

# Early Habitability and Crustal Decarbonation of a Stagnant-Lid Venus

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**MOTIVATION.** Long-term habitability relies upon a carbon cycle with plate tectonics. The tectonic state of ancient Venus is unknown. Would a modified carbon cycle consisting of silicate weathering, carbonate burial, and crustal decarbonation allow for liquid water on an early stagnant-lid Venus?

**METHODS.** We model Venus' coupled atmosphere-interior evolution assuming a stagnant-lid regime and benchmark the results with a 3D climate model.

**RESULTS.** An early habitable period of up to 900 Myr is possible due to silicate weathering. This is followed by rapid crustal decarbonation and build up of CO<sub>2</sub> as seen today on Venus.

*Figure: Evolution results for different planetary albedos (curves) and control cases from the ROCKE-3D GCM (diamonds)*

