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Carbon monoxide emissions by phytoplankton off the Mauritanian coast.

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Carbon monoxide (CO) is naturally produced from the ocean surface and this oceanic source, which can have an impact on the remote atmospheric chemistry, needs to be better quantified. In the framework of the European project OOMPH (Organics over the Ocean Modifying Particles in both Hemispheres) a ship campaign was carried out with the German research vessel Meteor in July/August 2006 in the Mauritanian upwelling region. Natural seawater samples were incubated in deck incubators with running seawater and under natural light conditions using neutral density screenings for the appropriate light depth of 50% or 20%. 0.2 μm filtered natural sea water from the same water sample was used as control. CO mixing ratio in the headspace of the sample (control) was monitored continuously during a day (the day after). In total 5 experiments were performed from low to high biomass waters. Each experiment had an individual set of phytoplankton communities representing oligotrophic to eutrophic phytoplankton assemblages or a mixture of both. While the oligotrophic samples were

dominated by prochlorophytes, the highest biomass samples were dominated by diatoms. In all samples a varying but high grazing activity was present characterized by high phaeopigments concentrations.

All measured samples and controls showed a clear diurnal cycle of CO production following in general the shape of the natural light curve. However, the amplitude was much lower for the control (about 6 ppb) compared to most samples (up to 25 ppb CO). Within the different water samples no clear trend was observed for a biomass related CO production. While very low phytoplankton seems to produce almost no CO, comparable biomasses not necessarily produce the same concentrations of CO. This is in agreement with experiments performed in the laboratory, which showed that CO emission rates from phytoplankton are species dependent (Gros et al., 2008). These experiments suggest that, in addition to the known source of CO photoproduction from dissolved organic matter, there is also another CO production mechanism, attributed to direct biological production.