Ad Astra Rocket Company
http://www.adastrarocket.com/home
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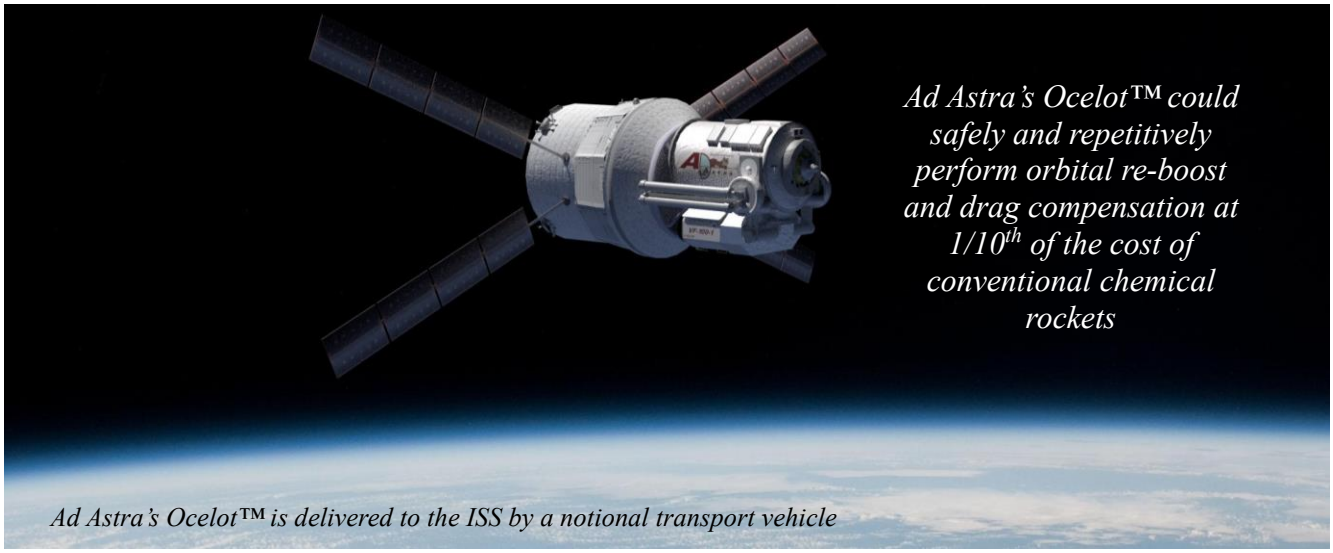
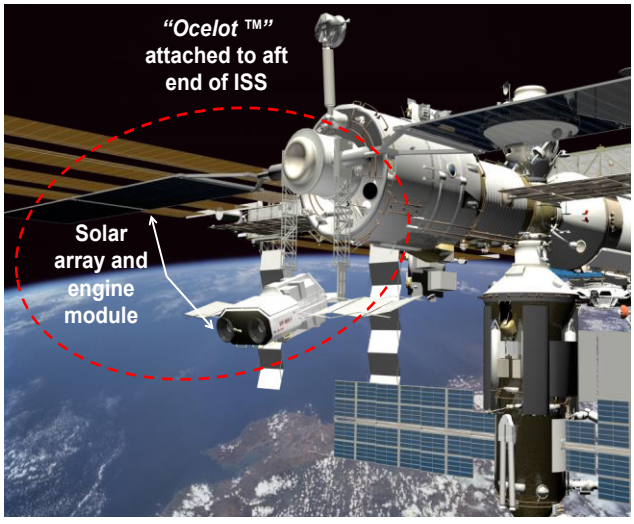
Ad Astra's VASIMR® "*Ocelot*™" Orbital Electric Power and Propulsion Module

Ad Astra Rocket Co (Ad Astra), presents the advantages of the VASIMR® electric propulsion engine as a re-boost and/or drag compensation method for space stations and other large space platforms in low Earth orbit (LEO). For example, while in orbit, the International Space Station (ISS) requires occasional re-boosts to maintain a preferable altitude or to avoid hazardous space debris. The ISS experiences orbital decay and loses altitude from residual atmospheric drag. Additionally, orbital debris or "space junk" generated from inactive satellites, spent upper stages and fragments from spacecraft collisions, creates a



Ad Astra's Ocelot™ is delivered to the ISS by a notional transport vehicle

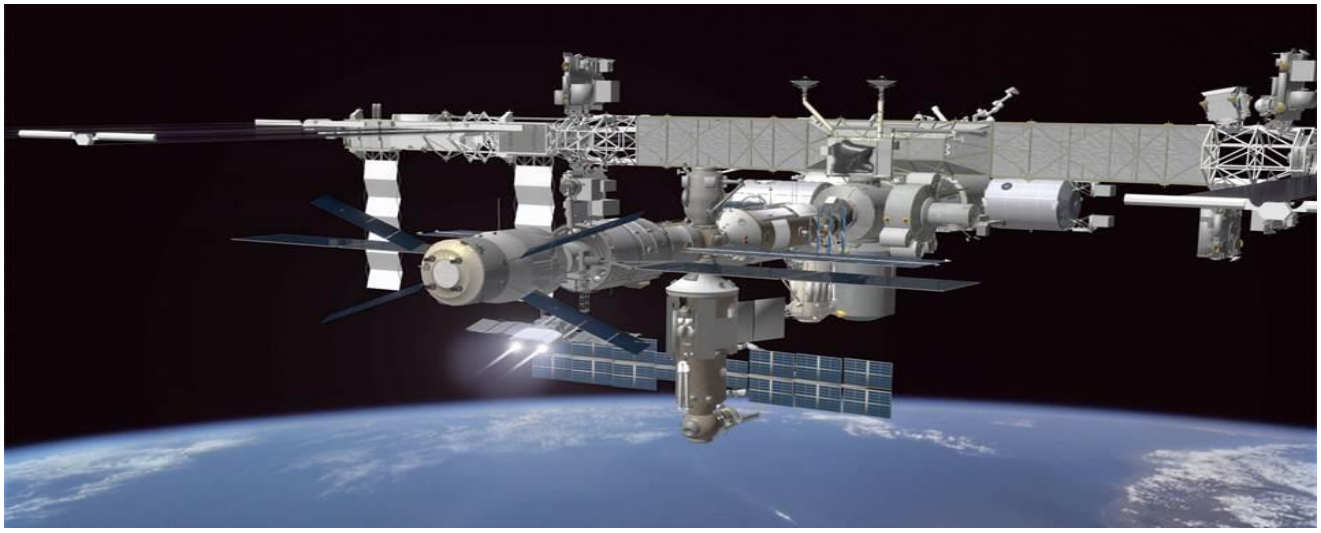


severe threat to the ISS. Tens of thousands of pieces of tracked debris are traveling at up to 17,500 mph around the Earth[1]. At those speeds, regardless of size, any of them presents a severe hazard to the ISS and other orbital outposts. Debris growth due to further collision-induced fragmentation exacerbates the threat.

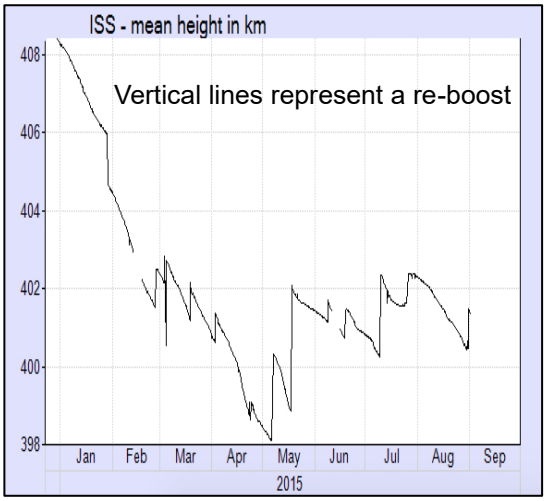
Ad Astra's *Ocelot*™ solar electric power and propulsion module features a 100 kW-class VF-100 VASIMR® engine with independent power generation and standard docking capabilities. The module could be delivered to the station by a commercial transport vehicle. Once docked, *Ocelot*™ can trim its thrust vector to compensate for center of gravity offsets on the customer's station, insuring a linear, non-

[1] Reference: https://orbitaldebris.jsc.nasa.gov/faq/#

rotational maneuver. *Ocelot*™ has an open "extension collar" architecture with standard docking interfaces at both ends, enabling full docking to other visiting spacecraft and unimpeded pressurized tunnel access through the module to the rest of the customer's station.



The VASIMR® engine has completed more than 10,000 successful high-power firings in Ad Astra's 150m^3 Houston vacuum chamber with excellent performance (70% thruster efficiency, 4500-5000 s specific impulse, 6 N thrust at 200 kW with argon). Further long-duration tests of the engine are ongoing. The VASIMR® engine has no electrodes, a desirable feature for reliable and enduring space propulsion systems and uses less expensive propellants such as argon ($5/kg) or krypton ($300/kg) as compared with conventional Hall and ion thrusters which operate with Xenon ($1000/kg). The *Ocelot*™ would require about 100 gal (500kg) of liquid argon to compensate drag on a large station such as ISS for a year with more than 50% safety margin.



Ad Astra's *Ocelot*™ autonomous power and propulsion module provides a reliable and cost-effective option to meet foreseeable orbital drag compensation and re boost needs in LEO

Houston (281) 526-0500
Costa Rica +506 2666 9272