

Project Details

ROSES ID: NRA-NNH04ZSS001N

Selection Year: 2005

Program Element: Focused Science Topic

Topic: Sensitivity of regional and global climate to solar forcing

Project Title:

A Model of Long-Term Variability of Solar UV and EUV Irradiance

PI Name: Jeff Morrill

PI Email: jeff.s.morrill@nasa.gov

Affiliation: Naval Research Laboratory

Summary:

Studies of climate and ozone variability have shown the need for detailed knowledge of long-term solar UV/EUV spectral irradiance variability. The proposed research will derive estimates of the long-term solar UV and EUV spectral irradiance using Ca II K images and a solar irradiance model developed under an earlier NASA/LWS TR&T research grant. That model uses Ca II K images observed by Big Bear Solar Observatory and model results are currently being validated by comparison to observed full disk irradiance spectra from UARS. By using digitized versions of the Mt Wilson Observatory (MWO) Ca II K film archive and spectra measured from the SKYLAB film archive estimates of the solar UV irradiance spectrum can be derived over the wavelength range from ~ 120 to ~400nm. In addition, by using the calculated Mg II index as a proxy for shorter wavelength emissions we will provide irradiance values in the EUV. Use of the SKYLAB and MWO archives coupled with more recent photoelectric Ca II K observations will yield estimated UV/EUV spectra that will span the time period from 1915 through the present thus providing estimated values over nearly a century. These estimated spectra will be valuable as inputs to long-term models of climate and ozone variability as well as Martian photochemistry. Currently, a preliminary set of digitized versions of the MWO photographic solar images has been acquired from the National Geophysical Data Center. In addition, a more comprehensive analysis and improved digitization of the MWO photographic archive is presently underway as part of a NASA funded project. Once available, we will use these improved MWO images to generate the final set of estimated spectra. An initial component of this proposal will be to upgrade the current irradiance model to include wavelengths below 200nm and to validate model results with measured UV and EUV. Once completed, the resulting estimated spectra will be used to address unresolved questions surrounding current long-term reconstructions of solar variability.

Publication References:

no references