Magnetometer constraints on the ocean salinity and ice shell thickness of Europa. K. P. Hand[1,2] and C. F. Chyba[2], [1]Stanford University, Dept. Geological & Env. Sciences, 450 Serra Mall, Stanford, CA 94305, khand@stanford.edu, [2]Princeton University Dept. of Astrophys. Sciences, Peyton Hall, Princeton, NJ, 08544.

Introduction: We have recently provided new constraints on the salinity of the europan ocean and the overlying ice shell thickness [1]. Using the Galileo magnetometer results [2,3] and physical limits on the conductivity of aqueous solutions we find that for an amplitude ratio of A = 0.97±0.02 the ocean must be near saturation and the ice shell is 4 km thick. Accounting for the ±0.02 on A we find a maximum thickness of ~15 km and a minimum thickness of near zero thickness.

These results are for both a three-layer sphereical model (mantle, ocean, ice) and a five layer half-space model (core, mantle, ocean, ice, ionosphere). An ionosphere cannot account for the high amplitude, however additional modeling should help us better constrain the influence of the plasma [4].

Here we present results for extended ranges of A values, focusing on $0.9 < A < 1.0$. At low values for A, near saturation salt levels permit an ice shell of ~25 km. Interestingly, solution with low A and thin ice shells permit near freshwater oceans (< 5 g salt per kg H_2O).

Finally, we consider sulfuric acid as a possible means for enhancing conductivity. H_2SO_4 has been proposed as an important surface compound [5] and comparisons with NIMS data indicate that solutions with [1:1:1] $MgSO_4$:Na_2SO_4:H_2SO_4 provide the best fit to the hydrate features in the spectra. Results show that H_2SO_4 can increase conductivity on small scales for oceanic engineering purposes [8] and on its own H_2SO_4 in solution is slightly more conductive than ocean salts [9]. Sulfuric acid cannot, however, significantly modify our results for the high-amplitude magnetometer results, *i.e.* an ice shell on the order of a few kilometers thickness is still requied to explain the observations.

References: [1] Hand K. P. and Chyba C. F. (2007) *Icarus,* doi:10.1016/j.icarus.2007.02.002 [2] Zimmer C. et al. (2000) *Icarus., 147,* 329-347. [3] Schilling N. (2004) *J. Geophys. Res,* 109. [4] Schilling N., pers. comm. [5] Carlson, R.W. (1999) *Science*, 286, 97-99. [6] Dalton J. B. et al. (2005) *Icarus., 177,* 472-490. [7] Orlando T. et al. (2005) *Icarus., 177,* 528-533. [8] Lin T. F. et al. (1991) *IEEE*:0-7803-0202-8, 1629-1631. [9] Handbook of Physics & Chemistry, (1978) CRC Press, Inc.