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Atmos. Chem. Phys., 9, 9587-9597, 2009

www.atmos-chem-phys.net/9/9587/2009/

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Seasonal variation of aliphatic amines in marine sub-micrometer particles at the Cape Verde islands

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Abstract. Monomethylamine (MA), dimethylamine (DMA) and diethylamine (DEA) were detected at non-negligible concentrations in sub-micrometer particles at the Cap Verde Atmospheric Observatory (CVAO) located on the island of São Vicente in Cape Verde during algal blooms in 2007. The concentrations of these amines in five stage impactor samples ranged from 0–30 pg m⁻³ for MA, 130–360 pg m⁻³ for DMA and 5–110 pg m⁻³ for DEA during the spring bloom in May 2007 and 2–520 pg m⁻³ for MA, 100–1400 pg m⁻³ for DMA and 90–760 pg m⁻³ for DEA during an unexpected winter algal bloom in December 2007. Anomalously high Saharan dust deposition and intensive ocean layer deepening were found at the Atmospheric Observatory and the associated Ocean Observatory during algal bloom periods. The highest amine concentrations in fine particles (impactor stage 2, 0.14–0.42 μm) indicate that amines are likely taken up from the gas phase into the acidic sub-micrometer particles. The contribution of amines to the organic carbon (OC) content ranged from 0.2–2.5% C in the winter months, indicating the importance of this class of compounds to the carbon cycle in the marine environment. Furthermore, aliphatic amines originating from marine biological sources likely contribute significantly to the nitrogen content in the marine atmosphere. The average contribution of the amines to the detected nitrogen species in sub-micrometer particles can be non-negligible, especially in the winter months (0.1% N–1.5% N in the sum of nitrate, ammonium and amines). This indicates that these smaller aliphatic amines can be important for the carbon and the nitrogen cycles in the remote marine environment.

[Final Revised Paper](#) (PDF, 2618 KB) [Supplement](#) (152 KB) [Discussion Paper](#) (ACPD)

Citation: Müller, C., Iinuma, Y., Karstensen, J., van Pinxteren, D., Lehmann, S., Gnauk, T., and Herrmann, H.: Seasonal variation of aliphatic amines in marine sub-micrometer particles at the Cape Verde islands, Atmos. Chem. Phys., 9, 9587-9597, 2009. [Bibtex](#) [EndNote](#) [Reference Manager](#)

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