Landing on Europa. William. B Whiddon, Andrew Christensen, Peter Landecker, Justin M. Reuter, and Luke Sollitt, *Northrop Grumman Corporation, One Space Park Drive, Redondo Beach, CA 90277*

The Jupiter Icy Moons Orbiter (JIMO) is a mission dedicated to orbiting the three icy moons of Jupiter. The JIMO Science Definition Team (SDT) has identified that landing on Europa is of highest scientific priority. It was recommended that 25% of the payload mass be dedicated to one or more landers. There are several classes of landers available for Europa, including impactors, penetrators, and soft landers. This paper will look at potential science and accommodation requirements of various lander classes,

Stationary Landers: There are several options available for a stationary lander depending on the highest priority science. It is expected that any lander will desire to get below the radiation blasted surface to the pristine environment below. Thus it is highly desirable that any lander will need the capability to drill or melt into the surface.

Rovers: A rover would soft land on the surface of Europa and journey about the surface taking measurements at different points on the surface. This would enable several point sources for validation of findings, and potentially several different surfaces to explore.

Penetrators: A penetrator will be impacted into the surface with the design to get below the icy surface. Since, this will be a high g landing any instruments involved would have to be quite simplistic. This is the lowest risk option for landing and science as seismometry, and astrobiology would be possible. Additionally, due to the lower mass required, several penetrators could be deployed, possibly into other moons, or to create a network of instruments on Europa.

Subsurface Landers: One of the greatest science desires at Europa is to break through the ice to see what is below. There are three ways one could accomplish this, cracking, drilling or melting. However due to the potential of five mile or more thick ice, any drilling or cracking would require orders of magnitude more power and energy than is available. Thus at this time the most likely option for getting below the ice would be to melt through. If an ocean is found as expected a submersible could be deployed from the probe. This option will require a large technology investment but would yield revolutionary results.