

**SERVICING LARGE SPACE TELESCOPES WITH THE DEEP SPACE GATEWAY.** B.M. Peterson<sup>1</sup> L.D. Feinberg<sup>2</sup>, M.A. Greenhouse<sup>2</sup>, J.M. Grunsfeld<sup>2</sup>, R.S. Polidan<sup>3</sup>, N. Siegler<sup>4</sup>, and H.A. Thronson<sup>2</sup>. <sup>1</sup>Space Telescope Science Institute, 3700 San Martin Drive, Baltimore, MD 21218 and Department of Astronomy, The Ohio State University, 140 West 18<sup>th</sup> Avenue, Columbus, OH 43210, [Peterson.12@osu.edu](mailto:Peterson.12@osu.edu), <sup>2</sup>NASA Goddard Space Flight Center, Greenbelt, MD USA 20771, <sup>3</sup>Polidan Science Systems & Technologies, LLC, 3884 NW Orchard Ct, Suite 100, Terrebonne, OR 97760, <sup>4</sup>NASA Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena CA 91109

Future major missions in astrophysics, including the James Webb Space Telescope (JWST) and the Wide Field Infrared Space Telescope (WFIRST), are designed to operate at Sun-Earth L2, which affords a number of significant advantages relative to low-Earth orbit. Future generations of major missions will probably also operate at SE-L2. However, to fully realize the potential of future major telescopes and amortize their cost, these observatories will require long operational lifetimes, which means that they will need to be serviceable. This was the case with the Hubble Space Telescope (HST), which demonstrated the immense scientific value by using astronauts for regular upgrading of instruments and spacecraft systems.

Servicing at SE-L2 seems unlikely, given the multiple challenges to operate with humans at that distance. However, the energy requirements to move from SE-L2 back to cis-lunar space for servicing are comparatively modest. Observatories at Earth-Moon L1 or L2 would be much easier to service, either robotically, by humans, or likely by some combination of the two. Such a capability would be of significant and easily justified scientific value, just as was the case with HST and its multiple servicing missions.

NASA's human space flight program has identified the Deep Space Gateway (DSG) as its next major facility beyond the immediate vicinity of the Earth. The early design phase of the DSG affords an opportunity to incorporate features that will enable servicing in cis-lunar space, both with astronauts and their telerobotics partners. Perhaps eventually these capabilities may be extended to enable in-space assembly of telescopes much larger than those currently under study.