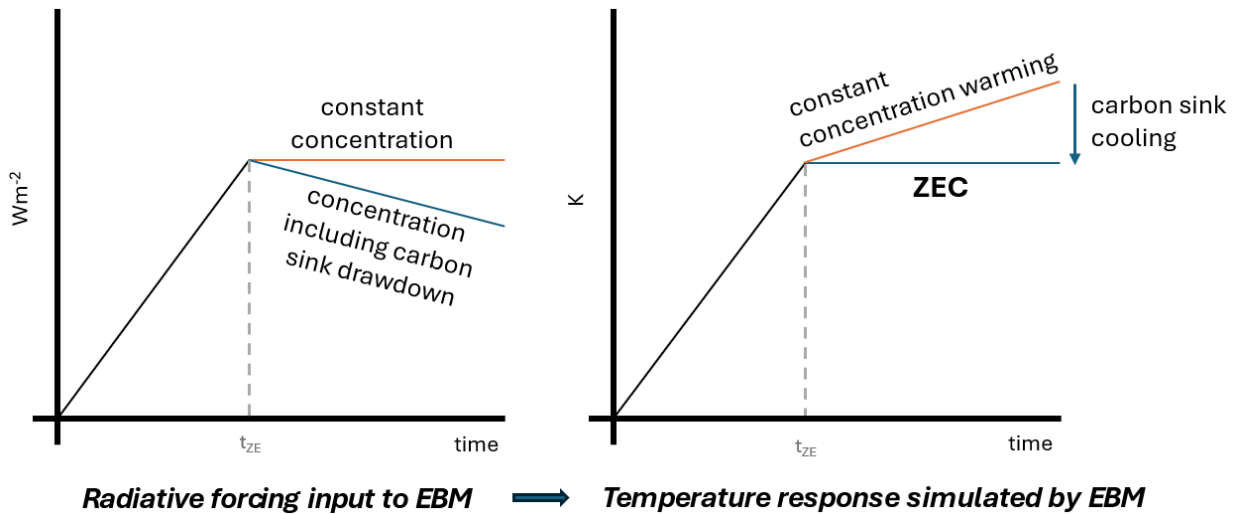
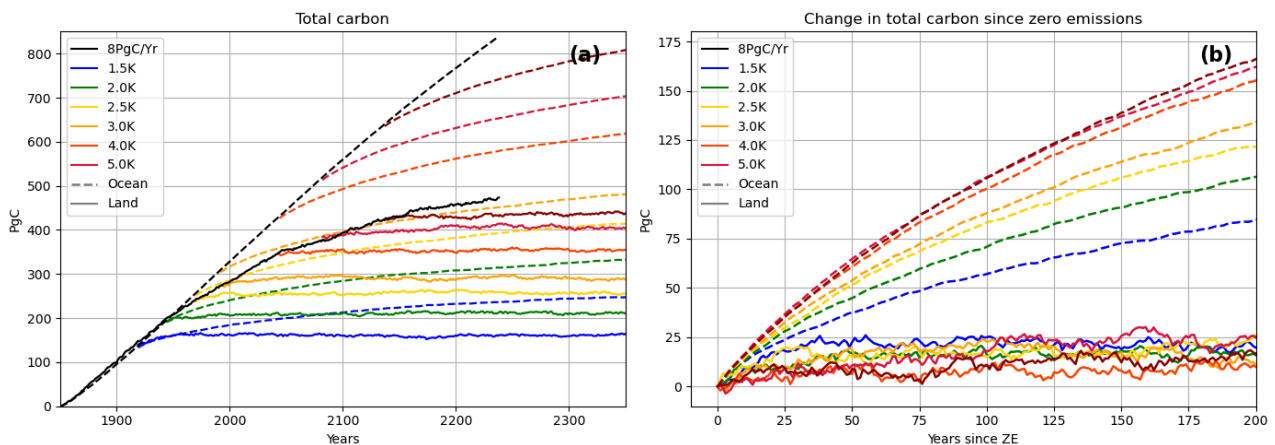


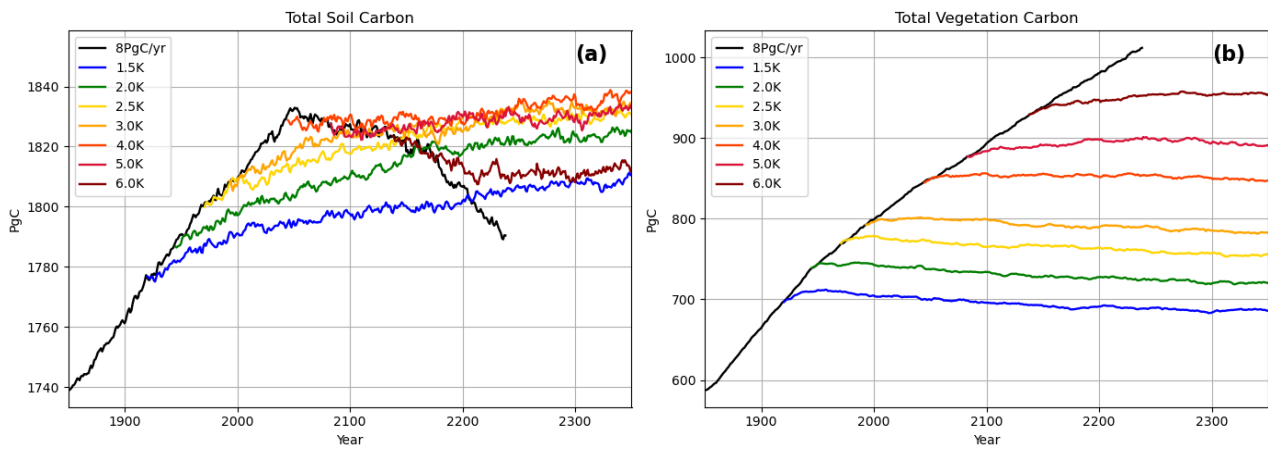
## Supplementary material



**Figure S1:** Schematic illustrating the decomposition of the Zero Emissions Commitment (ZEC) into constant concentration warming and carbon sink cooling. At the branch point ( $t_{ZE}$ ), emissions cease. Constant concentration warming is obtained by holding radiative forcing fixed at its branch-point value (orange), while carbon sink cooling reflects the forcing decline due to continued carbon uptake (blue). The blue temperature trajectory corresponds to the ZEC, and its separation from the constant concentration warming path indicates the contribution of carbon sink cooling.



**Figure S2:** (a) Total carbon stored in the land (solid) and ocean (dashed) across all global warming levels, spanning the ramp-up and zero-emission phases, and (b) change in total land and ocean carbon relative to the zero-emissions branch point.



**Figure S3:** (a) Total soil carbon and (b) total vegetation carbon across all global warming levels, spanning the ramp-up and zero-emission phases.