

## **Spectral and Brightness Variations of Cycling and Flat Activity Sun-Like Stars**

**Jeffrey C. Hall  
Lowell Observatory  
1400 West Mars Hill Road  
Flagstaff, AZ 86001**

Synoptic observations of Sun-like stars provide a broad perspective on the variability the Sun may exhibit on century or millennial timescales. Regular observations of stellar activity cycles began in 1966, and 44 years of data since then have provided many insights on their frequency, morphology, and generative mechanisms. Since the 1980s, complementary spectroscopic and photometric observations have allowed examination of activity-brightness relationships among the stars, essential data for constraining the possible excursion of solar brightness during periods of high and low activity. The spectral and brightness records are of particular interest for stars in non-cycling states perhaps analogous to the solar Maunder Minimum. Renewed interest in solar-terrestrial interactions, spurred by Jack Eddy's landmark 1976 paper, has led to ongoing efforts to identify true "solar twins" and to characterize their variability. Despite much progress, however, important questions remain. As the recent solar spectral irradiance data show, interpretation of stellar variability requires a multiwavelength approach lacking in synoptic studies to date. Good solar twins have been elusive and the number of true solar proxies is therefore limited. Fortunately, current and near-future work has great potential to address these problems.

In this paper I will review these various threads, with emphasis on key results from the long-term Mount Wilson and Lowell Observatory stellar cycles programs and on stars with behavior relevant to the recent extended solar minimum. I will also outline what are likely the most productive ways that stellar cycles research can support solar-terrestrial work over the next several years.