SEISMOBALL: A SMALL EUROPA ORBITER DROP-OFF PROBE FOR EARLY EXPLORATION OF THE EUROPAN SURFACE. L. Tamppari, W. Zimmerman[1], and J. Green, [1]Jet Propulsion Laboratory, 4800 Oak Grove Drive, Mail Stop 198-219, Monrovia CA 91109, USA.

Recent magnetometry data received from Galileo indicate that the most likely explanation for the magnetic signature there is indeed a a global conducting layer below the surface (Kivelson, 2000). This conducting layer is well-matched by a salty, mineral rich strata beneath the Europan ice crust or a salt water ocean. Galileo imaging results show a variety of terrain types thought to contain young material; for example, lineaments, chaotic terrain, and eruption features. Additionally, Galileo images have shown indications of areas of up-welling where subsurface material periodically gets pushed to the surface due to the forces of fracturing, butting, and refreezing of the ice sheet. While Europa Orbiter will provide close-flyby high resolution images, as well as magnetometry, spectroscopy and other remote sensing data of the surface, it will not be able to provide essential engineering data like surface hardness and surface ice structure needed to support eventual landed missions. Additionally, ice chemical composition at microscopic scales can only be studied in detail through in-situ instrumentation.

Seismoball is a small probe designed to be injected into a surface intersect orbit around Europa. Using small reverser thrusters, the probe will be capable of nulling the high horizontal injection velocity as it approaches the 2km surface injection altitude, thus allowing it to fall to the surface at an impact velocity of <100m/sec (much less than the DS-2 impact velocities). The external breakaway thruster structure and crushable exterior shell absorb the impact energy while allowing the science instrument suite to remain intact. JPL has already started analyzing the entry dynamics and designing/building a small, low mass probe which will withstand the impact g-forces and fit as a “carry-on” onboard the Europa Orbiter. The probe will carry a suite of 5-6 micro-instruments for imaging the surface (both microscopic and far-field), surface and shallow subsurface ice temperatures, surface hardness, crustal dynamics and periodicity, and compositional chemistry. If selected, this flight development activity will provide a unique science opportunity and adjunct to the primary Orbiter science mission. The final flight system will be designed to accommodate orbiter mass, volume, and power interface constraints, as well as entry dynamics, g-load mitigation, and arbitrary landing orientation.