ICE RHEOLOGY AND THE EVOLUTION OF ICY SATELLITES: TEN PROPOSITIONS. William B. McKinnon, Department of Earth and Planetary Sciences and the McDonnell Center for the Space Sciences, Washington University, Saint Louis, MO 63130 (mckinnon@wustl.edu).

Introduction: I propose to defend the following:

1) Realistic and accurate rheology is essential for understanding icy satellites and Kuiper belt objects; agreement between different experimental groups should be sought.

2) Robust numerical methods are necessary for reliable results, with the caveat that models are only as good as the physics behind them.

3) More specifically, the semibrittle regime (poorly enough understood in rock) needs exploration for water ice. This is an important input for localization models, and Beeman's rule could use a revisit as well.

4) Measurement of diffusion creep in ice would be more than just reassuring, it would allow its interplay with grain-boundary sliding to be better understood.

5) Measurement of activation volumes (V^*) in low-stress creep regimes is important.

6) The low-stress (grain-size-sensitive) creep rate for ice III is very important, as it likely an important control on the evolution of larger icy satellites, such as Ganymede.

7) Grain size evolution during creep is no doubt important as well, and could be studied experimentally. Rheologies may be different at small and large strains.

8) Multiple stress and strain systems may couple during creep in couple ways, if at least one of the rheologies is non-Newtonian. The effects may be especially important for tidally flexed satellites, such as Europa and Enceladus.

9) Porosity evolution is important for midsize icy satellites, KBOs, and ice-rich regoliths, but is poorly understood and often neglected. Benchmarking against experiments would be especially valuable.

10) Although strictly speaking not part of this workshop, we should keep our eyes on the properties of "exotic" ices and organic materials, as they are likely important bulk constituents of distant icy satellites and KBOs.