



Supplement of

Permafrost response and feedback under temperature stabilization and overshoot scenarios with different global warming levels

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Supplementary materials

Figures S1–S5 are extended versions of selected figures from the main text, supplemented with uncertainty ranges derived from 250 ensemble simulations (5th–95th percentiles). Due to substantial overlap among different scenarios, the main-text figures display uncertainty only at the year 2300 to avoid visual clutter. In contrast, these supplementary figures present the full temporal evolution of uncertainty throughout the simulation period, providing a clearer depiction of the variability and nonlinearities in model responses under parametric perturbations.

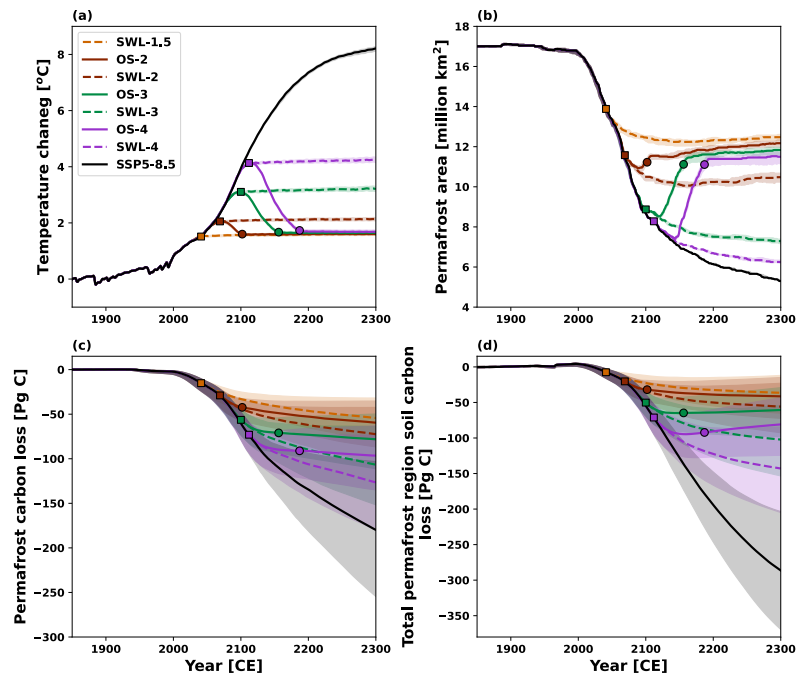


Figure S1. As Fig. 3, but with shadings indicating the 5th and 95th percentile uncertainty ranges across the 250 ensemble simulations.

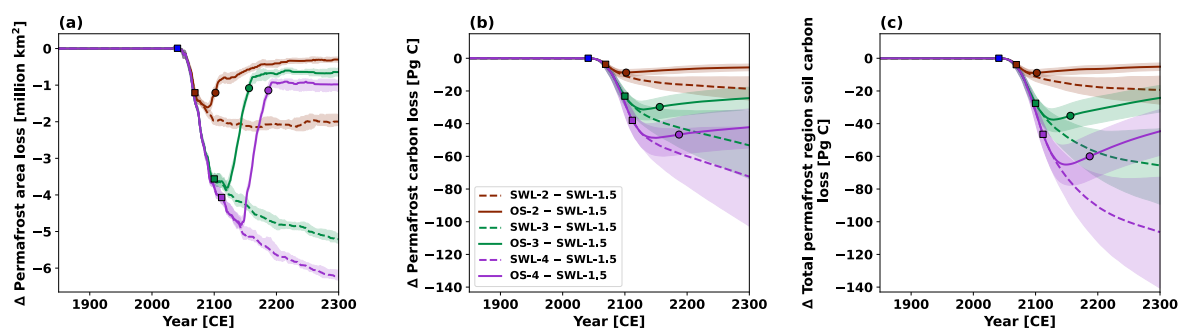


Figure S2. As Fig. 4, but with shadings indicating the 5th and 95th percentile uncertainty ranges across the 250 ensemble simulations.

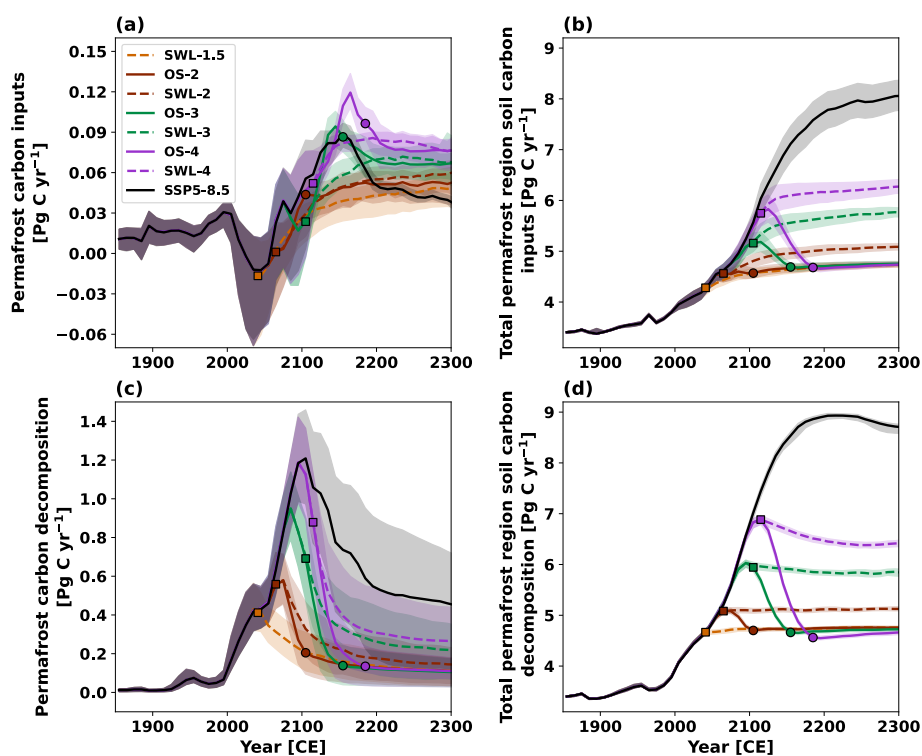


Figure S3. As Fig. 5, but with shadings indicating the 5th and 95th percentile uncertainty ranges across the 250 ensemble simulations.

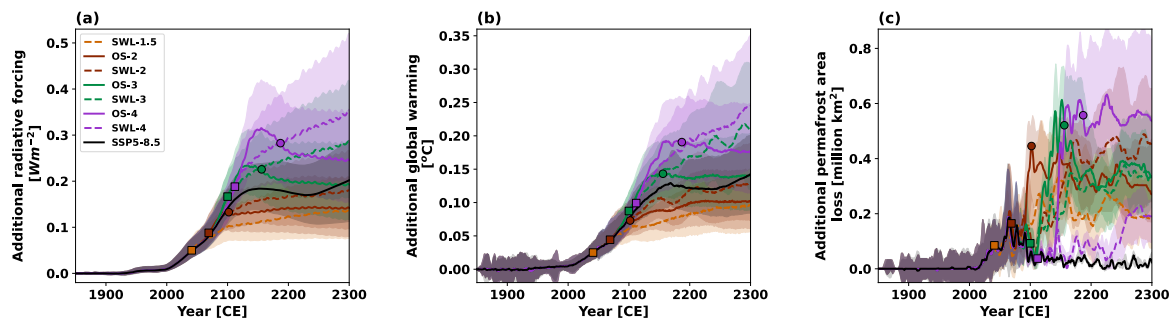


Figure S4. As Fig. 7, but with shadings indicating the 5th and 95th percentile uncertainty ranges across the 250 ensemble simulations.

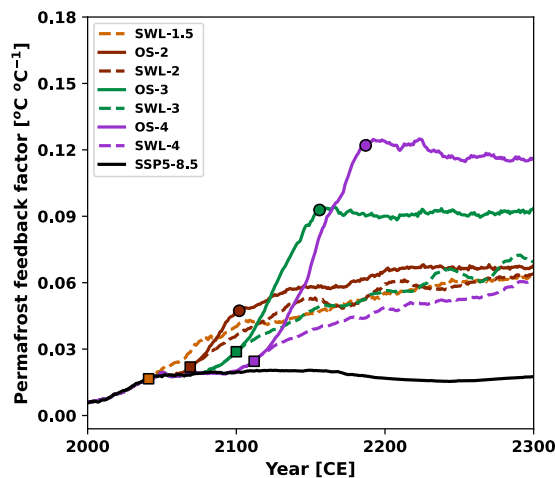
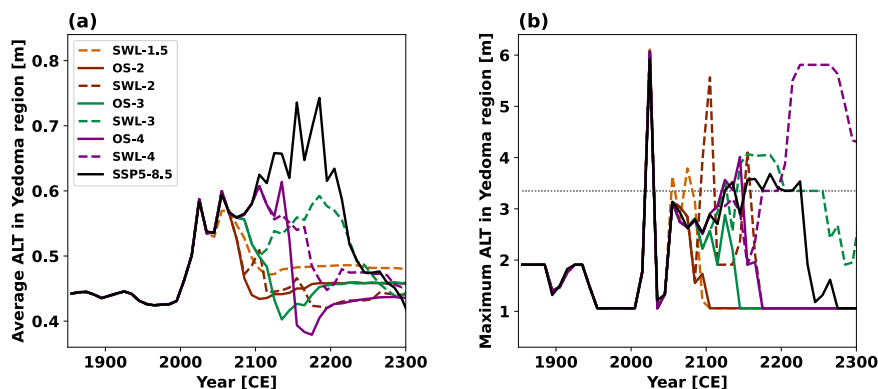


Figure S5. As Fig. 8, but with shadings indicating the 5th and 95th percentile uncertainty ranges across the 250 ensemble simulations.



30 Figure S6. Timeseries of annual (a) average and (b) maximum active layer thickness (ALT) in Yedoma regions under overshoot (colored solid lines) and stabilization (colored dashed lines) scenarios for 1.5 °C (orange), 2.0 °C (brown), 3.0 °C (green), and 4.0 °C (purple) global warming levels, as well as the SSP5-8.5 scenario (black solid line). Results represent the ensemble median of 250

simulations based on the PFC simulations. The Yedoma region mask used in this analysis is based on the Ice-Rich Yedoma Permafrost Database Version 2 (IRYP v2) (Strauss et al., 2021, 2022; <https://doi.org/10.1594/PANGAEA.940078>).