



The marine source of CO and NMHC in the Arctic Ocean in summer 2010: spatial variability, vertical distributions and impact of the biology.

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Oceanic emissions of carbon monoxide (CO) and light non methane hydrocarbons (NMHC) are important for both their impact on marine atmospheric chemistry and their contribution to global CO and NMHC budgets. Owing to the large area of the oceans, even small fluxes of those compounds per unit area could result in large global oceanic emissions. This is particularly important in the Arctic Ocean which is sensitive to environmental changes linked to global warming. To explore processes leading to the formation of CO and NMHC at the sea surface and their transfer to the atmosphere, their concentration in surface seawater as well as in the water column down to 100m depth were measured during a cruise of RV Polarstern in June-July 2010 through the Norwegian Sea to the Arctic Ocean. These results combine the first simultaneous set of measurements for CO, NMHC, and biological data in surface water and vertical profiles for the Arctic Ocean.

Preliminary results presented here show the variability of dissolved CO and NMHC all along the transects including data on surface waters covered by the ice pack. Variability of alkenes seems to be well correlated to CO which originates from the photo degradation of chromophoric dissolved organic matter (CDOM) under UV radiation. Concerning the vertical profiles, we have observed a maximum of concentration of CO close to the surface (0-15m) in relation to the UV penetration maximum followed by a sharp decrease until -100m. Such distributions seem to be related to the vertical stability of seawater masses since the layer at ~15m depth corresponds to the halocline, a natural salinity barrier which prevents rapid exchanges between deeper layers and the mixed layer. Some profiles of CO also show a secondary maximum at the maximum of fluorescence and oxygen. This secondary maximum is then attributed to a biological production acting as a secondary source.

Alkenes profiles (mainly ethene, propene and butenes) and surprisingly some alkane profiles show the same pattern as CO, and suggest the same photo-production processes. Isoprene vertical distribution displays a clear maximum in depth (20-30 m) and appears to be well correlated with the fluorescence profile, in agreement with a pure biological origin.

These variations are interpreted with the help of biological data and enable to estimate the contribution of arctic surface waters in the CO and NMHC budgets.