Geophysical Research Abstracts, Vol. 9, 08468, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-08468


# The effect of humidity during ozonolysis of unsaturated fatty acid aerosol on the hygroscopicity of the products

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Hygroscopicity and CCN activity influence the direct and indirect aerosol effects on the Earth's radiation balance. Oleic and arachidonic acids have been used as proxies to monitor hygroscopicity changes induced by ozonolysis at atmospherically relevant reaction conditions using a humidified tandem differential mobility analyzer (H-TDMA). The hygroscopic growth of these particles was investigated after processing them in a flow reactor at controlled relative humidity and ozone concentration. Experimental results showed that increasing the humidity during the ozonolysis caused an increase in the hygroscopic growth factor (GF) of the oxidized polyunsaturated arachidonic acid particles of up to 1.1 at 93% of RH in the H-TDMA. The GF of oleic acid stays almost invariant to the ozonolysis conditions and relatively low at 1.03 at 93 % RH. The hygroscopic growth can be related to a functional group analysis based on proton nuclear magnetic resonance ($^1$H NMR) spectroscopy measurements. The ratio of carboxylic acid to aliphatic groups in the aerosol gradually increased from 0.055 to 0.12 with increasing RH in the flow reactor from 0 to 85 % RH, which indicates that the chemical mechanism under humid conditions promotes the formation of hygroscopic carboxylic acid functionalities.