



Modelling global CO₂ emissions into the atmosphere from crown, ground, and peat fires

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The scheme for natural fires implemented in the climate model (CM) developed at the A.M. Obukhov Institute of Atmospheric Physics (IAP RAS) is extended by a module accounting for ground and peat fires. With the IAP RAS CM, the simulations are performed for 1700–2300 in accordance with the CMIP5 (Coupled Models Intercomparison Project, phase 5) protocol. The modelled present-day burnt area, BA, and the corresponding CO₂ emissions into the atmosphere E agree with the GFED–3.1 estimates at most regions. In the 21st century, under the RCP (Representative Concentration Pathways) scenarios, the global BA increases by 10–41% depending on scenario, and E increases by 11–39%. Under the mitigation scenario RCP 2.6, both BA and E slightly decrease in the 22nd–23rd centuries. For scenarios RCP 4.5, RCP 6.0, and RCP 8.5, they continue to increase in these two centuries. All these changes are mostly due to changes in natural fires activity in the boreal regions. Ground and peat fires contribute significantly to the total emissions of CO₂ from natural fires (20–25% at the global scale depending on scenario and calendar year). Peat fires markedly intensify interannual variability of regional CO₂ emissions from natural fires.