

Opportunity Title: Enhanced Characterization of Solar Storm Events

Opportunity Reference Code: ICPD-2023-32



Organization Office of the Director of National Intelligence (ODNI)

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How to Apply

Create and release your Profile on Zintellect – Postdoctoral applicants must create an account and complete a profile in the on-line application system. **Please note: your resume/CV may not exceed 2 pages.**

Complete your application – Enter the rest of the information required for the IC Postdoc Program Research Opportunity. The application itself contains detailed instructions for each one of these components: availability, citizenship, transcripts, dissertation abstract, publication and presentation plan, and information about your Research Advisor co-applicant.

Additional information about the IC Postdoctoral Research Fellowship Program is available on the program website located at:
<https://orise.orau.gov/icpostdoc/index.html>.

If you have questions, send an email to ICPostdoc@orau.org. Please include the reference code for this opportunity in your email.

Application Deadline 2/28/2023 6:00:00 PM Eastern Time Zone

Description **Research Topic Description, including Problem Statement:**

Solar storms are recognized as one of the six potentially disastrous and unpredictable 'black swan' events that could happen before 2030. Solar storms occur when the sun releases bursts of energy, called coronal mass ejections (CMEs) or solar flares. CMEs can dramatically change Earth's magnetic field, which can cause power grids to fail, resulting in the loss of power for weeks at a time. Such extended power loss can lead to health crises, food shortages, and economic effects. With the dependence on technology today, a solar storm could result in \$2 trillion in damages that would take a decade to repair.

The Sun has entered a new solar cycle. As a result, solar wind activity is being generated at an increasing rate. When energized particles from the Sun interact with the Earth's upper atmosphere, the atmosphere heats up and becomes denser, shifting denser air to higher altitudes and increasing drag on satellites and uncertainty in the satellite orbit. Therefore, the risk of satellite collisions would be extremely high after a major solar storm. In October 2003, satellite controllers lost track of hundreds of satellites for days after a major solar storm hit Earth. More recently, in February 2022, Space-X launched 49 Starlink satellites during a solar storm and lost at least 40 satellites. Additionally, over the past year, the European Space Agency's Swarm satellites started dropping in the atmosphere ten times faster than before.

Example Approaches:

Solar weather activity creates a complexity of effects on the Earth's upper atmosphere and ionosphere, making it difficult to accurately predict the change in satellite orbits. During the solar storm of October 2003, there were only approximately 5,000 tracked objects in low Earth orbit, and despite the loss of control, no collisions were reported. However, the number of objects in this region has increased four times since 2003, which will result in an increased risk of orbital crashes. Experts believe it would take weeks to restore the space catalog in the event of a solar storm today. Increased knowledge of solar weather effects on satellite orbits will improve on the capability to maintain the space catalog during such events.

Relevance to the Intelligence Community (IC):

Space weather affects all satellites, including those of the IC. Such solar storms and other space weather events can impact IC missions and increase the potential risk to satellite collisions due to the increased uncertainty of satellite orbits.

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Develop/enhance capabilities to characterize the space operating environment and improve global space situational awareness.

Key Words: space Situational Awareness, Satellite, Space Weather, Solar Storm, Plasma

Qualifications

Postdoc Eligibility

- U.S. citizens only
- Ph.D. in a relevant field must be completed before beginning the appointment and within five years of the application deadline
- Proposal must be associated with an accredited U.S. university, college, or U.S. government laboratory
- Eligible candidates may only receive one award from the IC Postdoctoral Research Fellowship Program

Research Advisor Eligibility

- Must be an employee of an accredited U.S. university, college or U.S. government laboratory
- Are not required to be U.S. citizens

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Discipline(s):**
 - **Communications and Graphics Design** (6 )
 - **Computer, Information, and Data Sciences** (17 )
 - **Earth and Geosciences** (21 )
 - **Engineering** (27 )
 - **Environmental and Marine Sciences** (14 )
 - **Life Health and Medical Sciences** (48 )
 - **Mathematics and Statistics** (11 )
 - **Other Non-S&E** (2 )
 - **Other Physical Sciences** (12 )
 - **Other S&E-Related** (1 )
 - **Physics** (16 )
 - **Social and Behavioral Sciences** (29 )