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Reality of the climatologic theory of wildland fires based on UV-B efficiency

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In recent publications (1998-2004) we presented different aspects of the climatologic theory of wildland fires. This theory is based on the action of the solar UV-B –after absorption by the stratospheric ozone- on terrestrial plants. Most of them have high content of cellulose among their components, which is very sensitive to radical deterioration by UV-B, increasing the risk of ignition and propagation of flame from vegetation.

Annual occurrence or intensity of wildland fires vary periodically with mean annual solar flux (F. 10.7 cm) with *extrema* occurring close to solar maximum or minimum. Two equations have been stated, which account for the data, using total ozone content of the atmosphere and solar flux as variables.

A transposition of these equations at the daily scale for a period corresponding to a solar radiation cycle (27 days) allowed us modelling the conditions of starting and propagation of wildland fires and introducing a method of forecasting, from daily data given by observatories, satellites and ground meteorological stations.

However, we know that the solar UV flux (Φ_{UV}) measured out of the atmosphere has light variations compared to F 10.7 cm variations along solar cycle, although in phase with them. We recall the result of S. Chandra (Geophysical Research Letters, 1991) who stated that the F 10.7 cm and R (Mg II c/w) time series are almost interchangeable for studying solar UV and ozone relationship for both the solar rotation and the solar cycle related change.

So, we consider that the flux variations at the two ends of total ozone column are linked together by the power correlation:

Φ^s_{UV} / Φ^i_{UV} = ($F^s_{10.7cm}$ / $F^i_{10.7cm}$)^n(1)

For a discussion of these results we analyzed the UV solar flux and ozone measurements done at different meteorological stations near the South pole (Palmer station, Ushuaïa...) for periods of very large ozone decrease. The expression of absorbancy –according to the classical law of absorption- is obtained with a correlation coefficient of $R^2 = 0.67$.

So, the extinction coefficient obtained validatesghe results of our hypothesis concerning the correlation (1) betweengΦ_{UV} and F 10.7cm variations through the atmosphere.