EGU21-10780
https://doi.org/10.5194/egusphere-egu21-10780
EGU General Assembly 2021
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Impact of heterogeneous chemistry on the distribution of Glyoxal and Methylglyoxal in the troposphere

Ramiro Checa-Garcia[1], Didier Didier Hauglustaine[2], Yves Balkanski[3], and Paola Formenti[4]
[1]Laboratoire des Sciences du Climat et de l'Environnement, CNRS , Institut Pierre–Simon Laplace (IPSL), Gif□sur□Yvette, France (ramiro.checa-garcia@lsce.ipsl.fr)
[2]Laboratoire des Sciences du Climat et de l'Environnement, CNRS , Institut Pierre–Simon Laplace (IPSL), Gif□sur□Yvette, France (didier.hauglustaine@lsce.ipsl.fr
[3]Laboratoire des Sciences du Climat et de l'Environnement, CNRS , Institut Pierre–Simon Laplace (IPSL), Gif□sur□Yvette, France (yves.balkanski@lsce.ipsl.fr)
[4]LISA, UMR CNRS 7583, Université Paris–Est–Créteil, Université de Paris, Institut Pierre–Simon Laplace (IPSL), Créteil, France (paola.formenti@lisa.ipsl.fr)

Glyoxal (GL) and methylglyoxal (MGL) are the smallest di-carbonyls present in the atmosphere. They hydrate easily, a process that is followed by an oligomerisation. As a consequence, it is considered that they participate actively in the formation of secondary organic aerosols (SOA) and therefore, they are being introduced in the current climate models with interactive chemistry to assess their importance on atmospheric chemistry. In our study we present the introduction of glyoxal in the INCA global model. A new closed set of gas-phase reactions is analysed first with a box model. Then the simulated global distribution of glyoxal by the global climate model is compared with satellite observations. We show that the oxidation of volatile organic compounds and acetylene, together with the photolysis of more complex di-carbonyls allows us to reproduce well glyoxal seasonal cycle in the tropics but it requires an additional sink in several northern hemispheric regions. Additional sensitivity studies are being conducted by introducing GL and MGL interactions with dust and SOA according to new uptake coefficients obtained by dedicated experiments in the CESAM instrument (Chamber of Experimental Simulation of Atmospheric Multiphases). The effects of these heterogeneous chemistry processes will be quantified in the light of the new chamber measurements and also evaluated in terms of optical properties of aged dust aerosol and the changes in direct radiative effects of the involved aerosol species.