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**Stretched-water equation of state at low temperatures**[1] MICHAEL SANTIAGO, VINAY PAGAY, DAVID SESSOMS, ABRAHAM STROOCK, Cornell Univ — Liquids can exist at negative pressure, a metastable state analogous to stretched rubber. This stretched state is ubiquitous. For instance, stretched water exists naturally in many plants, semi dry soils and porous materials, even food. Yet measurements of stretched water's thermodynamic properties are lacking because of experimental challenges. Such measurements could elucidate water's behavior in these settings, unfold the origins of water's anomalies, and perhaps provide conclusive evidence on whether a liquid-liquid critical point exists in highly supercooled water. Here we present the first isothermal measurements of the equation of state (EoS) of stretched water below room temperature, comparing them with predictions of existing theoretical models. For these measurements, we developed a microfabricated sensor that directly measures the pressure in a macroscopic volume of stretched water at known chemical potential and temperature. This sensor uses the metastable vapor liquid equilibrium technique to stretch the water, and is able to reach pressures down to -33 Mpa. Our results agree with the IAPWS EoS at 20 °C and 15 °C. We are currently taking further measurements at lower temperatures.

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