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Four top tier challenges for Space Weather Research for the next decade

James Spann
NASA/MSFC, Science and Exploration Research Office, Huntsville, United States (jim.spann@nasa.gov)

The science of space weather is that which (1) develops the knowledge and understanding to predict conditions in space that impact life and society, and (2) leads to operational solutions that protect assets and systems to the benefit of society. Advances over the past decades in this area of research have yielded amazing discoveries and significant strides toward fulfilling the promise of an operational solution to space weather, and have facilitated the enterprise to make its way into the realm of national and international policy. Even if the resources, technologies, and political will were available to take advantage of this progress, our current lack of understanding of space weather would prevent the implementation of a fully operational system.
This talk will highlight four distinct areas of research that, if fully understood, could enable operational solutions to space weather impacts, given sufficient resources and political will. These areas are (a) trigger of solar variability, (b) acceleration of mass and energy in interplanetary space, (c) geoeffectiveness of solar wind, and (d) ionospheric variability. A brief description, technical challenges, and possible pathways to resolution will be offered for each of these areas.