## SPARC Data Initiative: climatology uncertainty assessment

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The SPARC Data Initiative aims to produce trace gas climatologies for a number of species from a number of instruments. In order to properly compare these climatologies, and interpret differences between them, it is necessary to know the uncertainty in each calculated climatological mean field. The inhomogeneous and finite temporal-spatial sampling pattern of each instrument can lead to biases and uncertainties in the mean climatologies. Sampling which is unevenly weighted in time and space leads to biases between a data set's climatology and the truth. Furthermore, the systematic sampling patterns of some instruments may mean that uncertainties in mean fields calculated through traditional methods that assume random sampling may be inappropriate. We aim to address these issues through an exercise wherein high resolution chemical fields from a coupled Chemistry Climate Model are sub-sampled based on the sampling pattern of each instrument. Climatologies based on the sub-sampled data can be compared to those calculated with the full data set, in order to assess sampling biases. Furthermore, investigating the ensemble variability of climatologies based on sub-sampled fields will allow us to assess the proper methodology for estimating the uncertainty in climatological mean fields.