Supplement of:
Implication of extreme atmospheric methane concentration for chemistry-climate connections

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Figure S1. Comparison of observations on the research vessel Polarstern Klappenbach et al. (2015) (black) to annual zonal mean methane (CH$_4$) columns of the reference simulation (blue) in [parts per million volume (ppmv)]. The solid line represents the original column derived from the reference simulations and the dash dotted line are the columns moved by +0.055ppmv (see text for explanation).
Figure S2. Comparison of vertical global mean CH$_4$ profile of simulation with balloon borne observations provided by Röckmann et al. (2011). The balloon launch sites are Hyderabad, India (HYD, 17.5° N, 78.60° E), Kiruna, Sweden (KIR, 67.9° N, 21.10° E), Aire sur l’Adour, France (ASA, 43.70° N, –0.30° E) and Gap, France (GAP, 44.44° N, 56.14 E) (see text for explanation).
Figure S3. Seasonal differences in ozone (O$_3$) between S1 and REF. Non-stippled areas are significant on a 95% confidence level according to a two sided Welch’s test.
Figure S4. Seasonal differences in \( \text{O}_3 \) between S2 and REF. Non-stippled areas are significant on a 95% confidence level according to a two sided Welch’s test.
3 Adjusted temperature

Figure S5. Stratospheric adjusted temperature based on chemical changes in simulation S1* (2xCH₄) in (a) CH₄, water vapour (H₂O) and O₃ together, (b) CH₄, (c) H₂O, (d) tropospheric H₂O only, (e) stratospheric H₂O only, (f) O₃, (g) tropospheric O₃ only, (h) stratospheric O₃ only. Note the different color bars in panels (a), (b), (d), and (g).
Figure S6. Stratospheric adjusted temperature based on chemical changes in simulation S2* (5xCH₄) in (a) CH₄, H₂O and O₃ together, (b) CH₄, (c) H₂O, (d) tropospheric H₂O only, (e) stratospheric H₂O only, (f) O₃, (g) tropospheric O₃ only, (h) stratospheric O₃ only. Note the different color bars in panels (a), (b), (d), and (g).
References
