HAO Colloquium Series

(Refreshments served)

Speaker: **Alan Plumb, MIT**

Time: **1:30–2:30 pm**

Date: **Wednesday, October 24, 2012**

Location: **CG1-2126**

Title: **Stratospheric warmings and their remote effects throughout the atmosphere**

Abstract:

Stratospheric warmings are spectacular events occurring in late autumn through early spring; their most obvious manifestations are the disruption (through "splitting" or "displacement") of the cyclonic stratospheric polar vortex, and a dramatic increase in temperature throughout the polar stratosphere. With the single exception of a spectacular southern hemisphere event in Sept 2002, such events have been observed only in the northern hemisphere. It has been clear for many years now that these warmings are accompanied by and, indeed, a response to, amplification of the planetary-scale Rossby waves that dominate the wintertime stratosphere, especially in the northern hemisphere. Numerical simulations have now made it clear that these amplifications cannot be seen as being imposed by tropospheric events, but are in fact a consequence of chaotic wave, mean flow interaction within the stratosphere.

While center of action of these warming events is in the high latitude stratosphere, manifestations are clearly evident in the tropical stratosphere, in the midlatitude troposphere (all the way down to the surface), and in the high atmosphere. The surface manifestations are now well documented, but the precise mechanism of the stratosphere-to-troposphere coupling is not fully clarified; in particular, the relative roles of the planetary waves and the induced mean circulation remain obscure. The association between stratospheric events and ionospheric anomalies is now similarly well established. Several mechanisms for coupling to high latitudes have been proposed, via either the mean circulation or through one of several classes of wave (planetary, gravity, and tides). One hypothesis to be addressed in the talk is that tropical, upper stratospheric, ozone anomalies observed to accompany warming events modulate the forcing of thermal tides, which propagate into the high atmosphere from this level.