



## **Impact of aerosol mitigation on clouds properties in a 2xCO<sub>2</sub> climate simulation**

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We studied the impact on climate of mitigating main sectors that produce aerosols. This work, conducted in the framework of the European project COMBINE, considers in 8 different activity sectors (Aviation, Energy, Residential and Commercial, Industry, Land transportation, International Shipping, Waste, Biomass Burning). We account for BC, OC and sulfate emissions as computed for the Representative Concentration Pathways (RCPs) consistent with long term socio-economic scenarios. We aim to determine whether mitigating one activity sector has a significant effect on aerosol and cloud properties or not. The period of study consists of a 12 years period around 2050, period when CO<sub>2</sub> levels will be close to twice its preindustrial value and after the peak in aerosol emissions that according to the different scenarii is reached between 2020 and 2030.

We use in this study the LMDzINCA model with SSTs prescribed according to a previously run RCP 8.5 simulation. The GCM is coupled with an interactive aerosol chemistry module and a land surface/vegetation model, ORCHIDEE. Aerosol distributions are computed interactively according to climate. The first indirect effect is parameterized using the empirical relationship between cloud droplet number concentration and aerosol mass of Boucher and Lohmann (1995). For each economic sector we focus our analysis on the liquid water path (LWP), on the liquid cloud cover (LCC) and on the cloud droplet number concentration (CDNC) diagnostics of aerosol radiative effects. We highlight the economic sectors mainly affect the cloud properties. These effects are quantified regionally and globally.