

**SPARC SOLARIS & HEPPA intercomparison activities: Quantifying the impact of natural and anthropogenic forcings on ozone**

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Current chemistry-climate models are able to simulate the evolution of ozone for the recent past and the future. However, quantifying the non-stationary nonlinear impact of natural and anthropogenic forcings on ozone remains a difficult task. This work aims at employing multivariate statistical methods that model ozone on a global scale by incorporating significant variability factors like the Quasi-Biennial Oscillation, the El Niño-Southern Oscillation, the solar cycle, the aerosol optical depth, stratospheric chlorine, and others. Several linear and nonlinear statistical methods are introduced such as linear discriminant analysis, FEM-VARX, multi-layer perceptron, etc. These methods are validated and compared with respect to their ability to model ozone. The methods are trained with data from reanalyses and chemistry-climate model simulations. The variability factors are ranked according to their impact and statistical importance. It is shown how these factors change their influence on ozone over time in a non-stationary way. Finally, statistical ozone projections based on changes in natural and anthropogenic forcings are made.