Nonlinearity dependence between the Dimethylsulphide and the Total Solar Irradiance.

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Solar variability is one of the main natural influences on the Earth's climate and biota, but the mechanisms through which solar variability is impacting biophysical internal processes of the Earth have not yet to be more accurately specified. Two climatic parameters involved in that mechanism are the Total Solar Irradiance (TSI), related to solar activity, and the Dimethylsulphide (DMS) production, which has been proposed as a forcing of climate. Both of them contribute to the biological regulation of the climate through the effects of temperature and sunlight on phytoplankton population and DMS production. In this work we investigate the nonlinear level of dependence between TSI and DMS by using the mutual information function (I) of these climatic parameters. In order to quantify the nonlinearity level of dependence, we compute the difference between (λ(I) - ρ), ρ means the linear correlation coefficient and λ(I) is a generalized correlation coefficient, and the quantity (λ^s(I) - ρ^s), where the subscript s means surrogated. With this procedure we found an important nonlinear dependence between both climatic parameters.