Geophysical Research Abstracts
Vol. 20, EGU2018-14695, 2018
EGU General Assembly 2018

Modelling trends in stratospheric ozone using the dynamic linear model approach

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A typical feature of atmospheric time series is that they are not stationary but exhibit both slowly varying and abrupt changes in the distributional properties. These are caused by trends in mean level and seasonal variation, and by external forcing such as solar activity or volcanic eruptions. Further, the sampling is often non-uniform, there are gaps, and the uncertainty of the observations can vary. When observations are combined from various sources there will be instrument and retrieval method related biases.

Dynamic regression with state space representation of the underlying processes provides flexible tools for these challenges. By explicitly allowing variability in the regression coefficients, we let the system properties change in time. These changes can be modelled and estimated. Furthermore, the use of unobservable state variables allows direct modelling of processes that are driving the observed variability. In this presentations, we will show how dynamic linear model (DLM) approach can be applied to trend and change point analysis. The method and the corresponding computer code are illustrated by case studies analysing trends in stratospheric ozone.

References

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