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Do ice core data support marine sulfur climate feedbacks?

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Dimethylsulfide (DMS), emitted by oceanic phytoplancton, escapes to the air before being oxidized into non sea salt sulfate (nss SO_4) and methanesulfonate (MSA) aerosols. Nss SO_4 is the most abundant aerosol in the marine atmosphere. Both nss SO_4 and MSA are very efficient Cloud Condensation Nuclei (CCN) and largely contribute to shape the Earth albedo by affecting cloud microphysical properties. Under the CLAW hypothesis, biological forcing of climate is possible through the effects of temperature and sunlight on phytoplankton populations and DMS production, thus affecting cloud albedo and closing a feedback loop. However, whether this feedback thermoregulates (negative feedback) or destabilizes (positive feedback) climate is unknown. Here, we use for the first time an atmospheric general circulation and sulfur chemistry model to simulate sulfur (S) deposition on the Antarctique ice sheet at the Last Glacial Maximum (LGM). Using a recent reconstruction of sea-ice coverage, the model reproduces the ice core nss SO_4data if LGM DMS concentrations in the surface ocean are prescribed the same as today. This result calls into questions the climate effect on DMS production by phytoplancton and thus the climate feedback loop of the CLAW hypothesis.