

# Proposal Summary: Ampaire Inc

**Proposal Information**

Topic Title: **Electric and Hybrid Electric Systems for Unmanned Aerial Vehicle (UAV) and Aircraft in the 1500 to 5000 lbs size class**

Proposal Title: **High Efficiency Powertrain for Hybrid Aircraft (HEPHA)**

**Small Business Concern**

Firm: **Ampaire Inc**

Address: **3507 Jack Northrop Ave, Hawthorne, CA 90250**

Phone: **(617) 335-8162**

**Principal Investigator:**

Name: **Dr. Edward Lovelace**

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Address: **3507 Jack Northrop Ave, Hawthorne, CA 90250**

Phone: **(617) 335-8162**

**Business Official:**

Name: **Dr. Edward Lovelace**

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**Summary Details:**

Estimated Technology Readiness Level (TRL) :

**Begin: 4**

**End: 4**

Technical Abstract (Limit 2000 characters, approximately 200 words):

Ampaire proposes to fabricate, integrate, and test a novel hybrid electric powertrain on Ampaire's electrified propulsion flying testbed. The AMP Drive model AMP-H270 consists of a modern JetA/SAF engine plus electric machine in a hybrid electric configuration to enable flexible implementation in a number of aircraft applications. The JetA/SAF engine is a high efficiency compression ignition (CI) engine from subcontractor DeltaHawk (Racine, WI) that will be coupled to Ampaire's custom electric boost and regeneration system to provide several key features: enabling multi-mode hybrid electric operation, and significant reduction in fuel use. The AMP Drive hybrid unit will replace a conventional IO-550 avgas engine to power the tail propeller in Ampaire's hybrid Skymaster 337, and retain the all electric nose propeller drive. The aircraft will be converted to be supplied by JetA and SAF and retain Ampaire's high voltage lithium battery. Ground and flight testing will verify the performance and utility of the hybrid powertrain technology for a range of potential future applications with NASA, DoD, and commercially.

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**Hybrid electric manned and unmanned aircraft applications including the NASA SUSAN roadmap.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**DoD unmanned and manned cargo and passenger applications and commercial applications in Ampaire's roadmap with distributed electric propulsion.**

Duration: **12 Months**

## Proposal Summary: Canopy Aerospace Inc.

### Proposal Information

Topic Title: **Enabling technologies for the development of a robust Low-Earth Orbit Economy**  
Proposal Title: **Reusable Heatshields Additive Manufacturing (RHAM)**

### Small Business Concern

Firm: **Canopy Aerospace**  
Address: **8101 Midway Drive Suite A Littleton Colorado 80125**  
Phone: **(301) 602-0456**

### Principal Investigator:

Name: **John Howard**  
E-mail: **john@canopyaerospace.com**  
Address: **8101 Midway Drive Suite A Littleton Colorado 80125**

Phone: (301) 602-0456

### Business Official:

Name: **Will Dickson**  
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Address: **8101 Midway Drive Suite A Littleton Colorado 80125**  
Phone: **(469) 585-4838**

### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 3**

**End: 6**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**NASA has a stated strategic goal to promote a commercial presence in LEO, as formalized in their Commercial LEO Destinations (CLDs) program. Given the emphasis on transitioning to CLDs, highly available thermal protection system (TPS) manufacturing has become an even more critical capability. Unfortunately, reusable TPS materials such Alumina-Enhanced Thermal Barrier (AETB or “Shuttle Tile”) developed for the Shuttle program are still the state-of-the-art option despite high costs, long lead times, and incredible amounts of manual labor (~2 tiles/week per technician).**

**To fill this gap, Canopy Aerospace Inc. (Canopy) proposes to develop the Reusable Heatshields Additive Manufacturing (RHAM) platform, that allows rapid production of reusable TPS tiles with digitally defined tailorability. The proposed development of RHAM will leverage Canopy’s experience in advanced manufacturing of thermal protection system materials. RHAM advantages are made possible by the unique Canopy innovations that include: 1) New TPS material formulations that open up the space of usable precursors and manufacturing routes; 2) Unique implementation of a state-of-art binder jetting process to produce highly insulative ceramics; and 3) New heat treatment processes for forming mechanically resilient porous ceramics.**

**Canopy’s Phase II RHAM project will mature the manufacturing approach, laying the foundation for scalable production of high-performance reusable TPS materials. Phase II will culminate in simulated reentry ground testing at the NASA Langley HyMETS facility, enabling an accurate performance comparison between RHAM and legacy TPS materials. The HyMETS testing will secure readiness level (TRL) 6 for the RHAM technology and indicate readiness for potential transition to both NASA and commercial space companies.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

The proposed RHAM addresses the major NASA strategic goal of enabling the commercial LEO economy. The RHAM production system will reduce or fully remove the need for the costly machining of reusable TPS materials and promote the commercial LEO economy, directly in support of NASA's CLD strategic vision. This will support many of NASA's missions that now utilize spacecraft manufactured by commercial companies, providing faster development and manufacturing which will lead to lower overall costs for the administration.

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

The RHAM platform has attracted serious interest from commercial space companies and has significant potential for near-term insertion into commercial missions. This spans across a variety of space verticals that include reusable rockets, downmass logistics, orbital spacecraft, and hypersonics. Some specific applications include Sierra's Dreamchaser, SpaceX's Starship, and NASA's Orion capsule contracted to Lockheed. Furthermore, there is strong alignment with military defense systems in development today that can utilize reusable TPS.

Duration: 16

## Proposal Summary: Cecilia Energy

### Proposal Information

Topic Title: Point-of-use Recycling for Optimized Space-Age Logistics  
Proposal Title: Catalytic Conversion of Waste Plastic to Hydrogen and Performance Carbon

### Small Business Concern

Firm: Cecilia Energy, inc.  
Address: 211 Warren St #516 Newark New Jersey 07103  
Phone: (973) 348-6736

### Principal Investigator:

Name: Kathryn Carpenter  
E-mail: kathryn@ceciliaenergy.com  
Address: 211 Warren St #516 Newark New Jersey 0710  
Phone: (973) 348-6736

### Business Official:

Name: **Kathryn Carpenter**  
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Address: **211 Warren St #516 Newark New Jersey 0710**  
Phone: **(973) 348-6736**

### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 4**

**End: 6**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**Our technology is microwave-assisted thermocatalytic decomposition of mixed waste plastic. In Phase I, we proved our lab-scale system and demonstrated high efficiency conversion of plastic to hydrogen gas and solid carbon with high yields. In Phase II we propose to scale-up our system with data to be used in the design and modeling of our first commercial pilot-scale reactor system. The ultimate goal of this Phase II work is to compile a full engineering package for our first pilot-scale reactor system to be deployed on customer sites for treatment of their waste plastic with concomitant generation of hydrogen and performance carbon.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**Processing of mission trash to recover hydrogen gas for fuel or atmosphere regeneration. Production of performance carbon for Low Earth Orbit manufacturing. Support of In Situ Resource Utilization goals.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**Beneficial reuse of waste plastic. Hydrogen fuel production. Production of performance carbon for semiconductors, solar power generation, energy storage, water treatment, composite materials, and other uses.**

Duration: **18**

## Proposal Summary: Crystal Sonic, Inc.

### Proposal Information

Topic Title: **Low-Cost Photovoltaic Arrays for Space**  
Proposal Title: **Reducing Cost of Space Photovoltaics via Sound-Assisted Substrate Reuse**

### Small Business Concern

Firm: **Crystal Sonic, Inc.**  
Address: **311 W. Virginia Ave, Phoenix, AZ 85003**  
Phone: **(617) 515-5031**

### Principal Investigator:

Name: **Dr. Arno Merkle**  
E-mail: **arno@xtalsonic.com**  
Address: **311 W. Virginia Ave, Phoenix, AZ 85003**  
Phone: **(617) 515-5031**

### Business Official:

Name: **Dr. Arno Merkle**  
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Address: **311 W. Virginia Ave, Phoenix, AZ 85003**  
Phone: **(617) 515-5031**

### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 5**

**End: 6**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**High substrate costs limit the proliferation of many next-generation semiconductor device applications, such as high-efficiency GaAs-based photovoltaics for space applications, often consuming 50% of the cell manufacturing cost. We propose a novel substrate re-use technology, known as Sonic Lift-off (SLO), to drive down the costs of space photovoltaic manufacturing. SLO utilizes sound to separate thin devices from their host substrate, leaving the remaining substrate available for multiple reuses. A key milestone in the march towards commercialization is the ability to demonstrate the technology at industrially relevant wafer diameters and on real-world functioning devices. In this proposal we plan to build upon our successes to date in Phase I, moving from 4" wafer SLO feasibility to functioning 4" device feasibility and optimization. For this effort, a new SLO alpha tool ('Gen2') will be built and operated in order to demonstrate overall performance.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**Substrate re-use of GaAs photovoltaic devices for space.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**A wide range of emerging next-generation semiconductor device technologies based on 'wide bandgap' semiconductors, including SiC, GaN, AlN and others. Applications include: power electronics for electric vehicles, electric motors, photovoltaic inverters and more; RF communication devices; UVC-LED devices for disinfection; Laser diodes and sensor applications and more.**

Duration: **15**

## **Proposal Summary: H3X Technologies Inc.**

### **Proposal Information**

Topic Title: **Electric and Hybrid Electric Systems for Unmanned Aerial Vehicle (UAV) and Aircraft in the 1500 to 5000 lbs size class**

Proposal Title: **System Level Testing of HPDM-30 – A 10 kW/kg Integrated Motor Drive for UAV and Aircraft Electric Propulsion**

### **Small Business Concern**

Firm: **H3X Technologies Inc.**  
Address: **410 S Arthur Ave Louisville Colorado 80027**  
Phone: **(952) 913-7232**

### **Principal Investigator:**

Name: **Mr. Max Liben**  
E-mail: **max@h3x.tech**  
Address: **410 S Arthur Ave Louisville Colorado 80027**  
Phone: **(917) 608-1164**

### **Business Official:**

Name: **Mr. Jason Sylvestre**  
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Address: **410 S Arthur Ave Louisville Colorado 80027**

Phone: (952) 913-7232

### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 5**

**End: 8**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**The HPDM-30 is a ultra-high power density 30kW integrated motor drive (IMD) for Unmanned Aerial Vehicle (UAV) and Small Aircraft Electric Propulsion. It combines the motor and inverter into a single unit and utilizes the same advanced core technology developed for H3X's flagship product, the HPDM-250. H3X is targeting a combined motor/inverter efficiency of 93% and a continuous specific power of 10 kW/kg, making it 3X more power dense than anything else commercially available. The goal of this Phase II proposal is to manufacture a full-scale HPDM-30 prototype in order to perform functional testing, performance characterization, and baseline environmental testing of the full IMD system.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**25% SUSAN Flight Research Vehicle (SARV), X-57**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**Unmanned Aerial Vehicles (UAVs), Underwater Vehicles (AUVs and ROVs), cargo drones, Auxiliary Power Units (APUs) and onboard power generators, aerospace actuators, electric boats, light electric aircraft, electric motorcycles, and specialized industrial applications.**

Duration: 10

## Proposal Summary: Outpost Technologies Corporation

### Proposal Information

Topic Title: **Enabling technologies for the development of a robust Low-Earth Orbit Economy**  
Proposal Title: **Outpost Cargo Ferry: A Rapid Cargo Downmass Vehicle**

### Small Business Concern

Firm: **Outpost Technologies Corporation**  
Address: **1601 Colorado Ave, Santa Monica, CA 90404**



Phone: (714) 876-7102

#### Principal Investigator:

Name: Vanessa Kuroda  
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Phone: (650) 336-8659

#### Business Official:

Name: Paul Tomko  
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Address: 1601 Colorado Ave, Santa Monica, CA 90404  
Phone: (310) 906-0070

#### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 3**

**End: 6**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**Today's cost to go to ISS and back represents a high barrier to entry for the Low Earth Orbit (LEO) economy. Commercial LEO Destinations (CLDs) as well as the International Space Station (ISS) are in need of the ability to have rapid cargo downmass capabilities in order to iterate quicker and accelerate their business. In this effort, Outpost Technologies Corporation (Outpost) will address this need and develop the Cargo Ferry which is a rapid cargo downmass vehicle that will be used for both returning cargo from commercial space stations as well as the ISS. Beneficial applications of our innovation include Earth return of non-human cargo, scientific samples, small payloads, and important research. Driving down the cost of Earth return would open the door to more throughput on the ISS National Lab while also enabling the broader Low-Earth orbit economy to flourish.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**The ISS is at stowage capacity, requiring tough decisions by the ISS program office each time a new payload is manifested. By downmassing stowed cargo, more room is made for new science and R&D on station. On-demand availability of the Cargo Ferry as a backup trunk payload ensures there will be no empty trunk space on future missions.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**Dedicated payload and cargo return is one of the few remaining items left unsolved for CLD business models to close. Companies and institutions looking to iterate quickly in the space environment need fast Earth return. A human rated version of the Cargo Ferry may one day provide a solution for CLDs necessitating an emergency Earth return solution.**

Duration: **24**

## Proposal Summary: re:3D, Inc.

### Proposal Information

Topic Title: **Point-of-use Recycling for Optimized Space-Age Logistics**  
Proposal Title: **On-Orbit Additive Manufacturing Using Recycled Waste**

### Small Business Concern

Firm: **re:3D, Inc.**  
Address: **1100 Hercules Ave Ste 220, Houston, TX 77058**  
Phone: **(512) 730-0033 EXT 22**

### Principal Investigator:

Name: **Patrick Ferrell**  
E-mail: **patrick@re3d.org**  
Address: **1100 Hercules Ave Ste 220, Houston, TX 77058**  
Phone: **(720) 987-8500**

### Business Official:

Name: **Samantha Snabes**  
E-mail: **samantha@re3d.org**  
Address: **1100 Hercules Ave Ste 220, Houston, TX 77058**  
Phone: **(832) 746-0922**

### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 2**

**End: 4**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**re:3D Inc. proposes to build a functional benchtop demonstration unit of an integrated waste-to-print recycling system based on a granulation mechanism and 3D printer capable of turning thermoplastic waste generated from logistics foam available from in-space applications into functional and useful objects through the use of material extrusion additive manufacturing (AM). This will be a low size, weight and power (SWaP) engineering prototype based on re:3D's commercial Gigabot X (GBX) technology and new innovative methods to shred the bulk foam and transport the resulting loose granulate in a contained system. The design will address the unique challenges of operating in microgravity with limited space and power resources.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**NASA has specifically identified packaging materials as an upmass of significant logistical overhead, and its reuse must be considered - particularly for lunar and deep space missions which have limited opportunities for resupply and waste disposal.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**A waste-to-print system integrated in a small form factor would be of use to US Navy submarines on active deployment which can be away from supply and repair opportunities for months at a time. This development might also be of interest to individuals and families looking for a personal recycling system.**

Duration: **24**

## Proposal Summary: Solestial, Inc.

### Proposal Information

Topic Title:	<b>Low-Cost Photovoltaic Arrays for Space</b>
Proposal Title:	<b>Next Generation Silicon Based Solar Arrays for Space Stations and Other Permanent Space Infrastructure</b>

### Small Business Concern

Firm:	<b>Solestial, Inc.</b>
Address:	<b>7700 South River Parkway, Tempe, AZ 85284</b>

Phone: (520) 838-9404

#### Principal Investigator:

Name: Dr. Stanislau Herasimenka  
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Address: 7700 South River Parkway, Tempe, AZ 85284  
Phone: (520) 838-9404

#### Business Official:

Name: Luke Gordon  
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Address: 7700 South River Parkway, Tempe, AZ 85284  
Phone: (419) 549-0872

#### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 4**

**End: 6**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**Solestial, Inc. (formerly Regher Solar) in collaboration with Opterus Research and Development, Inc. (Opterus) propose this SBIR Ignite Phase 2 project to continue development of a novel photovoltaic solar array technology for large-scale spacecraft and planetary surface infrastructure that can overcome size, cost and weight limitations of the existing solar array technologies, achieve >50 kWe scale, 200 W/kg specific power and 50 kW/m<sup>3</sup> stowed volume efficiency while simultaneously having \$40/W cost and >1,000 MW manufacturing potential.**

**The proposed innovation is based on the integration of the the next generation radiation hard and ultra-light silicon solar blankets developed by Solestial with R-ROMA deployment system developed by Opterus. The proposed Phase 2 project will focus on increasing the readiness of the blanket framing system - the key technology required to integrate thin silicon blankets with R-ROMA deployment system. A 500W framed blankets will be produced and tested to achieve TRL 6 followed by flying on a commercial spacecraft to achieve TRL 7. The proposed Phase 2 project will also develop a model and engineering drawings for a 15 kW solar array. Solestial will be offering a 15 kW array to commercial customers and will be looking to build a flight model using follow on funding after 2025. Finally, Solestial will be looking to build a full size 50 kWe solar array and fly it with commercial space station.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**The proposed technology will meet the NASA goal of bringing to TRL 6 by 2030 50 kW-scale photovoltaic solar arrays, deployed vertically or horizontally, providing power at >200 V at 200 W/kg BOL and exhibiting no more than 10% degradation over ten years in the Lunar polar environment. Large scale arrays can also be used to power future science missions using solar electric propulsion as well as non-nuclear deep space missions.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**50 kW-scale solar arrays are needed for commercial space stations and solar electric propulsion tugs. In addition to meeting 200 W/kg and 50 kW/m<sup>2</sup> goals commercial customers are looking for at least 10X cost reduction compared to the state of practice. The proposed technology can deliver \$40/W manufacturing cost making it the most cost effective solution on the market.**

Duration: **18**

## Proposal Summary: StormImpact Inc.

### Proposal Information

Topic Title: **Technologies Using NASA Data to Foster Climate Resilience**  
Proposal Title: **Real-Time Vegetation Risk Integration in Utility Damage and Outage Modelling to Improve Resilience of the Utility Grid to Extreme Weather**

### Small Business Concern

Firm: **StormImpact Inc.**  
Address: **7510 Heatherwood Lane, Dublin, OH 43017**  
Phone: **(614) 935-2835**

### Principal Investigator:

Name: **Dr. Brent McRoberts**  
E-mail: **brent@stormimpact.net**  
Address: **7510 Heatherwood Lane, Dublin, OH 43017**  
Phone: **(317) 847-2003**

### Business Official:

Name: **Mr. Jamie McKee**  
E-mail: **jamie@stormimpact.net**  
Address: **7510 Heatherwood Lane, Dublin, OH 43017**  
Phone: **(614) 935-2835**

### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 4**

**End: 7**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**The reliability of the electrical grid is a matter of both national security and quality of life. The frequency of weather-related outages are expected to increase due to climate change. Electrical utilities in the United States spend over \$70 billion annually on storm restoration. The number of outages and cost can be significantly decreased with better information on vegetation risk near critical infrastructure and assessing key vulnerabilities. StormImpact Inc. will use NASA Earth Observation data to build machine learning (ML) vegetation growth and risk models that will allow electrical utilities to proactively prepare for storms and improve their infrastructure resilience. We anticipate cost savings of 10% to 20% for utility customers due to improved vegetation management efficiency. We will leverage these data to provide enhanced StormImpact prediction models and a new national power outage forecast model. These innovations will greatly improve storm preparedness, optimize vegetation management, and improve the resilience of the electrical grid in a changing climate.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**This proposal is responsive to the solicitation "Technologies Using NASA Data to Foster Climate Resilience". The vegetation risk and power outage prediction innovations proposed here are relevant to NASA's Applied Sciences Program because they can provide insights into the impacts of weather-related disasters, wildfire risks, and inform long-term planning to improve the resilience of U.S. infrastructure in a changing climate.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**These vegetation management products will address a critical market gap by providing electrical utilities of all sizes with accurate and cost-effective guidance to identify vegetation issues before they cause outages. In addition, the power outage models can be used by Federal agencies, emergency management organizations, NGOs and the private sector to assess power outage risk and optimize pre-storm preparations.**

Duration: **24**

# Proposal Summary: Terrafuse, Inc.

## Proposal Information

Topic Title: **Technologies Using NASA Data to Foster Climate Resilience**  
Proposal Title: **Wildfire Mitigation through Explainable Risk Predictions**

## Small Business Concern

Firm: **Terrafuse, Inc.**  
Address: **2261 Market Street, #5161 San Francisco California 941146**  
Phone: **(707) 570-5450**

## Principal Investigator:

Name: **Mr. Stephen Marshall**  
E-mail: **steve@terrafuse.ai**  
Address: **8 Putnam Ave, Chelmsford, MA 11824**  
Phone: **(617) 797-2172**

## Business Official:

Name: **Hunter Connell**  
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Address: **2261 Market Street, #5161 San Francisco California 94114**  
Phone: **(707) 570-5450**

## Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 4**

**End: 6**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**The proposed innovation is built upon and improve the wildfire explanation and mitigation prediction capabilities developed in Phase I of this contract. Mitigations are actions like clearing defensible space**

around buildings or installing fire-resistant vents. Explanations describe the relative importance of each input to the wildfire prediction model, or feature, to the overall wildfire risk; we refer to these explanations as feature contributions. Feature contributions will be used to create localized mitigation guidance that will support more optimal resource allocation and better decision-making during pre-wildfire planning for the insurance industry and the public.

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

This innovation is a show case for how NASA's space-based observing programs make a difference on Earth. It makes extensive use of NASA data sets, such as the Shuttle Radar Topography Mission (SRTM), the Moderate Resolution Imaging Spectroradiometer (MODIS), the Shuttle Radar Topography Mission (SRTM), the NASA Global Fire Atlas, and Canopy and Anderson Fuel data sets from Land fire, developed using NASA Landsat data.

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

This innovation is targeted at the insurance industry: society's first line of defense for coping with wildfire damage. The insurance industry does not know how community and property-level mitigation affects wildfire risk. This innovation will provide location-specific guidance on which mitigating actions will be most effective.

Duration: 18

## Proposal Summary: Trans Astronautica Corporation (TransAstra)

### Proposal Information

Topic Title: **Commercial Development of Active Debris Remediation (ADR) Services**  
Proposal Title: **Apis™ Capture Bags for Collection of Large Orbital Debris: Ground Test Bed Demonstrations and Payload Commercialization**

### Small Business Concern

Firm: **Trans Astronautica Corporation**  
Address: **11404 Camaloa Ave Sylmar California 91342**  
Phone: **(818) 422-0514**

### Principal Investigator:

Name: **Dr. Joel Sercel**  
E-mail: **joel@transastra.com**



Address: 13539 Desmond St Pacoima California 91331

Phone: (818) 422-0514

#### Business Official:

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#### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 4**

**End: 6**

Technical Abstract (Limit 2000 characters, approximately 200 words):

**The increasing accumulation of orbital debris has become a critical challenge for space operations and economic development of space, posing a significant threat to the safety and sustainability of the space environment. To address this issue, TransAstra proposes to advance the design, testing, and commercialization of its cutting-edge Apis Capture Bag technology. The Apis Capture Bag is derived from technology originally envisioned for the Asteroid Redirect Mission. It utilizes inflatable booms to deploy a rip-stop bag around the target debris. The bag fully seals before making contact with the target and then retracts to secure the debris safely. This scalable, adaptable, and efficient debris capture, and containment system is uniquely designed to tackle a wide range of debris removal missions, from small satellites to large spent rocket bodies. The proposed program encompasses five key Task Areas, focused on addressing the specific technical objectives of rotational dynamics management, capture bag scalability, multi-target confinement, architectural modeling, and space-qualified payload maturation.**

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**Primary applications are orbital debris removal, supporting mission safety and preserving the space environment for future exploration endeavors. Additional NASA applications would be servicing, repair, or refueling missions for current NASA spacecraft, enhancing operational capabilities and extending mission lifetimes.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**The Apis Capture Bag provides commercial satellite operators with a robust debris removal solution, ensuring compliance with their disposal plans. Furthermore, the capture bag system can be employed for in-orbit servicing missions, supporting satellite life extension, maintenance, and refueling operations.**

Duration: 18

## Proposal Summary: Turion Space Corp.

### Proposal Information

Topic Title: **Commercial Development of Active Debris Remediation (ADR) Services**  
Proposal Title: **Low-Cost CubeSat for Active Removal of Sizable Space Debris Utilizing a Mothership Architecture**

### Small Business Concern

Firm: **Turion Space Corp.**  
Address: **9272 Jeronimo Rd, Suite 107c, Irvine, CA 92618**  
Phone: **(678) 689-4592**

### Principal Investigator:

Name: **Mr. William Figueiredo**  
E-mail: **bfigueiredo@turionspace.com**  
Address: **9272 Jeronimo Rd, Suite 107c, Irvine, CA 92618**  
Phone: **(951) 236-9442**

### Business Official:

Name: **Mr. Tyler Pierce**  
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Address: **9272 Jeronimo Rd, Suite 107c, Irvine, CA 92618**  
Phone: **(425) 205-7022**

### Summary Details:

Estimated Technology Readiness Level (TRL) :

**Begin: 3**

**End: 6**

Technical Abstract (Limit 2000 characters, approximately 200 words):

Turion Space Corp. proposes developing a CubeSat-based debris remediation strategy, whereby several "Deorbiter" CubeSats are deployed from a carrier spacecraft to remove multiple debris objects from LEO (600-1500km) in a single mission. The system's mothership will be a scaled adaptation of Turion's DROID platform, currently undergoing development for Space Situational Awareness (SSA) and Rendezvous and Proximity Operations (RPO) applications. The DROID mothership will be equipped with a gridded ion thrust to ensure maximum  $\Delta V$ , an RPO computer vision system and CubeSat deployer. The Deorbiters will be designed based on an 12-16U form factor and emphasize commercial-off-the-shelf components with flight heritage to accelerate development timelines, scale production, and lower the Deorbiter unit costs with economies of scale. If a Deorbiter does not have sufficient  $\Delta V$  to deorbit a debris object, multiple can be deployed and used on the same object, enabling the architecture to scale to larger debris, higher energy orbits, and reduced deorbit timeframes. In addition, each Deorbiter will operate independently of the mothership and, if issues arise, can deorbit itself to avoid creating additional debris. The architecture does not require additional hardware on the target object, such as docking adapters or communication systems. In addition, alternative state-of-the-art ADR methods such as throw nets, space-based lasers, the ion-beam shepherd, electrodynamic tethers, and robotic arms have drawbacks due to highly complex system dynamics and increased risk of further debris generation. The proposed mission architecture maximizes commercial utility because the mothership will collect SSA data when not performing the debris removal missions, and the Deorbiter system can be used for multiple commercial applications such as life extension.

Potential NASA Applications (Limit 1500 characters, approximately 150 words):

**The proposed Low-Cost CubeSat for Active Removal of Sizable Debris Utilizing a Mothership Architecture will address critical ADR needs for NASA by deorbiting non-operational US government owned space objects. The proposed employment of the multi-use capabilities of the mothership and Deorbiter CubeSats have the potential to enable ADR to become a viable and sustainable part of the growing space economy, reducing the fiscal burden on NASA for development and deploying this technology.**

Potential Non-NASA Applications (Limit 1500 characters, approximately 150 words):

**The proposed Low-Cost CubeSat for Active Removal of Sizable Debris Utilizing a Mothership Architecture maximizes commercial utility because the mothership will collect SSA data when not performing debris removal missions, and the Deorbiter can be used for multiple applications such as life extension and orbit relocation, eventually ranging beyond LEO to MEO and GEO. However, if Deorbiter CubeSats are not utilizing mothership deployer slots, last-mile orbit delivery for commercial CubeSat customers can be performed.**

Duration: 24