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Review of effective emissions modeling and computation

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Abstract. An important issue in the evaluation of the environmental impact of emissions from concentrated sources such as transport modes, is to understand how processes occurring at the scales of exhaust plumes can influence the physical and chemical state of the atmosphere at regional and global scales. Indeed, three-dimensional global circulation models or chemistry transport models generally assume that emissions are instantaneously diluted into large-scale grid boxes, which may lead, for example, to overpredict the efficiency of NO_x to produce ozone. In recent times, various methods have been developed to incorporate parameterizations of plume processes into global models that are based e.g. on correcting the original emission indexes or on introducing "subgrid" reaction rates in the models. This paper provides a review of the techniques proposed so far in the literature to account for local conversion of emissions in the plume, as well as the implementation of these techniques into atmospheric codes.

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