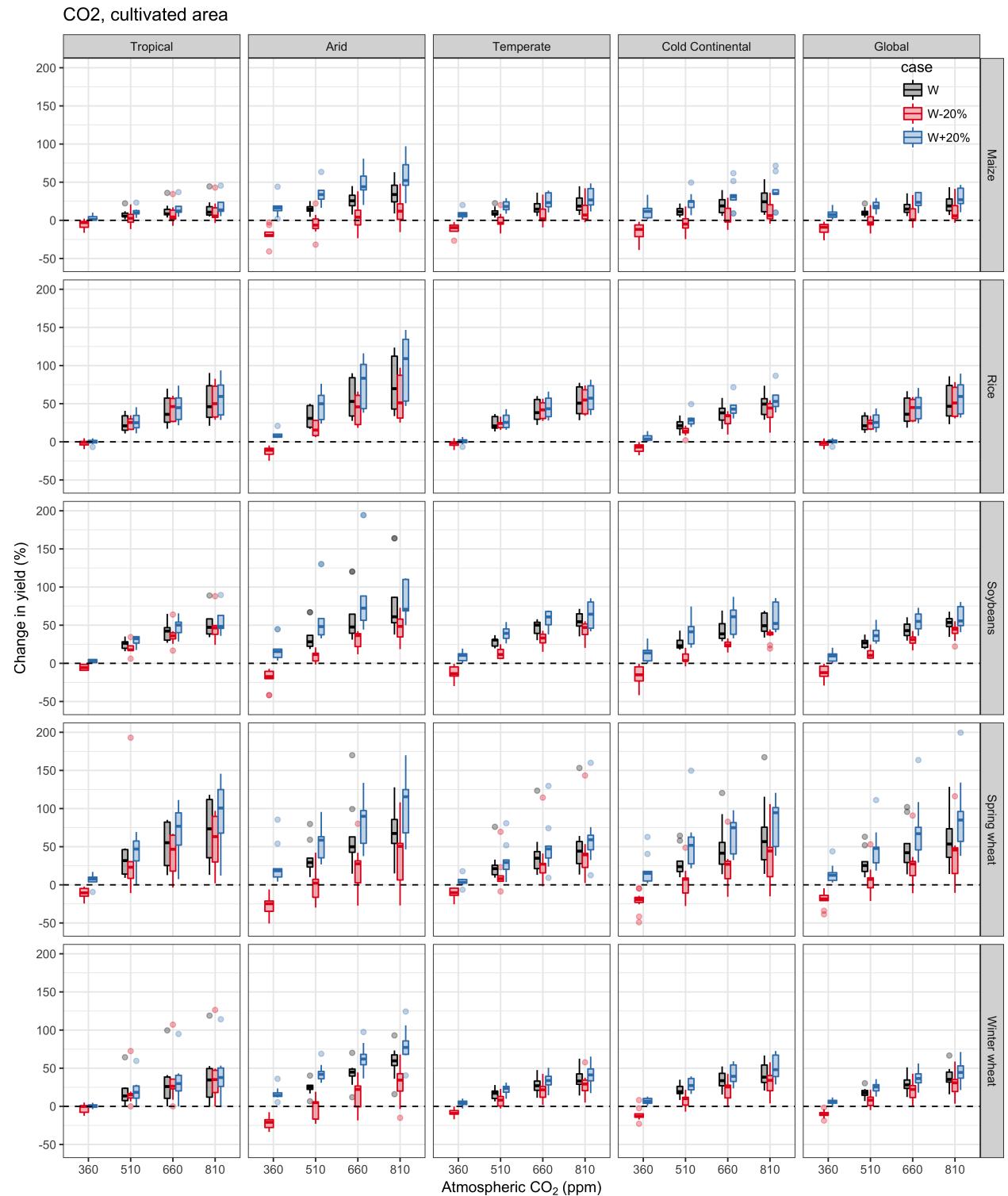
**Figure S9:** Same as main Figure 5a for all crops. Irrigated crops compared to rainfed. Note that yield change for irrigated crops is from the irrigated baseline, which is typically higher than rainfed.



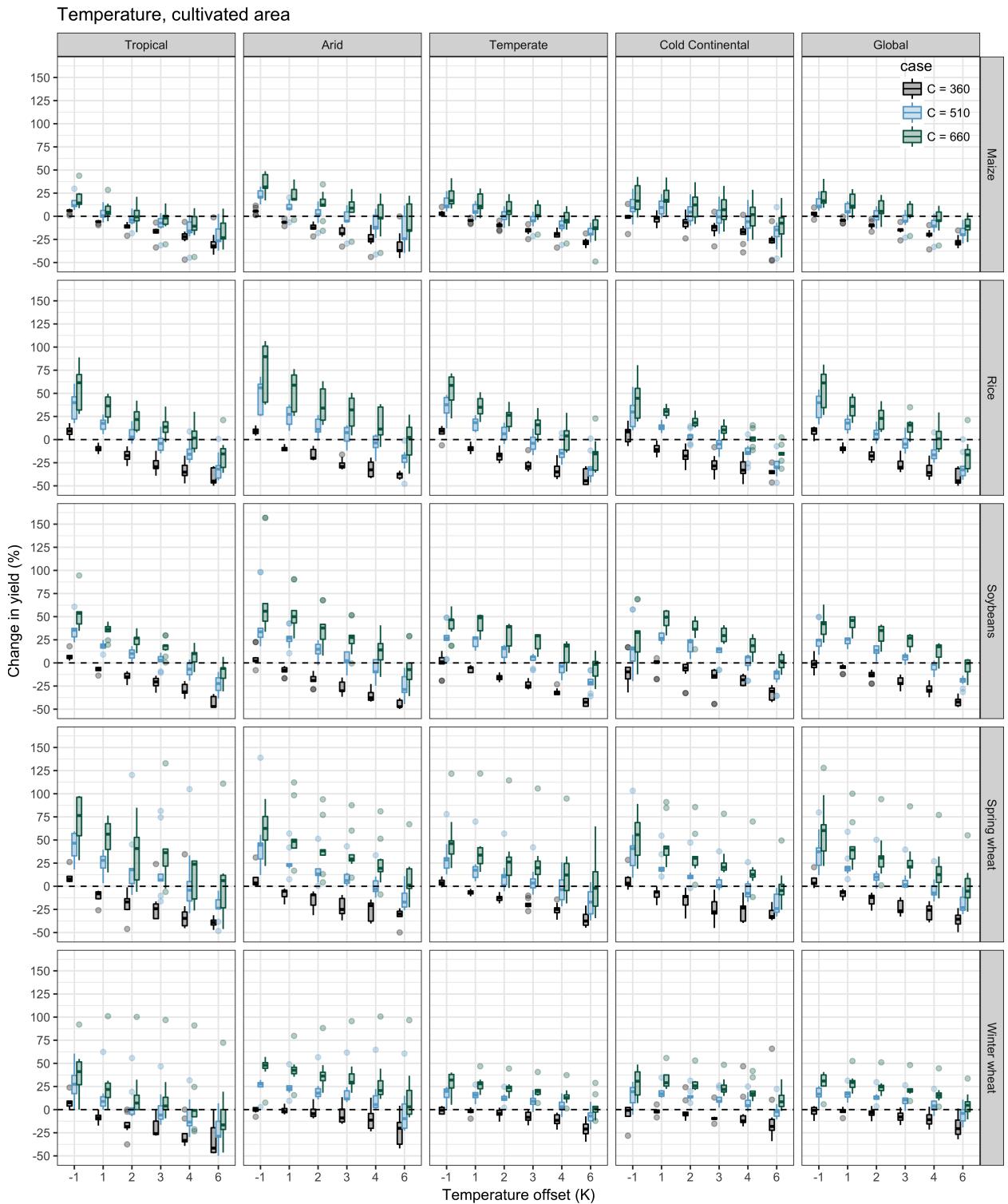
**Figure S10:** Same as main Figure 5a for all crops. Only over cultivated area.



**Figure S11:** Same as main Figure 5b for all crops. Only over cultivated area.



**Figure S12:** Same as main Figure 6a for all crops. Only over cultivated area.



**Figure S13:** Same as main Figure 6b for all crops. Only over cultivated area.