HAO Colloquium Series

(Refreshments served)

Speaker: **Leif Svalgaard, Stanford University**

Time: **1:30–2:30 pm**

Date: **Wednesday, September 19, 2012**

Location: **CG1-1210 South Auditorium**

Title: **How Well Do We Know the Sunspot Number? [And what we are doing to answer that question]**

Abstract:

A hundred years after Rudolf Wolf's death, Hoyt et al. (1994) asked "Do we have the correct reconstruction of solar activity?" After a heroic effort to find and tabulate many more early sunspot reports than were available to Wolf, Hoyt et al. thought to answer that question in the negative and to provide a revised measure of solar activity, the Group Sunspot Number (GSN) based solely on the number of sunspot groups, normalized by a factor of 12 to match the Wolf numbers 1874–1991. Implicit in that normalization is the assumption or stipulation that the 'Wolf' number is 'correct' over that period. In this talk we shall show that that assumption is likely false and that the Wolf number (WSN) must be corrected. With this correction, the difference between the GSN and WSN becomes even more disturbing: The GSN shows either a 'plateau' until the 1940s followed by a Modern Grand Maximum [MGM], or alternatively a steady rise over the past three hundred years, while the (corrected) WSN shows no significant secular trend and no MGM. As the sunspot number is often used as the basic input to models of the future evolution of the Earth's environment and of the climate, having the correct reconstruction becomes of utmost importance, and the difference between GSN and WSN becomes unacceptable. By re-visiting the construction of the GSN we show how the GSN can be reconciled with the WSN, resolving the issue. We finally report on recent discrepancies between various indices of solar activity which raise the issue of the very meaning of the sunspot number and of the future evolution [and predictability] of solar activity. The talk is based on work in support of the Sunspot Number Workshops: http://ssnworkshop.wikia.com/wiki/Home.