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Fluxes of short-lived halogenated methanes into the marine boundary layer

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Recent interest in the contribution of short-lived halogenated gases to stratospheric ozone depletion has prompted us to evaluate the fluxes of these gases from the ocean surface into the atmosphere, especially in areas of potential deep convection. We make our evaluation based upon seven cruises in the Pacific, Atlantic, and Southern Oceans over the past decade, a number of which have cruise tracks that overlap in part. Two pairs of cruises course through similar water masses during nearly opposite seasons. This allows us to make seasonal comparisons of the saturations of these gases and, by extension, evaluate their fluxes relative to their potential to be associated with deep convection. In the Tropical West Pacific, where the potential for convection is highest, spring and summer supersaturations of the very short-lived gases (CH_3I, CH_2Br_2, and $CHBr_3$) were about twice those in the fall, ranging from a mean of 25% for CH_2Br_2 during the fall to 4300% for CH_3I during the spring and summer. In the temperate Northeast Pacific, these gases remained supersaturated at all times, but at lower levels than in the tropics. Their supersaturations during the spring and summer also were about twice those of those in the fall, ranging from 40% for CH_2Br_2 to 3200% for CH_3I. CH_3Br, a slightly longer lived gas, behaved differently, remaining undersaturated at around -30% in tropical waters and swinging from a mean of -20% in the fall to +20% in the summer in temperate waters, consistent with seasonality previously observed for this gas in temperate waters. Here, we calculate the fluxes of these

gases into the marine boundary layer, comparing their boundary layer turnover times to their photochemical lifetimes to assess the initial step in their potential delivery to the stratosphere.