

Title : The calcium triplet as an infrared chromospheric indicator: a large-scale study, from Narval/ESPaDOnS to Gaia DR4

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Abstract:

The magnetic and chromospheric activity of the Sun is well understood thanks to decades of continuous, high-quality observations. However, our knowledge of stellar activity in other stars remains far more limited, as obtaining such detailed and long-term measurements beyond the Sun is observationally much more challenging. The best-known chromospheric activity indicators in the visible are the Ca II H & K lines, used to derive the classical log R'_{HK} index. Yet, obtaining this indicator still requires dedicated, ground-based spectroscopic observations of each star, making the process time-consuming and inefficient for assembling large datasets of stars observations. To overcome this, we explore the calcium infrared triplet as an alternative chromospheric activity proxy, which will be measurable directly from the time series available in the forthcoming Gaia DR4 near-infrared spectra for billions of stars. Using a sample of over 1000 high-resolution spectra of FGK stars obtained with the NARVAL and ESPaDOnS spectropolarimeters, we investigate the global correlation between the Ca II IRT as an activity indicator and the log R'_{HK}, as well as their temporal correlations and properties (period, amplitude of variation on short or long term, etc.). Such large-scale activity diagnostics will be particularly valuable in the context of follow-up observations of PLATO targets, where stellar activity characterization is essential for interpreting photometric variability and exoplanet signals. Finally, we will present an analysis of the link between this activity indicator and stellar metallicity based on a much larger sample based on the analysis of the Gaia DR3 spectra.

