



## **The effects of bottom boundary placement on subsurface heat storage in climate model simulations**

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The bottom boundary condition placement (BBCP) in land-surface components of General Circulation Models (GCMs) is a critical parameter for realistic modeling of subsurface physics over long timescales. A one-dimensional soil model (1DSM) was used to quantify the influence of BBCP on heat storage capacity in the land-surface submodels of GCMs. Results show that shallow boundary conditions can reduce the capacity of the global continental subsurface to store heat by as much as  $1.0 \times 10^{23}$  Joules during a 110-year climate change simulation with a 10m bottom boundary. These calculations are relevant for any GCM future climate projection that utilizes a land-surface component with a shallow BBCP (currently 10m or less). These shallow boundary conditions preclude a large fraction of the expected subsurface heat gain. This displaced heat may partition to other parts of the simulated climate system. Our results suggest that climate models of any complexity must impose appropriate BBCP to fully account for subsurface heat storage in future climate change projections.