

3.036 Future tropospheric ozone impacts of unconventional oil and natural gas development in Mexico.

Early Career Scientist

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Abstract:

New efficient drilling techniques have increased the amount of onshore extractable oil and natural gas (ONG). Consequently, unconventional exploitation of these resources has expanded rapidly into new regions across the U.S. and other countries with proven reserves. Having the sixth largest technically recoverable shale gas resources, Mexico has the potential to increase its current natural gas production by a factor of nine considering the estimated proven natural gas reserves, or by a factor of 270 considering the unproven wet shale gas technically recoverable resources. Studies of U.S. basins have shown that the exploitation of these resources is associated with large and poorly constrained emissions to the atmosphere that include non-methane hydrocarbons (NMHC) and nitrogen oxides (NO_x). Both species play an important role in tropospheric ozone (O_3) production through several pathways. By modifying the emissions of NMHC and NO_x , we designed three different future emission scenarios of ONG production in Mexico to analyze the impact on nation-wide atmospheric composition. The distribution of the NMHC and NO_x emissions over Mexican territory is based on the geographical distribution of its proven ONG reserves. The total emissions of NMHC are calculated by considering known emission rates per well (kg well^{-1}) using three different well densities (well km^{-2}) associated to each ONG production scenario. Underlying NMHC and NO_x emissions in the baseline scenario were updated and considered as of the year 2010. For the future scenarios, these emissions followed the same trend from 1999-2010.