

IRIS's view of solar cycle 24: variability of Mg II h & k lines

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- IRIS capability to build spectral maps of entire disk in FUV and NUV (IRIS full-Sun mosaics),
- 97 mosaics were obtained over the period Sep 2013 Jul 2021,
- cover raising phase, maximum, decline, and the end of solar cycle 24 (SC24),
- level 2 mosaics available through IRIS webpage,
 - given in Data Number, radiometric calibration needed,
 - cover the range of ±1.75 Å centered at 2803 Å (Mg II h) and 2796 Å (Mg II k).

Astronomický ústav AV ČR



- radiometric calibration from DN to W m⁻² sr⁻¹ Å⁻¹, consistent computation of uncertainties,
- disk-averaged Mg II h & k profiles, conversion to the spectral irradiances SI at 1 AU,
- wavelength integrated spectral irradiances SI($\Delta\lambda = 1 \text{ Å}$) correlated with:
 - the Bremen composite Mg II index, CC = 0.94,
 - the composite Lyman- α index, CC = 0.92,
- the high correlations:
 - verify the long-term stability of IRIS radiometric calibration,
 - qualify the IRIS NUV full-Sun mosaics for solar cycle studies.





- the wavelength integrated spectral irradiance SI($\Delta\lambda$ = 3.5 Å) of disk-average IRIS Mg II k profile was computed and compared with equivalent quantity provided by the radiometer SOLSTICE aboard the SORCE satelite,
- the comparison shows:
 - CC = 0.85,
 - IRIS calibration offset of about 2 mW m $^{-2}$ (the relative difference of 10%).

See: Gunár et al. ApJS, 255, 16 (2021)





- Mg II h & k profiles show significant center-to-limb variation in contrast with Lyman-α, no Lyman-α center-to-limb variation, see: <u>Gunár et al. (2020)</u>,
- profiles averaged over 10 concentric zones of equal area,
- Mg II h & k wavelength integrated intensities *E* show limb darkening.



One of many possible applications

The calibrated IRIS NUV full-Sun mosaics allow to answer the question:

"Does the quiet Sun change over solar cycle at chromospheric layers?" <u>Solanki (2007)</u>