On the averaging kernels parametrization for the implementation of fast observing system simulation experiments targeted on tropospheric ozone observations

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Observing System Simulation Experiments (OSSEs) are useful tools to evaluate the added-value brought by a future observing system. By the way, an OSSE can be very time-consuming and practical implementations usually rely on some approximations of the pseudo-observations by means of a parametrization of the averaging kernels (AvKs) related to the target observing systems.

Here we present a study aimed at investigating how such a parametrization can be done without loosing the significance of the OSSE, in the case of tropospheric ozone monitoring. First an analysis of the behavior of the AvKs and related quantities including the degrees of freedom and the shape of partial columns AvKs, over three days of full retrieval for two test geostationary future observing systems, is carried out. A marked dependency of the AvKs on thermal contrast and tropopause height has been found; the dependency of the vertical sensitivity of the retrieval on these two quantities is analyzed. Following these results, a parametrization of the AvKs with respect to these quantities is attemped and the full retrieval is compared with approximated retrievals with this and scantier parametrizations.