Glyoxal and Methylglyoxal in Atlantic Seawater and marine Aerosol Particles

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The two α-dicarbonyls glyoxal (CHOCHO; GLY) and methylglyoxal (CH3COCHO; MGLY) have attracted increasing attention over the past years because of their potential role in secondary organic aerosol formation. Recently *Sinreich et al. (2010)* suggested the open ocean as an important (so far unknown) source for GLY in the atmosphere. To date, there are few available field data of these compounds in the marine area. In this study we present measurements of GLY and MGLY in seawater and marine aerosol particles sampled during a transatlantic Polarstern cruise in spring 2011. In seawater we especially investigated the sea surface microlayer (sampled with the glass plate technique) as it is the direct interface between ocean and atmosphere. Analytical measurements were based on derivatisation with o-(2,3,4,5,6-Pentafluorobenzyl)-hydroxylamine reagent, solvent extraction and GC-MS (SIM) analysis. The results show that GLY and MGLY are present in the sea surface microlayer of the ocean and corresponding bulkwater with average concentrations of 228 ng L^{-1} (GLY) and 196 ng L^{-1} (MGLY). Significant enrichment (factor of 4) of GLY and MGLY in the sea surface microlayer was found implying photochemical production of the two carbonyls though a clear connection to global radiation was not observed. On aerosol particles, both carbonyls were detected (average concentration 0.2 ng m^{-3}) and are strongly connected to each other, suggesting similar formation mechanisms. Both carbonyls show a very good correlation with particulate oxalate, supporting the idea of a secondary formation of oxalic acid via GLY and MGLY. A slight correlation of the two carbonyls in the sea surface microlayer and in the aerosol particles was found at co-located sampling areas. In summary, the results of GLY and MGLY in marine aerosol particles and in the oceanic water give first insights towards interaction processes of these alpha dicarbonyls between ocean and atmosphere (*van Pinxteren and Herrmann (2013)*).

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References:

Sinreich et al., Ship-based detection of glyoxal over the remote tropical Pacific Ocean. Atmos. Chem. Phys. 10(23), 11359-11371 (2010).

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