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The total column stratospheric ozone in the tropics during solar cycles 21-24

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The Sun is an active and variable star. Instabilities and non-stationary processes connected to solar magnetic field and evolutionary mechanisms modify his radiative and particle output on different time scales, from seconds to the evolutionary scale of the star.
The main feature of solar activity, at least in the last centuries, is the quasi-11-years Schwabe cycle. The Schwabe cycle is distinctly observed with different physical (e.g., Total and Spectral Solar Irradiance, MgII or F10.7 fluxes) and synthetic (e.g., sunspot number) indexes. Over this period, changes in the Total Solar Irradiance are $\sim$0.1% with different spectral intervals contributing in different amounts. Solar Irradiance in the UV spectral region varies up to 10%. Such UV radiation is responsible for the temperature increase above the tropopause and the production and destruction of stratospheric ozone which dictates the chemistry, temperature and dynamics of the stratosphere.
In order to investigate the time correlations between the total column stratospheric ozone in tropics regions and solar UV irradiance we decompose the ozone NIWA signal and solar MgII index in the various Intrinsic Mode Functions (IMFs) by means of the Empirical Mode Decomposition (EMD) technique. The MgII index is the most appropriate to reproduce the 122-200nm FUV band variation.
The analysis of ozone and MgII IMFs associated with Schwabe period unambiguously establish that the total column stratospheric ozone in tropics regions is modulated by UV radiation. Moreover, the detailed analysis of the correlation trajectory in the IMFs plan offers ways to explore and investigate the dynamics of the relationship between stratospheric ozone and solar UV.