

MEASURING LOW-TEMPERATURE CO₂-H₂O EQUILIBRIA: START-UP

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ABSTRACT

Vast potential sinks for anthropogenic CO₂ exist within and possibly beneath the Antarctic and Greenland ice sheets. In the process of working out the phase equilibria in the low-temperature portion of the CO₂-H₂O binary system relevant to Mars' volatile history (the atmospheric composition, which is 95 % CO₂ and 0.03% H₂O, is buffered by water ice), it became apparent to me that the CO₂-clathrate phase (CO₂•5.75H₂O) is thermodynamically stable in the presence of water ice over a most of the pressure-temperature range of the terrestrial ice sheets. Furthermore, there are significant portions of the ice sheet P-T range over which liquid CO₂ is stable either with clathrate or liquid water. There is relatively little data on the mutual solubility of CO₂ and H₂O at the relevant equilibrium conditions, so I am requesting funds to begin the process of setting up an experimental apparatus that will enable measurement of the various equilibria and phase composition.