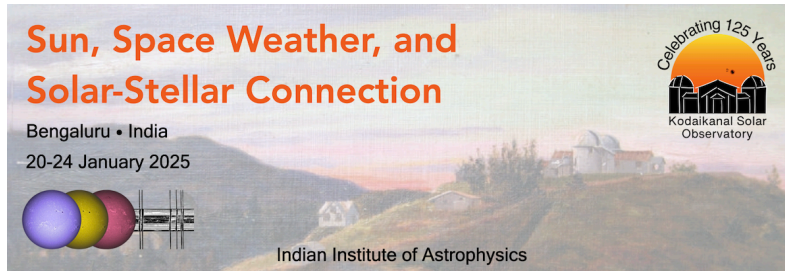


## Sun, Space Weather, and Solar-Stellar Connection



Contribution ID: 63

Type: **Invited talk**

# Unveiling the Significance of Ca II K Observations for Long-Term Solar Irradiance Reconstructions

*Monday, January 20, 2025 9:55 AM (20 minutes)*

Direct measurements of solar irradiance started in 1978, which is a rather short period for climate studies. Irradiance variations on timescales of days and longer are attributed to the evolution of the solar surface magnetic field, which allows irradiance reconstructions for periods that appropriate data describing solar surface magnetism exist. In particular, such models require information on both sunspots and faculae. Although sunspot observations readily exist back to early 1600s, facular data are significantly more scarce. The longest available record of facular data is Ca II K observations, dating back to 1892, with one of the most prominent such Ca II K archives being from Kodaikanal observatory. Unfortunately, the use of Ca II K data for irradiance studies has been hampered by significant challenges with analysing the Ca II K images, including the non-linear response of photographic plates and the presence of large-scale artifacts in the images. Our analysis of Ca II K data has allowed us to overcome many of these obstacles. We also reassessed the link between Ca II K brightness and magnetic field strength, enabling the conversion of Ca II K observations into detailed maps of the solar surface magnetic field. Here we will present our latest advancements in utilizing Ca II K data to reconstruct past solar irradiance variations.

## Contribution Type

### Theme

Solar Magnetism over Long-Time Scales

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**Session Classification:** Long Term Synoptic Observations