



Cryospheric Cap Degradation as a Driver of Antarctic Seep Emergence

Photo: Martin Jakobsson

Dr Sarah Seabrook, Marine Biogeochemist at National Institute of Water and Atmospheric Research (NIWA), New Zealand

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The climate sensitivity and significance of subsurface fluid and greenhouse gas reservoirs have received attention in the Arctic and paleoscience, yet the presence of these features in Antarctica and their contribution to global methane and the carbon cycle remains enigmatic. Here, we present the recent discoveries of extensive and emergent seafloor seeps which are releasing climate-reactive fluids and gases in the coastal Ross Sea. Emission of methane in these shallow waters would expedite transfer to the atmosphere, as reported at other shallow global seep systems. While the origin, driving mechanisms, and environmental consequence of these emerging Antarctic seep systems remains unknown,

we postulate that the emergent seepage results from cryospheric cap degradation initiating new fluid flow pathways, liberating subsurface fluids and gases. This mechanism is inherently climate sensitive with potential for positive feedback and may be widespread around the Antarctic Continent. We raise the discussion of if the emergence of these seep sites represents the crossing of a local, or regional, tipping point with potentially profound local and global implications as the climate continues to rapidly warm.



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Contact information: wei-li.hong@geo.su.se, paola.manzotti@geo.su.se & christian.stranne@geo.su.se



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