Machine Learning Tools for Predicting Solar Energetic Particle Hazards

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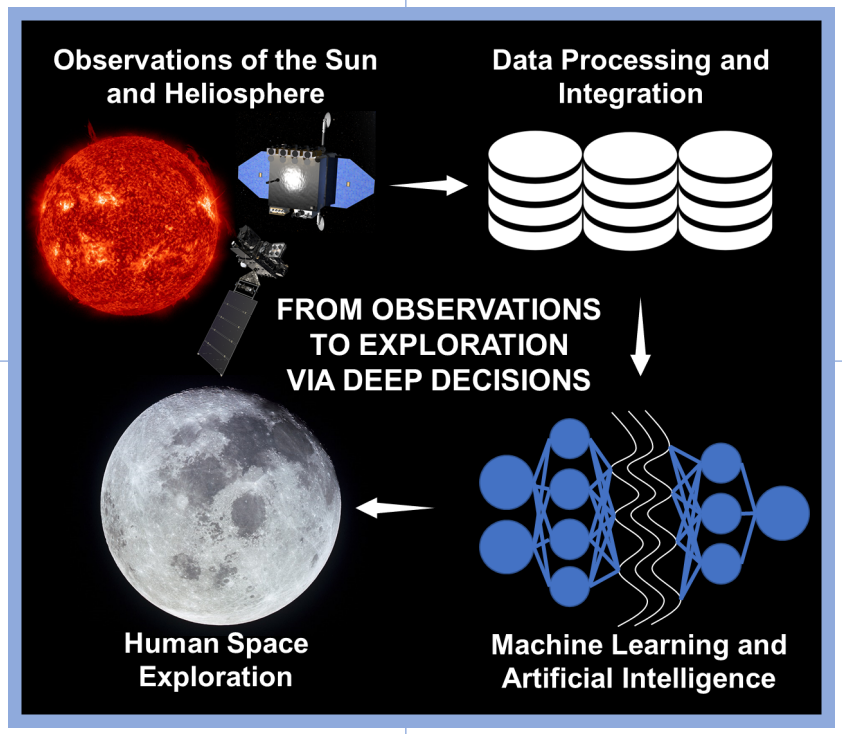
Research Objectives

- Enhance predictions of solar energetic particles (SEP) by developing an online-accessible database of SEP-related data and implementing robust machine learning-based "all-clear" forecasts;
- Innovation: unleashing machine learning technologies for the SPE forecasts, enabling the data discovery;
- Enhancement of SOA: automatic forecasts without "forecaster-in-the-loop";
- Current TRL2 will be raised to TRL5 (ML methodologies will be transformed in functional proof of concept of "all-clear" forecasting tools).



Approach

- Modern Machine Learning and database technologies with API-based online access to database entries and integrated data products;
- Automated utilization and processing of multi-spacecraft observational data;
- Customized Skill Score for "all-clear" forecasts;
- Application of advanced Machine Learning algorithms for solving classification tasks and prediction of active region evolution.

Potential Impact

- Robust "all-clear" forecasts enabling possibilities for safe space exploration and advanced mission planning;
- Availability of the prepared and integrated data for the heliophysics community;
- Data discovery possibilities for the broader community;
- Replacement of current operational forecasting techniques by machine learning-based approaches.