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Investigation of Solar Cyclic and Climatic Trends in Upper Atmospheric Hydrogen Distributions SUSAN NOSSAL, EDWIN MIERKIEWICZ, FRED ROESLER, Physics Department, University of Wisconsin-Madison, L. QIAN, S. SOLOMON, ALAN BURNS, High Altitude Observatory, National Center for Atmospheric Research — We will discuss work in progress to better understand solar cyclic and climatic influences on hydrogenous species budgets and distributions from both an observational and modeling perspective. Our Fabry-Perot observations of upper atmospheric hydrogen emissions during solar cycle 23 and during three solar minima (1985, 1997, 2006-2008) establish a reference data set of highly precise, consistently calibrated, thermospheric + exospheric hydrogen column emission observations from Northern mid-latitudes that can be used to compare with future observations and with atmospheric models. We will also discuss use of the National Center for Atmospheric Research's global mean model for sensitivity studies to investigate the response of thermospheric hydrogen to a doubling of carbon dioxide and methane. The results from this study suggest a strong solar cycle dependence and that carbon dioxide cooling may have a greater impact upon the changes in the upper atmospheric hydrogen distribution at solar minimum than do methane increases.

Susan Nossal
Physics Department, University of Wisconsin-Madison

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