

Climate Variability and Temporal Trends of Persistent Organic Pollutants in the Arctic: A Study of Glaucous Gulls

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Abstract

The impact of climate variability on temporal trends (1997-2006), of persistent organic pollutants (POPs; polychlorinated biphenyls [PCB], hexachlorobenzene [HCB], and oxychlorodane) was assessed in glaucous gulls (*Larus hyperboreus*) breeding in the Norwegian Arctic ($n = 240$). The Arctic Oscillation (AO: an index of sea-level pressure variability in the Northern Hemisphere above 20°N) with different time lags was used as a climate proxy. The estimated concentrations of POPs in glaucous gull blood/plasma declined substantially (16-60%) over the time period. Multiple regression analyses showed that the rates of decline for POPs were correlated to climate variation when controlling for potential confounding variables (sex and body condition). More specifically AO in the current winter showed negative associations with POP concentrations, whereas the relationships with AO measurements from the year preceding POP measurements (AO preceding summer and AO preceding winter) were positive. Hence, gulls had relatively higher POP concentrations in breeding seasons following years with high air transport toward the Arctic. Furthermore, the impact of AO appeared to be stronger for HCB, a relatively volatile compound with high transport potential, compared to heavy chlorinated PCB congeners. This study thus suggests that predicted climate change should be considered in assessments of future temporal trends of POPs in Arctic wildlife.