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Can ocean deoxygenation accelerate global warming via enhanced marine N₂O production?

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Ocean warming is projected to cause marine deoxygenation, reduce solubility, affect ocean circulation and enhance metabolic rates over this century. These changes, affecting oceanic N₂O production and emissions, have been suggested to potentially rise atmospheric N₂O concentrations and increase the positive feedback to anthropogenic climate change. However, current global model projections all suggest a decline in marine N₂O emissions under global warming but the processes leading to this decline are poorly constrained. Here, using an Earth system model of intermediate complexity, we disentangle the contribution of ocean deoxygenation and the direct and indirect warming effects on oceanic N₂O production and emissions changes under RCP8.5 emission scenario. We find that ocean deoxygenation and warming-reduced N₂O solubility do in fact increase oceanic N₂O emissions, however this increase is overcompensated by ocean circulation slow-down and reduced export production, suggesting a neglectable N₂O-emission feedback to climate on centennial timescales.