Alexander
Murph
Los Alamos National Laboratory
Jesse R. Woodroffe, LANL
Katherine E. Mesick, LANL
Brian P. Weaver, LANL
Sean M. Czarnecki, LANL
Poster
We present a three-part framework for extracting more information from Solar Energetic Particle (SEP) events and neutron observations. First, we develop an adaptive, stochastic fitting approach that continuously matches a double Band function to incoming Geostationary Operational Environmental Satellite (GOES) proton data, using a changepoint algorithm to identify SEP onset and cessation independently across multiple energy thresholds. Second, we combine these inferred proton inputs with physics simulations to estimate neutron production from both SEP-related processes and proton-on-satellite spallation, giving an estimate on total (environmental and spallation-induced) neutron signal. Finally, we introduce a new inverse model that uses Bayesian inference to estimate the incident proton spectrum with uncertainties directly from neutron count rates. This model is trained and evaluated using the past decade of SEP events observed by the GOES series, learning behavior across events by adaptively aligning them on the same time axis. Together, these methods allow for improved SEP fitting and spectrum reconstruction from neutron measurements, and will be used to obtain SEP characteristics from the satellite-based neutron instruments.
Poster session day
Wednesday, April 29, 2026
Poster location
22
Meeting homepage
2026 Space Weather Workshop
Download to PDF