

# The Freshwater Ocean of Europa

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The empirical constraints from the Galileo spacecraft magnetometer and gravity data are used to constrain the salinity of the putative European ocean to a range of 1 - 100 g MgSO<sub>4</sub> kg<sub>H<sub>2</sub>O</sub><sup>-1</sup>, or 0.1-10% MgSO<sub>4</sub> by weight. Taking into account the preferred models of the hydrosphere – a 10-30 km ice shell overlying a ~100 km ocean – we find the salt concentration to lie in the range of 1-5 g kg<sub>H<sub>2</sub>O</sub><sup>-1</sup>. This is far less than terrestrial ocean salt concentrations (~34 g kg<sub>H<sub>2</sub>O</sub><sup>-1</sup>) and extends into the freshwater regime. Our results indicate that the image of a hypersaline European ocean is likely mistaken, and there is no geochemical puzzle regarding high European MgSO<sub>4</sub> abundances that needs to be solved.