

P19 Revisiting cloudy-sky actinic fluxes treatment in WRF-Chem: Evaluation with in-situ airborne data.

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The actinic flux, the light intensity incident on a molecule, drives the photochemistry in the atmosphere. It is thus critical to accurately predict actinic fluxes in atmospheric chemistry models. Modeling of actinic fluxes is particularly challenging when clouds are present as they can both attenuate and enhance solar radiation. The representation in models of this interaction between clouds (cloud properties) and actinic fluxes is still highly uncertain.

Here, we have updated the treatment of the cloud effects on UV radiation in the current version of the TUV photolysis module in WRF-Chem, and compared the simulated actinic fluxes with those measured over the U.S. during the SEAC4RS aircraft campaign. We have also evaluated the cloud optical properties simulated by WRF/WRF-Chem using satellite cloud retrievals. Our results show that clear-sky actinic fluxes are generally well simulated by the model as expected. However, in the presence of clouds the simulated actinic fluxes show large discrepancies with observations. One of the reasons is that WRF-Chem simulates clouds in wrong locations, as one can expect. Apart from the inaccurate location, the results suggest that cloud optical properties such as cloud optical depth, are largely overestimated in WRF-Chem as compared to those in satellite retrievals. This leads to excessive attenuations of actinic fluxes and thus photolysis rates below clouds, for example. We discuss the sensitivity of the model results to assumptions made on the cloud vertical distribution and cloud optical depth calculations.