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Investigating the Thermodynamics and Seismic Profile of the Europan Hydrosphere through Pure-Water Modeling and Saltwater Experiments[1] SAMANTHA ROSENFELD, HEATHER WATSON, Union College — Europa is a prime candidate for the search for life beyond Earth due to its theorized subsurface liquid-water ocean. We perform a computational analysis of the thermodynamic properties for a pure-water Europan hydrosphere using a Python programming framework called SeaFreeze, creating four models of the ice shell assuming surface temperatures of 50K and 140K and ice shell thicknesses of 3km and 30km. We observe mostly linear trends for density and p- and s-wave velocities with respect to depth. Assuming a colder surface temperature of 50K introduces an inversion curve near the surface for density, indicating that temperature affects the models more than pressure. We also experimentally investigate the phase diagram of NaCl-water solutions up to 20

[1]SeaFreeze was developed by Baptiste Journaux, J. Michael Brown, and Penny Espinoza at the Earth and Space department of the University of Washington (Seattle, WA). Elise Liebow, Melanie Boyle, Srihari Balaji, and Manav Bilakhia at the Department of Physics and Astronomy of Union College (Schenectady, NY) also helped in collecting the experimental data. This work was completed with support from the NASA Solar System Workings Grant number 80NSSC22K0136.

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