The return of sunlight in the polar spring leads to production of reactive halogens (e.g. Br, BrO) through heterogeneous reactions on halide enriched snow and ice surfaces. This production of halogen species influences the Arctic environment by causing boundary layer ozone depletion events and mercury deposition events. Currently, many uncertainties exist regarding the vertical extent of this chemistry, as well as the transport and sustained recycling of these halogens aloft. Here, we present ground-based and airborne remote sensing measurements of halogen oxides obtained using differential optical absorption spectroscopy. These measurements showed that the vertical distribution and amount of BrO observed is dependent on atmospheric stability, ranging from shallow events that have lower column densities to more distributed events that have lower concentrations but higher column densities. At coastal locations, we observe that higher amounts of BrO are associated with air masses that have interacted with sea ice regions. However, at remote sea ice locations, we observed a wide range of BrO column densities, suggesting that other environmental factors are also important. Airborne observations of this chemistry showed that aerosol particles allow this chemistry to occur aloft, enabling transport of this reactive bromine. This chemical transport mechanism increases the spatial extent of reactive bromine chemistry, impacting atmospheric composition and pollutant fate across the Arctic. The development of new instrumentation for mobile ground-based measurements and unmanned aerial systems (UAS) will also be discussed.