Geophysical Research Abstracts
Vol. 21, EGU2019-7881, 2019
EGU General Assembly 2019

Fragrances as new contaminants in polar environments: local and long-range sources

Marco Vecchiato (1,2), Elena Barbaro (2), Elena Gregoris (1), Andrea Spolaor (2), Clara Turetta (2), Carlo Barbante (1,2), Rossano Piazza (1), and Andrea Gambaro (1)

(1) Department of Environmental Sciences, Informatics and Statistics (DAIS), Ca' Foscari University of Venice, Via Torino 155, 30172 Venezia-Mestre, Venice, Italy, (2) Institute for the Dynamics of Environmental Processes (IDPA-CNR), Via Torino 155, 30172 Venezia-Mestre, Venice, Italy

Fragrance Materials (FMs) are ubiquitous components of household and Personal Care Products (PCPs), whose environmental fate is still largely unknown. Even less information is available about the environmental distribution of PCPs in polar regions: beyond local human contamination, these fragile ecosystems are also threatened by long-range atmospheric transport (LRAT) of contaminants.
We chose 17 among the longest-lasting and most stable fragrance ingredients that are commercially available (Givaudan®: Amberketal, Ambrofix, Amyl Salicylate, Benzyl Salicylate, Bourgeonal, Dupical, Hexyl Salicylate, Isobutavan, Lemonile, Mefranal, Myraldene, Okoumal, Oranger Crystals, Pelargene, Peonile, Tridecene-2-Nitrile, Ultravanil) to assess their persistence, distribution and transport in the ecosystem.
The selected fragrances were initially found as contaminants in the Venice Lagoon: urban sewages largely emit these FMs into the surface seawater, reaching total concentrations higher than 10 μg/L in the innermost urban canals (Vecchiato et al., 2016). This pilot study reported the first detection in environmental samples for most of the selected FMs. These compounds were later detected in open sea areas of the Mediterranean, highlighting the role of mesoscale hydrodynamics and LRAT as key factors (Vecchiato et al., 2018a).
The distribution of these FMs in polar environments was studied in the coastal seawater of the Ross Sea, Antarctica (Vecchiato et al., 2017) and in seawater and snow samples from the Svalbard Islands (Vecchiato et al., 2018b). Local emission of FMs from both the Arctic and Antarctic research bases was revealed, together with evidences of LRAT of these substances. In particular, the snow deposition is likely to play a major role, constituting a possible secondary source of contamination during the seasonal snowmelt.
In each of the investigated environments the allergenic and oestrogenic Salicylate compounds resulted in general the most abundant and widespread components, probably due to their large global consumption. These findings support the hypothesis of the environmental persistence of the selected FMs, highlighting future research priorities.

Vecchiato, M., Cremonese, S., Gregoris, E., Barbaro, E., Gambaro, A. and Barbante, C.: Fragrances as new contaminants in the Venice lagoon, Sci. Total Environ., 566–567, 1362–1367, 2016.
Vecchiato, M., Gregoris, E., Barbaro, E., Barbante, C., Piazza, R. and Gambaro, A.: Fragrances in the seawater of Terra Nova Bay, Antarctica, Sci. Total Environ., 593–594, 375–379, 2017.
Vecchiato, M., Turetta, C., Patti, B., Barbante, C., Piazza, R., Bonato, T. and Gambaro, A.: Distribution of fragrances and PAHs in the surface seawater of the Sicily Channel, Central Mediterranean, Sci. Total Environ., 634, 983–989, 2018a.
Vecchiato, M., Barbaro, E., Spolaor, A., Burgay, F., Barbante, C., Piazza, R. and Gambaro, A.: Fragrances and PAHs in snow and seawater of Ny-Ålesund (Svalbard): Local and long-range contamination, Environ. Pollut., 242, 1740–1747, 2018b.