



HAO Colloquium Series

(Refreshments served)

Speaker: Jerry Harder, LASP

Time: 1:30 pm

Date: Wednesday, March 16, 2011

Location: CG-1, South Auditorium

Title: Measured and Modeled Trends in Solar Spectral Irradiance Variability and Application to Earth Atmospheric Studies

Abstract: The Spectral Irradiance Monitor (SIM) measures solar spectral variability in the 200–2400 nm range, accounting for about 97% of the total solar irradiance (TSI). This instrument monitored the descending phase of solar cycle 23 and is now continuing observations in the rising phase of cycle 24. The SIM observations show rotational modulation of spectral irradiance due to the passage of active regions, but also indicate slower evolutionary trends in solar spectral irradiance over longer time periods that are both in and out of phase with the TSI. This observation is discussed in terms of the Solar Radiation Physical Modeling (SRPM) program and solar images from Precision Solar Photometric Telescope (PSPT) that provides the areas of solar active regions as function of time to generate a modeled SSI time series that can be compared to SIM observations. To estimate the atmospheric response to the solar variability implied by these observations, quiet sun and active solar reference spectra were created as input into the Whole Atmosphere Community Climate Model (WACCM). The SIM observations were combined with the ultraviolet SORCE SOLSTICE measurements and SRPM estimates in the infrared to generate the reference spectra. The model output suggests a very different response in ozone than from atmospheric forcing from semi-empirical models of SSI. The model predicts a reduction in lower mesosphere at higher solar activity and a large increase in mid- to upper stratosphere. This atmospheric structure seen in the model is commensurate with contemporaneous observations of ozone from AURA-MLS and SABER.