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Cryogenic Brines as Diagenetic Fluids: Reconstructing the Diagenetic History of the Victoria  
Land Basin using Clumped Isotopes

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## ABSTRACT

The isotopic analyses ( $\delta^{13}\text{C}$ ,  $\delta^{18}\text{O}$ , and  $\Delta_{47}$ ) of carbonate phases recovered from a core in  
McMurdo Sound by ANtarctic geologic DRILLing (ANDRILL-2A) indicate that the majority of  
secondary carbonate mineral formation occurred at cooler temperatures than the modern burial  
temperature, and in the presence of fluids with  $\delta^{18}\text{O}_{\text{water}}$  values ranging between -11 and -6‰  
VSMOW. These fluids are interpreted as being derived from a cryogenic brine formed during the  
freezing of seawater. The  $\Delta_{47}$  values were converted to temperature using an in-house calibration  
presented in this paper. Measurements of the  $\Delta_{47}$  values in the cements indicate increasingly  
warmer crystallization temperatures with depth and, while roughly parallel to the observed  
geothermal gradient, consistently translate to temperatures that are cooler than the current burial

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