

Persistent organic pollutants analysis in environmental matrices from polar areas

Alice Callegaro*, Rachele Lodi, Andrea Spolaor, Jacopo Gabrieli, Carlo Barbante

*alice.callegaro@unive.it

Institute for the Dynamics of Environmental Processes – National Research Council of Italy IDPA-CNR, 30172, Venice, Italy



POPs – Persistent Organic Pollutants

according to Stockholm convention (since 17 May 2004)

- carbon-based organic chemical substances
- once released into the environment, they:
 - remain intact for exceptionally long periods of time (many years);
 - become widely distributed throughout the environment as a result of natural processes involving soil, water and, most notably, air;
 - accumulate in the fatty tissue of living organisms including humans; found at higher concentrations at higher levels in the food chain;
 - are toxic to both humans and wildlife

Factors dealing with POPs toxicity:

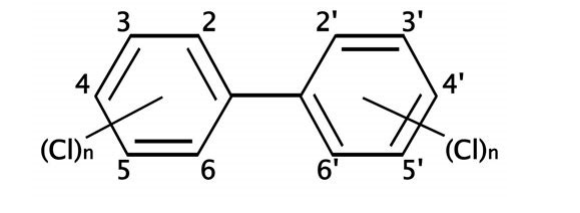
- Persistence
- Solubility (in water or organic solvents)
- Volatilization
- By-products resulting from POPs degradation

Main categories:

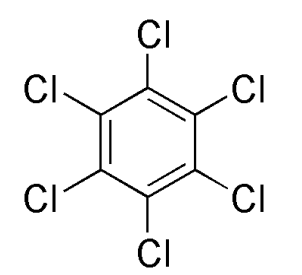
- Production purpose
 - Industrial chemicals
 - Agrochemicals (pesticides)
- By-products resulting from industrial activities

INVESTIGATED MOLECULES:

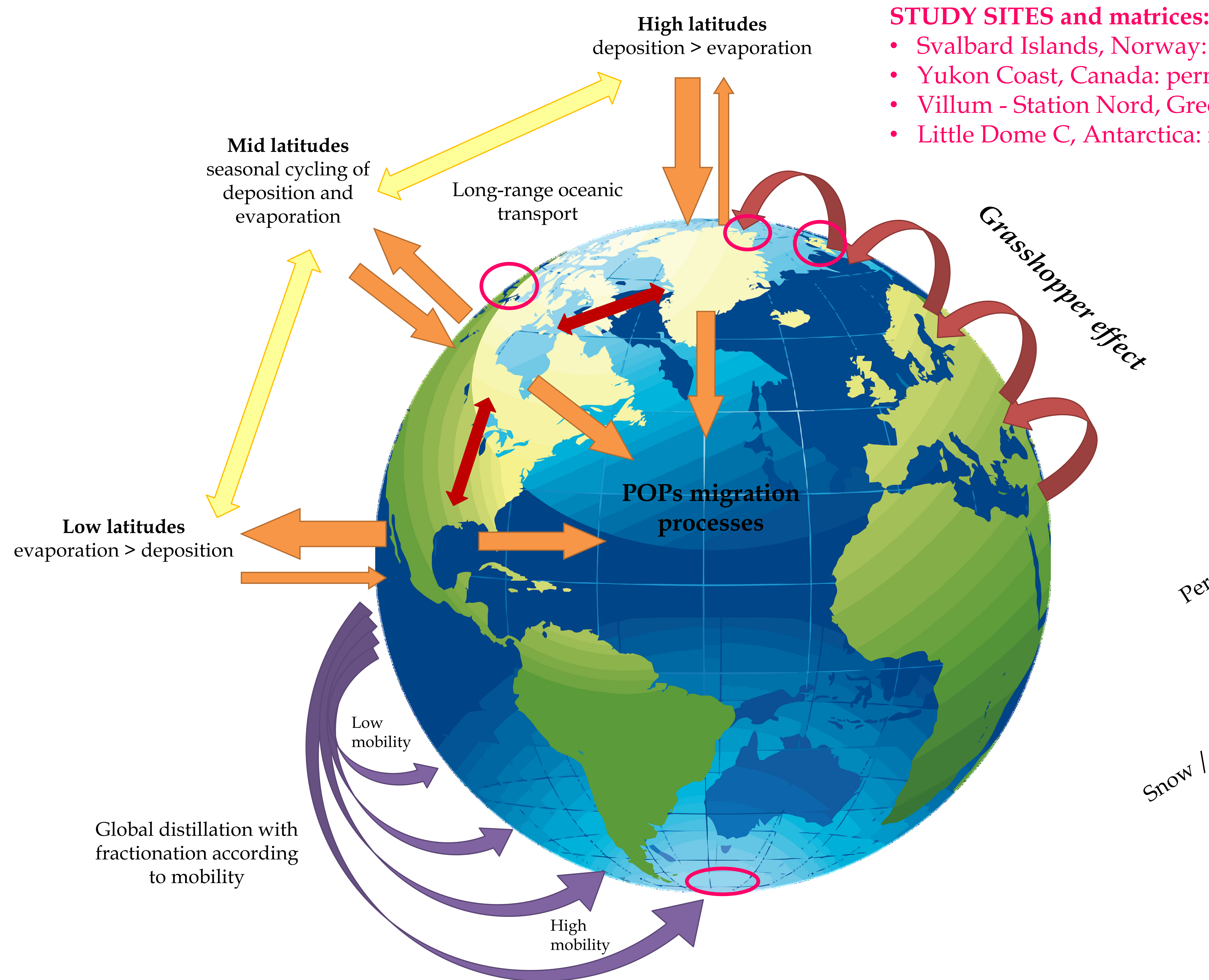
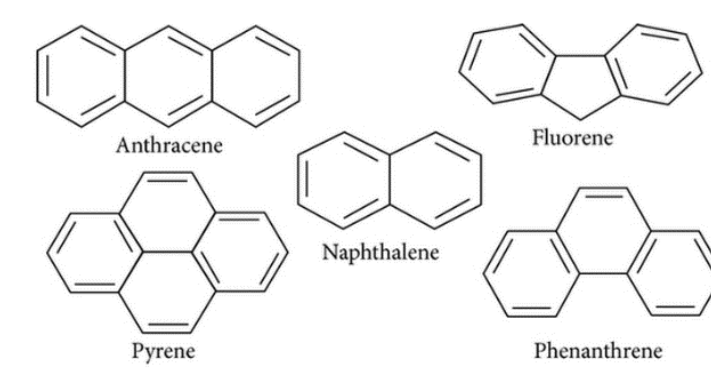
- PCBs (polychlorinated biphenyls)



- HCB (hexachlorobenzene)



- PAHs (polycyclic aromatic hydrocarbons) – not included in the Stockholm convention but toxic and persistent



STUDY SITES and matrices:

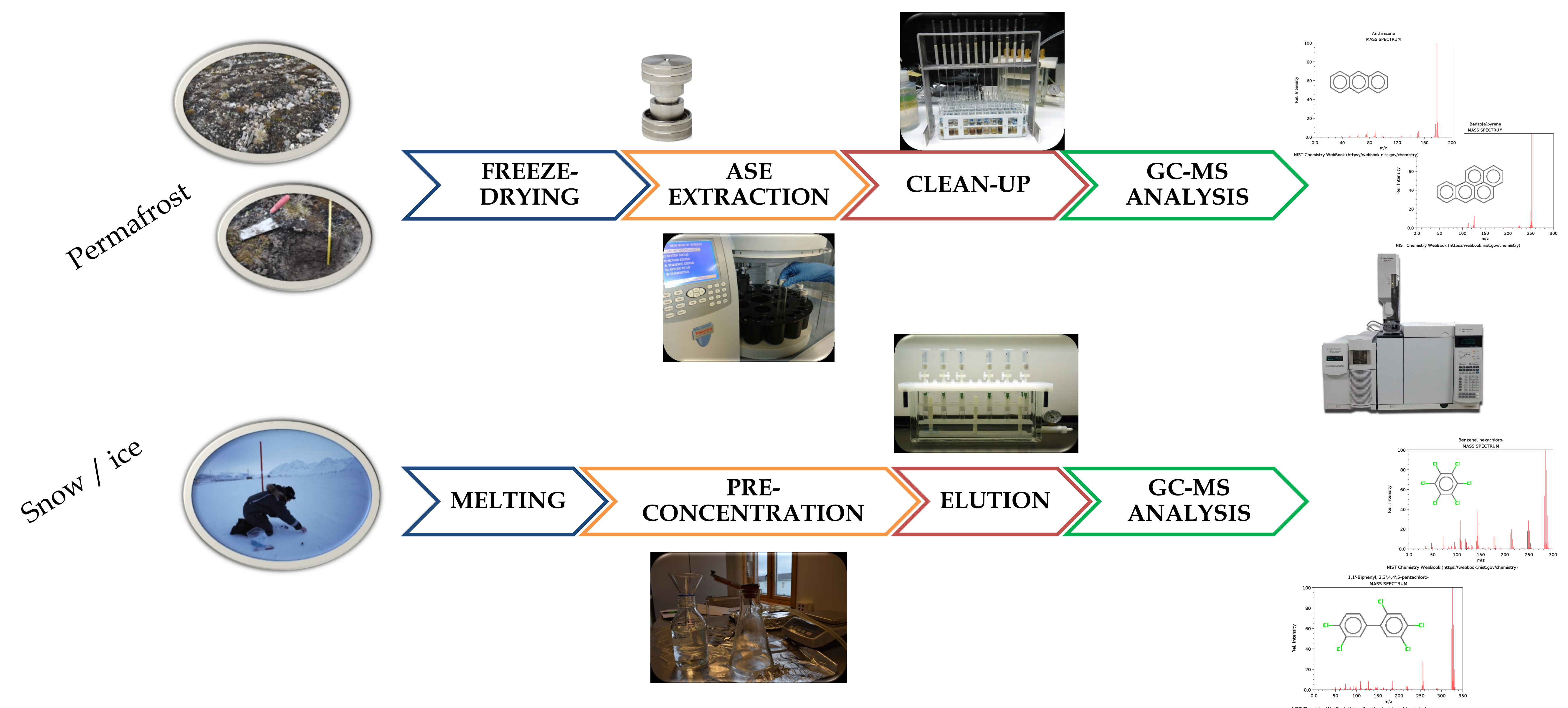
- Svalbard Islands, Norway: snow and permafrost
- Yukon Coast, Canada: permafrost
- Villum - Station Nord, Greenland: snow
- Little Dome C, Antarctica: ice core

Objectives within the projects Horizon 2020 NUNATARYUK and ERAPLANET

Strand 4 iCUPE:

- Determination of POPs in glacial (snow, ice) and periglacial (permafrost) samples
- Understanding the POPs contamination in the polar areas
- Quantification of released fluxes of POPs due to snow-ice melting and permafrost thawing

METHODS OUTLINE: SAMPLES PREPARATION AND ANALYSIS



Aknowledgments

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689443 via project iCUPE (Integrative and Comprehensive Understanding on Polar Environments) and grant agreement No 773421 via project Nunataryuk (H2020-BG-2016-2017/H2020-BG-2017-1, Permafrost thaw and the changing arctic coast: science for socio-economic adaptation – Nunataryuk)

Main references

- Argiriadis et al. – Atmospheric Environment, 2014
- Carrizo et al. – Environmental Science and Technology, 2011
- Gustafsson et al. – Science of the Total Environment, 2005
- Semeena and Lammet – Geophysical Research Letters, 2005
- Piazza et al. – Anal Bioanal Chem, 2013
- Vecchiato et al. – Microchemical Journal, 2015
- Wang et al. – Analytica Chimica Acta, 2010
- Wang et al. – Environmental Pollution, 2010
- Wolschke et al. – Marine Pollution Bulletin, 2015
- Zaborska et al. – Oceanologia, 2011
- Zhong et al. – Environmental Science and Technology, 2012