

1 **Supplementary material**

2 **Trends in global tropospheric hydroxyl radical and methane**  
3 **lifetime since 1850 from AerChemMIP**

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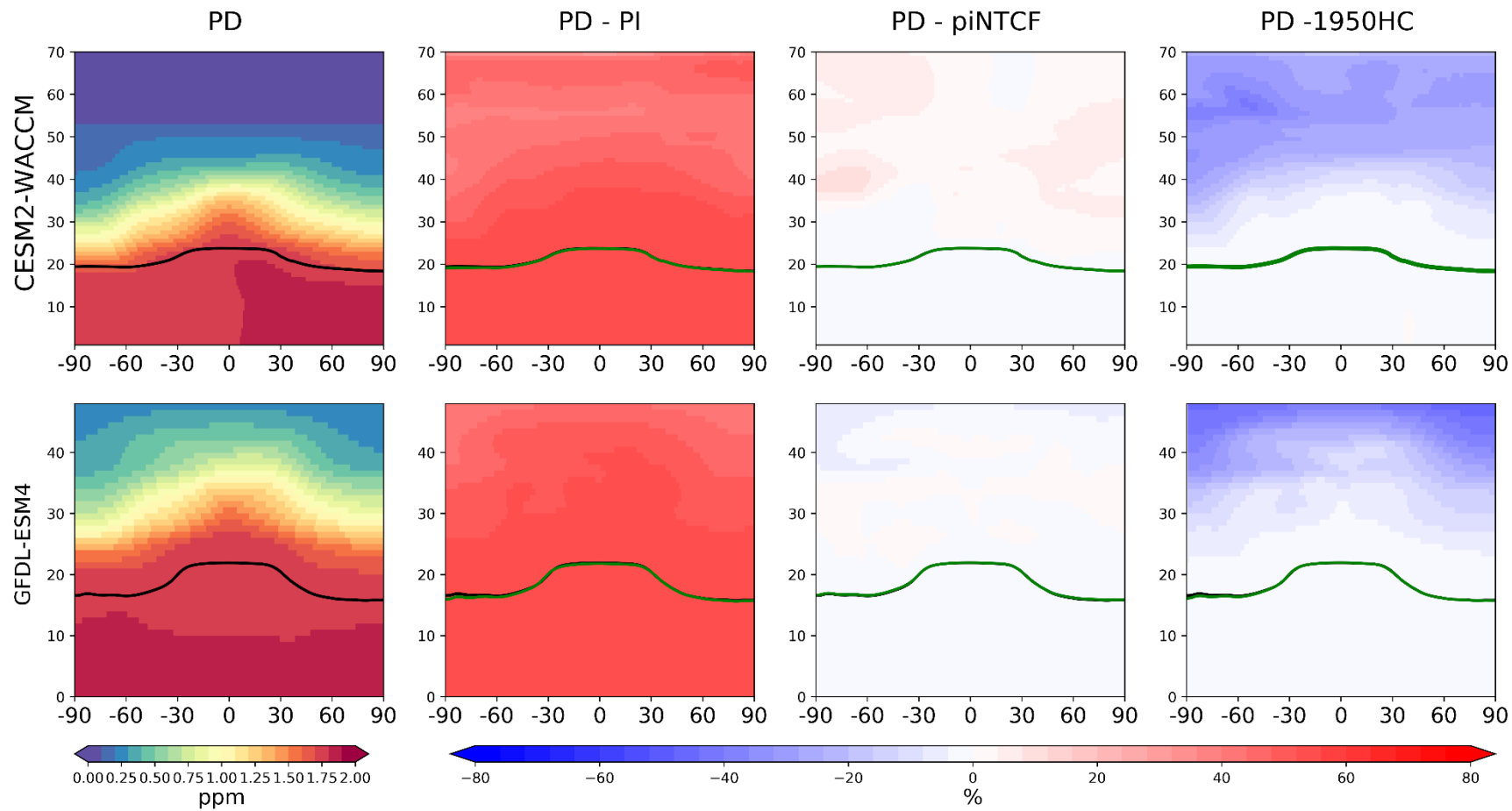
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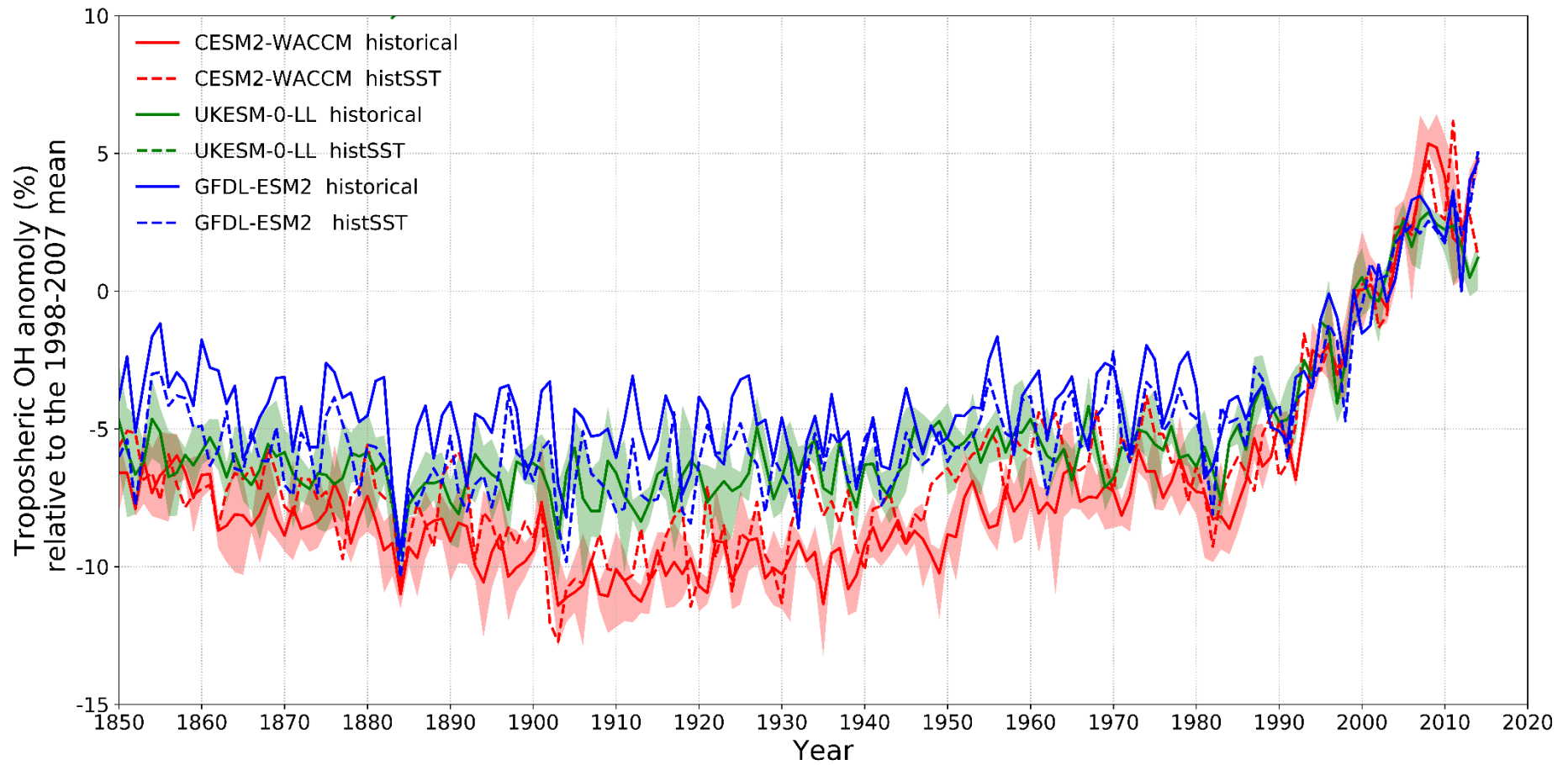
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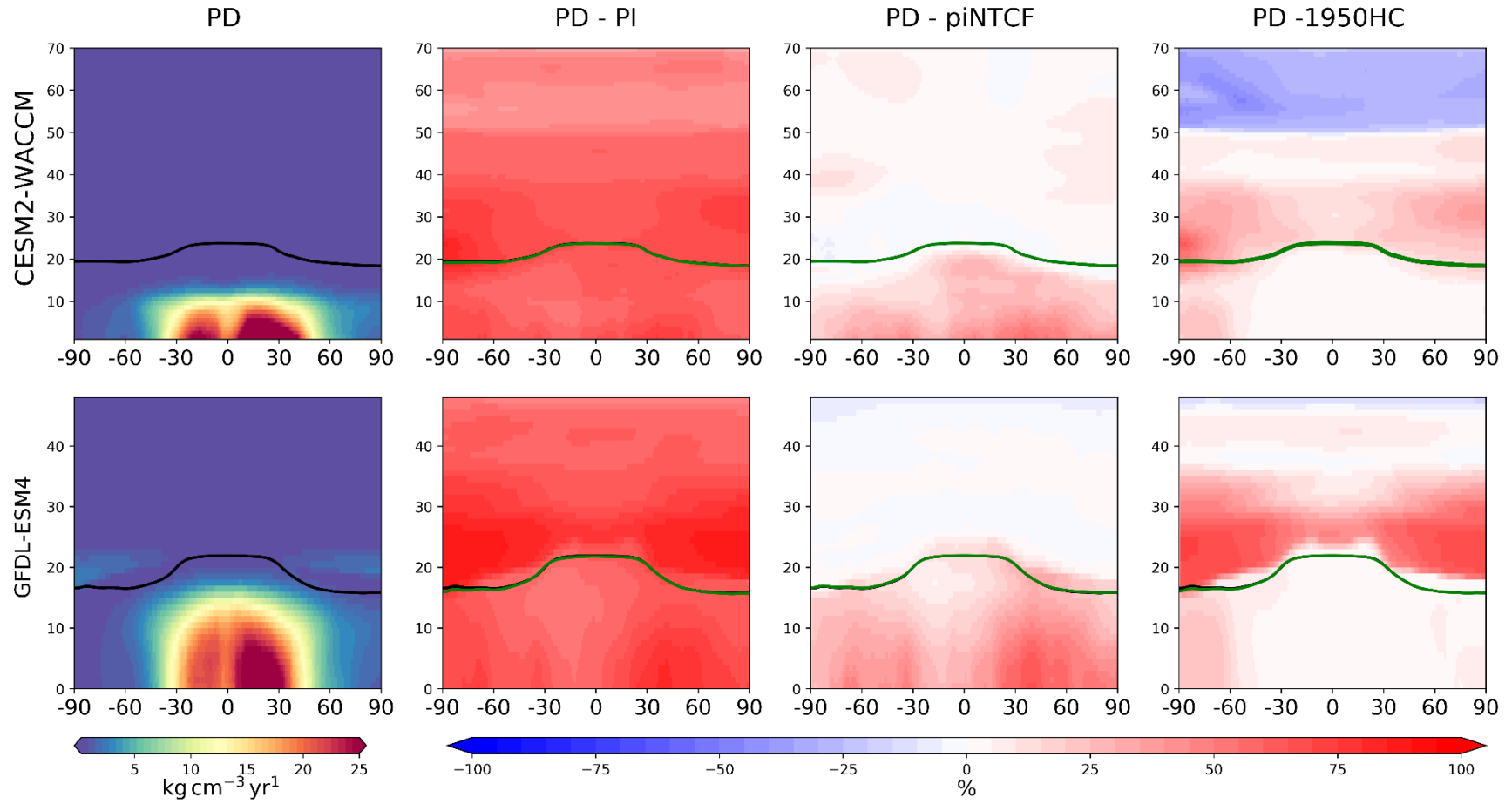
22 **Figure S1** The same as Figure 3, but for CH<sub>4</sub> mixing ratio (ppm) and the relative changes.



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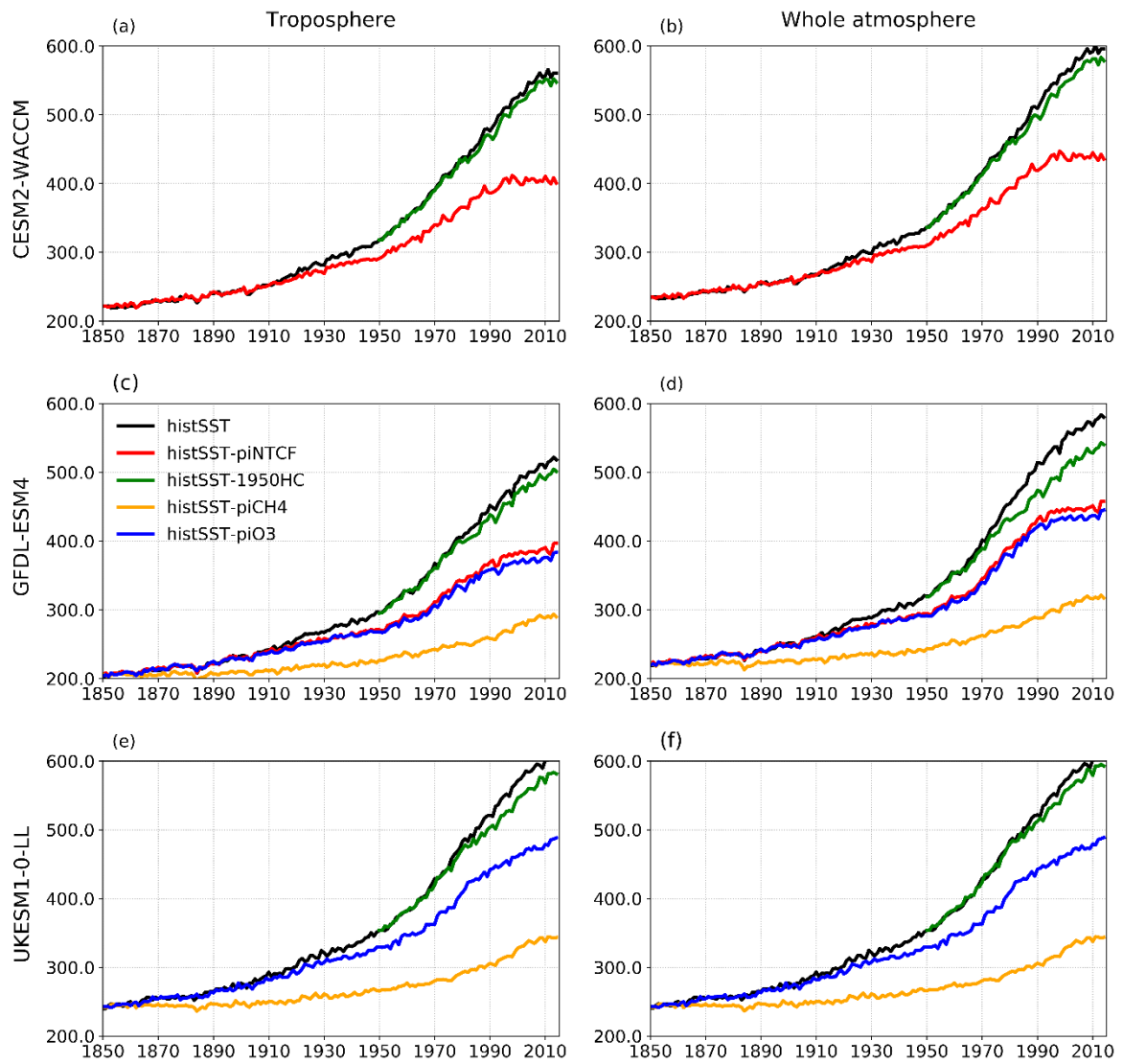
24 **Figure S2** The same as Figure 2, but comparing the historical runs (solid) with corresponding histSST runs (dashed). Red for CESM2-WACCM, green for  
 25 UKESM-0-LL and blue for GFDL-ESM4.

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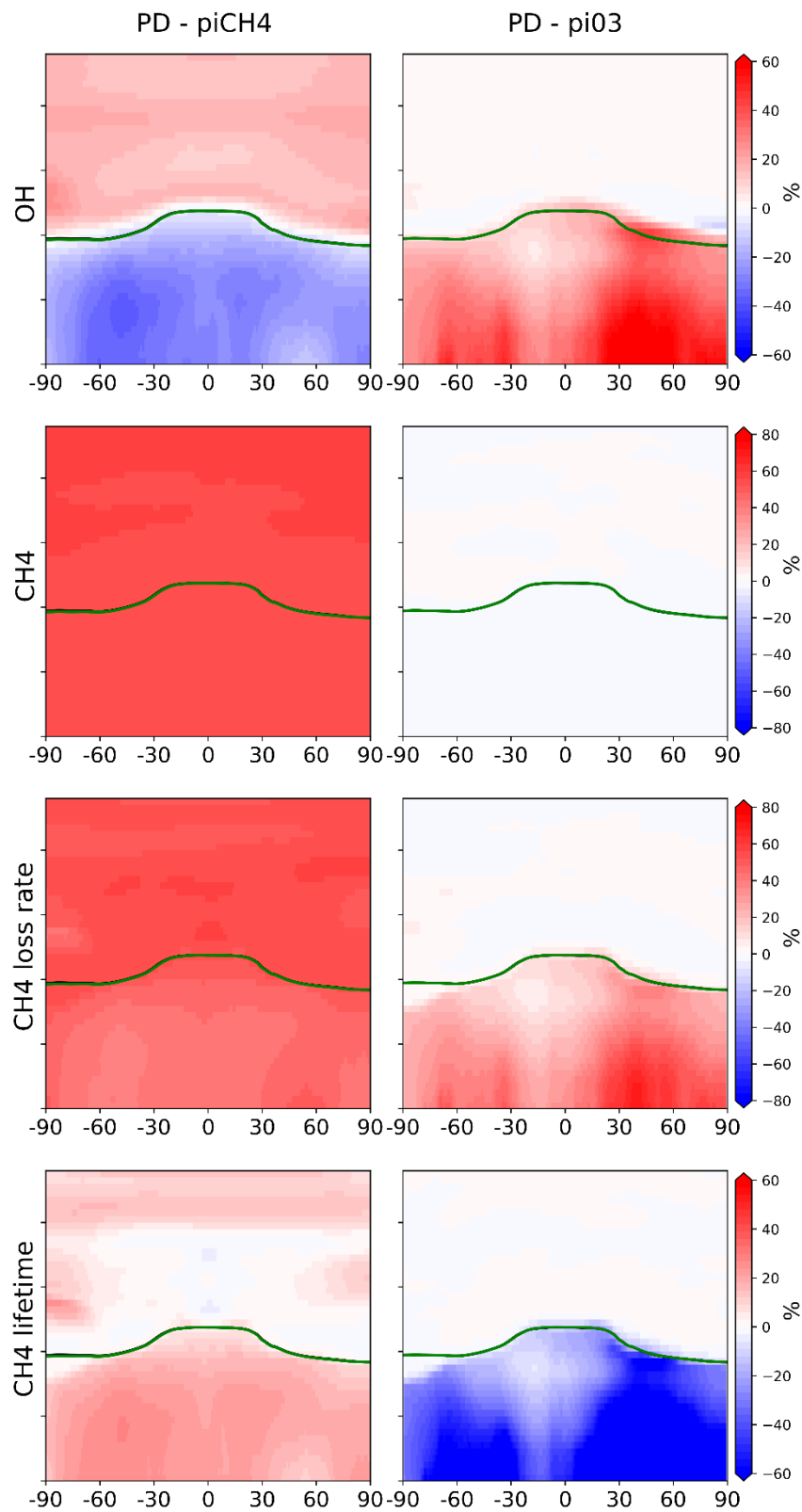
28 **Figure S3** The same as Figure 3, but for CH<sub>4</sub> loss rate (kg cm<sup>-3</sup> yr<sup>-1</sup>) and the relative changes. See Figure S7 for changes in absolute values.



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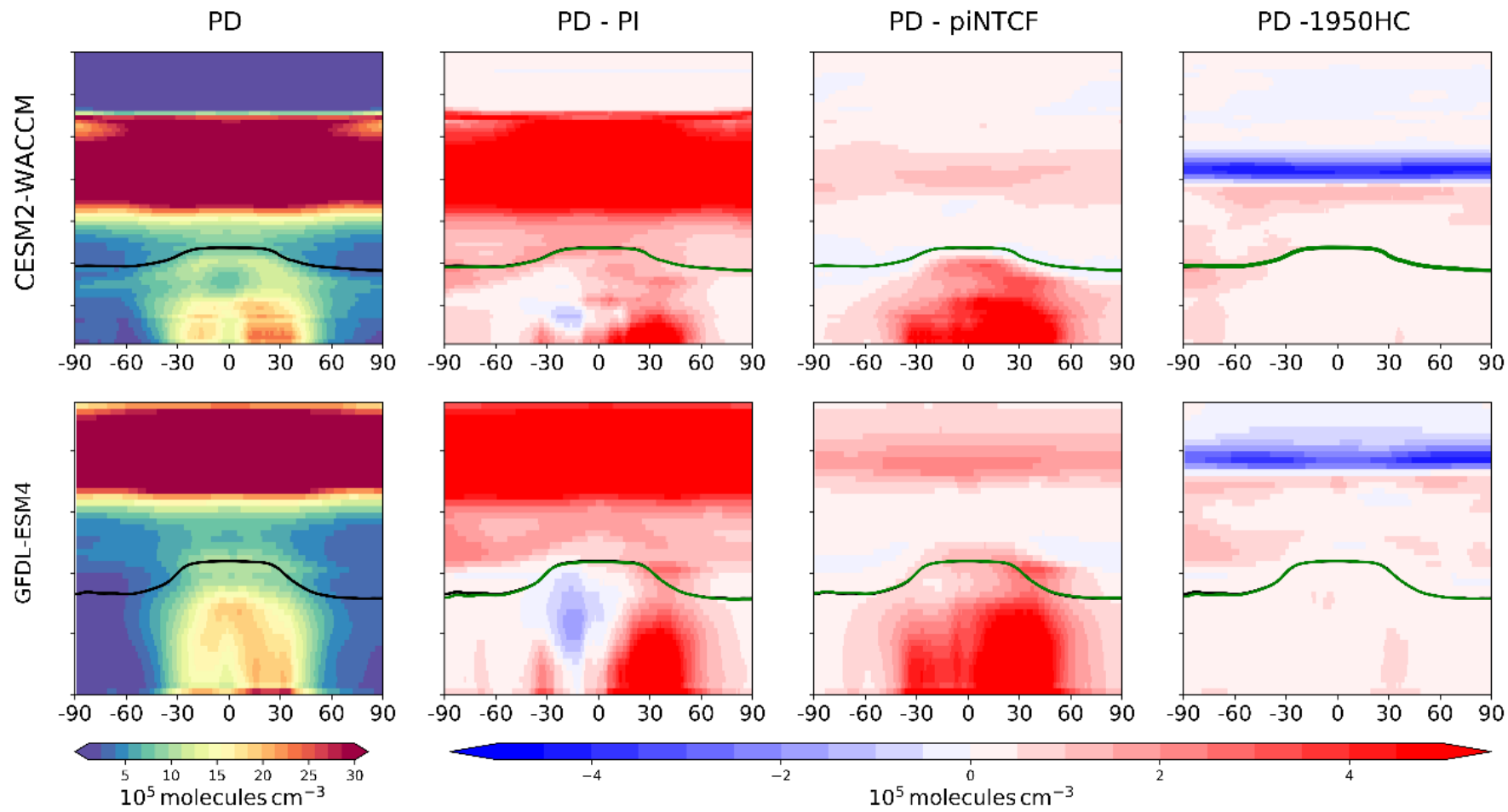
30 **Figure S4** The same format as Figure 5, but for CH<sub>4</sub> loss rate (Tg yr<sup>-1</sup>), integrated in the troposphere  
 31 (left) and the whole atmosphere (right).

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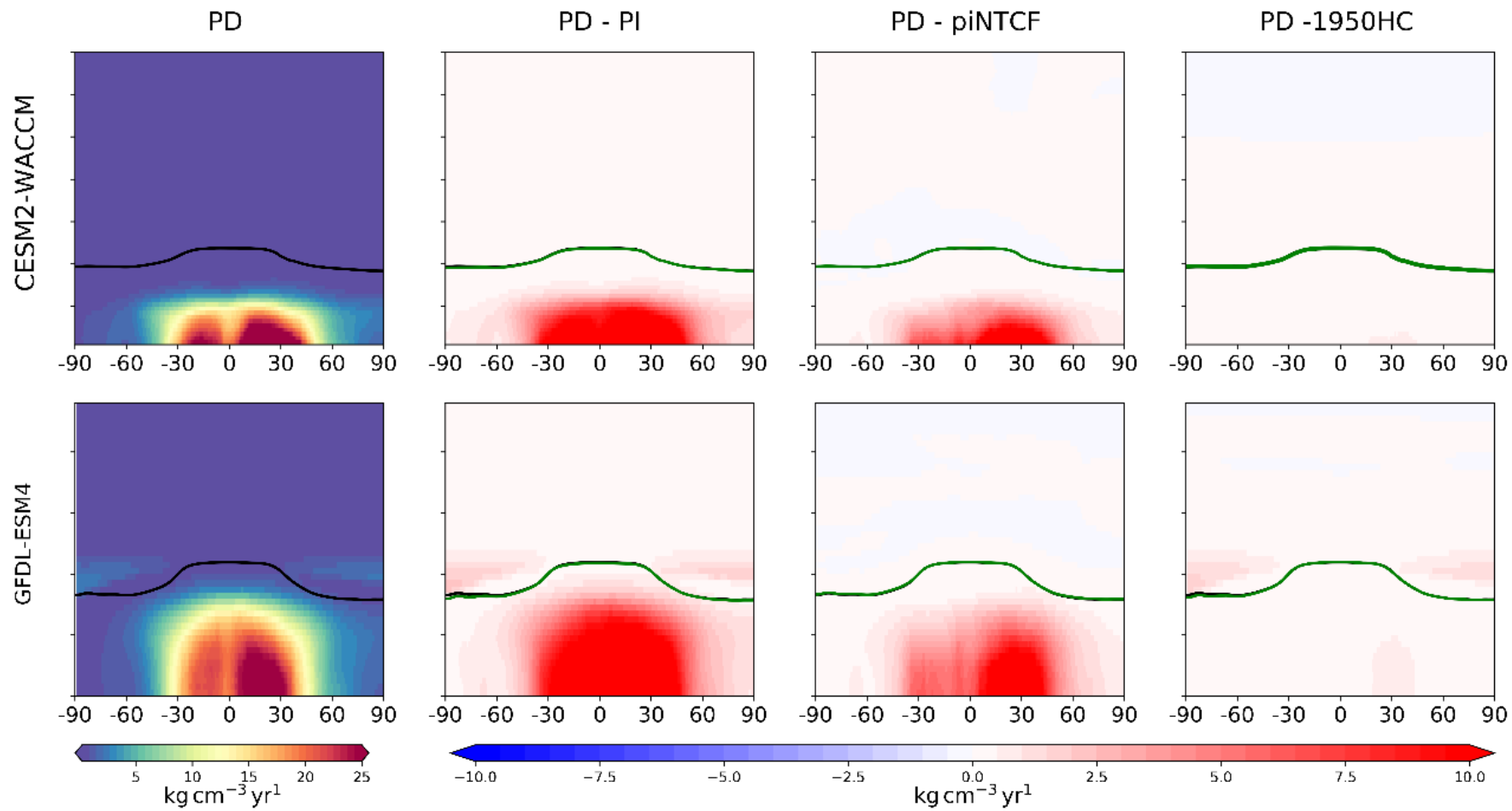
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34 **Figure S5** Percentage changes in OH, CH<sub>4</sub>, CH<sub>4</sub> loss rate and CH<sub>4</sub> lifetime, calculated relative to PD in  
 35 histSST run, derived from GFDL-ESM4. Left for PD-piCH<sub>4</sub> and right for PD-piO<sub>3</sub>.



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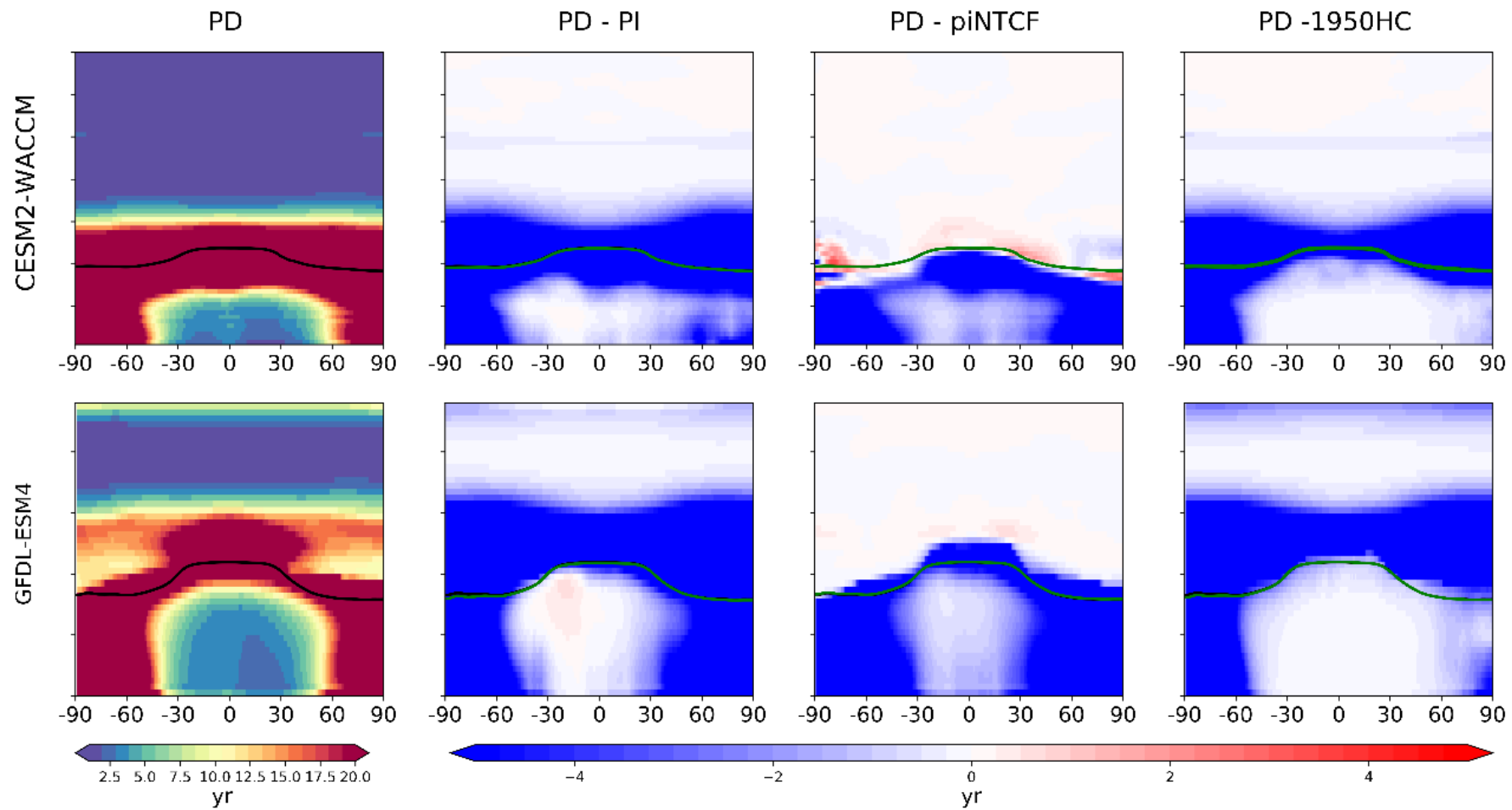
37 **Figure S6** As Figure 2 (OH), but with changes reported as absolute changes.



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39 **Figure S7** As Figure S3 ( $\text{CH}_4$  loss rate), but with changes reported as absolute changes.





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41 **Figure S8** As Figure 4 (CH<sub>4</sub> lifetime), but with changes reported as absolute changes.

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