Project Details

ROSES ID: NNH07ZDA001N
Selection Year: 2008
Program Element: Focused Science Topic

Topic: Focused science topics for Strategic Goal 2 (Sun-Climate): Solar Modulation of the galactic cosmic rays and the production of cosmogenic isotope archives of longterm solar activity, used to interpret past climate changes.

Project Title:
Evolving Solar Magnetic Activity on Time Scales Relevant for Space Climate

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Summary:
"One of the major challenges facing humanity is global climate change. In order to gauge the response of the terrestrial climate system to natural and anthropogenic forcings, NASA's Living With a Star program needs to deliver the understanding of how and to what degree variations in the solar radiative and particulate output contribute to changes in global and regional climate over a wide range of time scales." (Adapted from NASA LWS TR&T Steering Committee Report, 2006-2007).

We propose to use a new and innovative stellar dynamo simulation code, which we have developed under a NASA predecessor grant, to explore the origins of, and decipher the evolution of solar magnetic activity over multiple timescales ranging from centuries to stellar and planetary evolutionary timescales. The results from that dynamo code will be used as input for a surface magnetic flux transport code developed by our collaborators at the University of St. Andrews in Scotland to produce accurate predictions for the Sun's surface magnetic fields and open magnetic flux. The former regulates the variations in the total solar irradiance and the latter the amount of Cosmic Rays that penetrate the atmosphere of the Earth, both of which are key physical agents of the solar influence on the Earth's climate.

In keeping with MSU's tradition of involving students with NASA sponsored forefront astrophysical research, a graduate student will be involved with our project for his thesis research, and undergraduates will carry out appropriate portions of the work for research credit.

Publication References:

no references