Session 9.4 (Thurs, 14-217, 14:40-15:00)

Atmospheric monitoring for persistent organic pollutants in Antarctica

David McLagan*; Darryl Hawker; Roger Cropp; Susan Bengtson Nash

Atmospheric Environment Research Centre; Griffith University, 170 Kessels Road, Nathan, QLD, 4111
*presenting author

Abstract: Antarctica is the most uninhabited, most isolated and coldest continent on Earth. Thus, there is a significant requirement to preserve this unique, remote environment from anthropogenic contaminants. However, certain persistent organic pollutants (POPs) have been measured on and around Antarctica, with long-range environmental transport (LRET) from sources at lower latitude sites and local sources of emissions from research stations and shipping being the causes. The current study has been implemented in accordance with the Global Monitoring Plan for POPs set out by the Stockholm Convention on POPs to monitor POPs at Casey Station in the Australian Antarctic Territory. Samples were taken using a passive flow-through air sampler that has been designed to continually align with the downwind direction. Chlorinated benzenes (especially HCB), PBDEs and endosulphan I dominated the contaminant profile of the current study, with only trace levels of PCBs, DDTs and other OCs detected. Heavy congeners, BDE-206 and -209 dominated the PBDEs profile. This was unanticipated as heavier congeners are less volatile and are expected to be less prone to undergo LRET. The results suggest a local source of BDE-209 that is perhaps augmented by an increase in activity at the research station after the winter period. The relatively low concentrations (fg/m³) of all contaminants in comparison to other atmospheric research in both polar regions is in general reflective of a reduction in the production of many POPs, the isolation of the Casey Station from both human populations outside Antarctica and other research stations on the continent and chemical breakthrough associated with the large air volumes sampled. Analysis of the Casey Station air-shed proved to be relatively ineffectual at linking potential source regions outside Antarctic to contaminant concentrations at the site. This has however highlighted the limited application of back-trajectory based analysis in the majority of Antarctica given their limited effective duration and the overall isolation of the continent.

Keywords: long-range atmospheric transport; passive, flow-through air sampler; air-sheds; air-mass back trajectories