



Study of HUMic Like Substances in ice core from Col du Dôme

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Organic aerosols play an important role in the radiative properties of the atmosphere and on human health. HUMic Like Substances (HULIS) are a major contributor to this organic fraction. This study deals with extending to ice cores samples a HULIS measurement method initially developed for atmospheric aerosol.

First, HULIS are extracted using a weak anion exchanger resin (DEAE). Then carbon in the extracted fraction is quantified with a Total Organic Carbon analyzer. Analytical test indicate that firm contamination isn't a problem and that ≈ 140 mL of sample is enough for a proper TOC quantification. This method is thus adequate for alpine ice cores investigations.

First measurements are performed on a Col du Dôme ice core, on samples dated between 1988 and 1970. Results show a well-preserved seasonality of HULIS concentration, with an average concentration of 35 ppbC of HULIS in summer and 8.5 ppbC of HULIS in winter for this period. Results for the second part of the Col du Dôme ice core, concerning the 1950-1930 period indicate that average concentration of HULIS is 24 ppbC for summer and 8.8 for winter. Measurements point out a strange and currently unexplained signature during World War II with high values for HULIS together with a different UV-Vis spectrum. If we don't consider measurements during World War II, average HULIS concentration are respectively reduce to 19 and 5.9 ppbC. These results show an increase of HULIS concentration in the atmosphere over the last decades.

Absorption spectra measured on line during the extraction confirm that HULIS are efficient absorbers between 280 and 400 nm, which is important for aerosol radiative balance. Measured HULIS concentrations show that its contribution to dissolved organic carbon is less important than previously evaluated. This contribution is evaluated respectively at 17% in summer and 10% in winter, for the 1988-1970 period. With the contribution of this study between 53% and 57% of the DOC is now chemically identified. This study also suggests that some organic compounds evade analysis, and represent a significant fraction of DOC.

Key words: HULIS, carbonaceous organic aerosol, ice core