



Cover Page for Proposal  
Submitted to the  
National Aeronautics and  
Space Administration

NASA Proposal Number

TBD on Submit

**NASA PROCEDURE FOR HANDLING PROPOSALS**

This proposal shall be used and disclosed for evaluation purposes only, and a copy of this Government notice shall be applied to any reproduction or abstract thereof. Any authorized restrictive notices that the submitter places on this proposal shall also be strictly complied with. Disclosure of this proposal for any reason outside the Government evaluation purposes shall be made only to the extent authorized by the Government.

**SECTION I - Proposal Information**

Principal Investigator <b>Genaro Carrasco Ozuna</b>	E-mail Address	Phone Number	
Street Address (1)	Street Address (2)		
City	State / Province	Postal Code	Country Code

Proposal Title : **Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program**

Proposed Start Date  
**01 / 13 / 2026**

Proposed End Date  
**01 / 30 / 2027**

Total Budget  
**No budget required**

**SECTION II - Application Information**

NASA Program Announcement Number <b>NNH25ZDA001N-LWS</b>	NASA Program Announcement Title <b>B.3 Living with a Star Science</b>
---	--

For Consideration By NASA Organization (*the soliciting organization, or the organization to which an unsolicited proposal is submitted*)

**NASA , Headquarters , Science Mission Directorate , Heliophysics**

Date Submitted	Submission Method <b>Electronic Submission Only</b>	Grants.gov Application Identifier	Applicant Proposal Identifier <b>NNH25ZDA001N-LWS</b>
Type of Application <b>New</b>	Predecessor Award Number	Other Federal Agencies to Which Proposal Has Been Submitted	
International Participation <b>No</b>	Type of International Participation		

**SECTION III - Submitting Organization Information**

UEI	EFT	CAGE Code	Employer Identification Number (EIN or TIN)	Organization Type
Organization Name (Standard/Legal Name)				Company Division
Organization DBA Name				Division Number
Street Address (1)		Street Address (2)		
City	State / Province		Postal Code	Country Code

**SECTION IV - Proposal Point of Contact Information**

Name <b>Genaro Carrasco Ozuna</b>	Email Address <b>Geozunac3536@gmail.com</b>	Phone Number <b>52-812-5989869</b>
--------------------------------------	--	---------------------------------------

**SECTION V - Certification and Authorization**

**Certification of Compliance with Applicable Executive Orders and U.S. Code**

By submitting the proposal identified in the Cover Sheet/Proposal Summary in response to this Research Announcement, the Authorizing Official of the proposing organization (or the individual proposer if there is no proposing organization) as identified below:

- certifies that the statements made in this proposal are true and complete to the best of their knowledge;
- agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
- confirms compliance with all provisions, rules, and stipulations set forth in this solicitation.

Willful provision of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

Authorized Organizational Representative (AOR) Name	AOR E-mail Address	Phone Number
AOR Signature (Must have AOR's original signature. Do not sign "for" AOR.)		Date
<b>Digitally signed by</b>		

PI Name : <b>Genaro Carrasco Ozuna</b>		NASA Proposal Number <b>TBD on Submit</b>	
Organization Name :			
Proposal Title : <b>Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program</b>			
<b>SECTION VI - Team Members</b>			
Team Member Role <b>PI</b>	Team Member Name <b>Genaro Carrasco Ozuna</b>	Contact Phone	E-mail Address
Organization/Business Relationship		UEI	EFT
International Participation <b>No</b>	U.S. Government Agency	Total Funds Requested <b>0.00</b>	

PI Name : <b>Genaro Carrasco Ozuna</b>	NASA Proposal Number <b>TBD on Submit</b>
Organization Name :	
Proposal Title : <b>Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program</b>	
<b>SECTION VII - Project Summary</b>	
<p><b>This proposal addresses a critical challenge in the Living With a Star (LWS) program: the reliable interpretation and validation of space-weather predictions in the presence of heterogeneous, noisy, and sometimes contradictory solar data and models.</b></p> <p>Rather than developing new solar physics models, this work focuses on a meta-level framework that evaluates the internal coherence, stability, and entropy evolution of existing space-weather prediction pipelines.</p> <p><b>Scientific Motivation</b></p> <p>Solar variability affects technological and biological systems across space and Earth. While current models capture many physical mechanisms, operational challenges persist due to:</p> <ul style="list-style-type: none"> <li><b>inconsistent predictions across models,</b></li> <li><b>false alarms and missed events,</b></li> <li><b>lack of formal veto mechanisms when model confidence is unjustified.</b></li> </ul> <p>These issues represent not a lack of physics, but a lack of coherence-based validation.</p> <p>I propose to develop and test a framework that:</p> <ul style="list-style-type: none"> <li><b>Quantifies coherence metrics across multi-source solar and heliospheric datasets.</b></li> <li><b>Tracks entropy evolution of prediction outputs to identify unstable or misleading alerts.</b></li> <li><b>Implements an entropy-based veto mechanism that prevents low-coherence predictions from propagating into operational decision layers.</b></li> <li><b>Identifies causal precursor windows associated with transitions in solar-terrestrial coupling.</b></li> </ul> <p><b>Relevance to Living With a Star</b></p> <p>This work directly supports LWS objectives by improving:</p> <ul style="list-style-type: none"> <li><b>reliability of space-weather alerts,</b></li> <li><b>interpretability of model disagreements,</b></li> <li><b>operational trust in prediction systems.</b></li> </ul> <p>By focusing on validation and coherence rather than new physics, the framework is designed to integrate with existing NASA models and datasets.</p>	

PI Name : <b>Genaro Carrasco Ozuna</b>		NASA Proposal Number <b>TBD on Submit</b>			
Organization Name :					
Proposal Title : <b>Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program</b>					
<b>SECTION VIII - Other Project Information</b>					
<b>Proprietary Information</b>					
Is proprietary/privileged information included in this application?					
<b>Yes</b>					
<b>International Collaboration</b>					
Does this project involve activities outside the U.S. or partnership with International Collaborators?					
<b>No</b>					
Principal Investigator <b>No</b>	Co-Investigator <b>No</b>	Collaborator <b>No</b>	Equipment <b>No</b>		
Facilities <b>No</b>					
Explanation :					
<b>NASA Civil Servant Project Personnel</b>					
Are NASA civil servant personnel participating as team members on this project (include funded and unfunded)?					
<b>No</b>					
Fiscal Year	Fiscal Year	Fiscal Year	Fiscal Year	Fiscal Year	Fiscal Year
Number of FTEs	Number of FTEs	Number of FTEs	Number of FTEs	Number of FTEs	Number of FTEs

PI Name : <b>Genaro Carrasco Ozuna</b>	NASA Proposal Number <b>TBD on Submit</b>
Organization Name :	
Proposal Title : <b>Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program</b>	
<b>SECTION VIII - Other Project Information</b>	
<b>Environmental Impact</b>	
Does this project have an actual or potential impact on the environment? <b>Yes</b>	Has an exemption been authorized or an environmental assessment (EA) or an environmental impact statement (EIS) been performed? <b>No</b>
<p>Environmental Impact Explanation:</p> <p><b>Environmental and sustainability relevance arises through reduced satellite losses, avoided infrastructure damage, and minimized unnecessary operational actions, leading to lower lifecycle resource consumption</b></p>	
<p>Exemption/EA/EIS Explanation:</p>	

PI Name : <b>Genaro Carrasco Ozuna</b>	NASA Proposal Number <b>TBD on Submit</b>
Organization Name :	
Proposal Title : <b>Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program</b>	
<b>SECTION VIII - Other Project Information</b>	
<b>Historical Site/Object Impact</b>	
Does this project have the potential to affect historic, archeological, or traditional cultural sites (such as Native American burial or ceremonial grounds) or historic objects (such as an historic aircraft or spacecraft)?	
<b>No</b>	
Explanation:	

PI Name : <b>Genaro Carrasco Ozuna</b>	NASA Proposal Number
Organization Name :	<b>TBD on Submit</b>
Proposal Title : Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program	
<b>SECTION IX - Program Specific Data</b>	
<b>Question 1 : Short Title:</b>	
<b>Answer:</b> Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program	
<b>Question 2 : Team members not confirmed via NSPIRES</b>	
<b>Answer:</b>	
While this work does not directly target environmental remediation, it has measurable indirect environmental benefits through improved reliability and efficiency of space-weather prediction and decision-support systems.	
Enhanced coherence-based validation of space-weather models can reduce false alarms and missed events, enabling more accurate and proportionate operational responses. This improvement can lead to fewer unnecessary satellite maneuvers, reduced fuel consumption, and extended operational lifetimes of space assets, thereby lowering the demand for replacement launches and associated material and energy expenditures.	
On Earth, more reliable interpretation of solar and geomagnetic activity supports better protection of electrical power infrastructure and other vulnerable technological systems. By enabling earlier and more trustworthy warnings, this work can help prevent damage to large-scale components such as transformers, whose replacement involves significant industrial processes and environmental cost.	
The proposed framework is software-centric and designed to integrate with existing datasets and models, resulting in a low direct environmental footprint. Computational methods emphasize lightweight metrics and validation layers rather than extensive retraining of large models, aligning with efficient use of computational resources.	
Overall, the environmental relevance of this work arises from risk reduction, asset longevity, and avoidance of unnecessary high-impact interventions, contributing to more sustainable operation of space-based and ground-based technological systems affected by solar variability.	
<i>Hidden for Dual Anonymous Peer Review</i>	
<b>Question 3 : Focused-Science Topic</b>	
<b>Answer:</b> FST3: Tormentas similares, efectos diferentes: comprensión del acoplamiento iónico neutro a través de escala que impulsa la respuesta temporal global a tormentas geomagnéticas	
<b>Question 4 : Research Regime</b>	
<b>Answer:</b> Sistema-Interdisciplinario	
<b>Question 5 : Science Topic</b>	
<b>Answer:</b> Clima espacial	
<b>Question 6 : AI or ML?</b>	
<b>Answer:</b> Yes	

PI Name : <b>Genaro Carrasco Ozuna</b>	NASA Proposal Number <b>TBD on Submit</b>
Organization Name :	
Proposal Title : <b>Coherence-Driven Validation and Entropy-Based Veto for Space Weather Prediction under the Living With a Star Program</b>	
<b>SECTION X - Budget</b>	
<b>Total Budget:</b> No budget required	