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## Large emissions of perfluorocarbons in East Asia deduced from continuous atmospheric measurements

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The atmospheric mixing ratios of perfluorocarbons (PFCs), extremely potent greenhouse gases, have been continuously measured at two Japanese stations (Cape Ochiishi and Hateruma Island) since 2006, to infer their global and regional emissions. The baseline mixing ratios of the measured C2-C4 PFCs [PFC-116 (C2F6), PFC-218 (C3F8), and PFC-318 (c-C4F8)] showed slight annual increases of 1%-3%. Enhanced mixing ratios above baseline were occasionally observed at both sites in air masses that had passed over metropolitan regions in East Asia, suggesting high PFC emissions from those regions. We applied transport models to these pollution events and an inversion technique to estimate national emissions. The results suggest that, among the studied regions (mainland China, Japan, North Korea, South Korea, and Taiwan), China was the largest PFC emitter, accounting for more than half of the regional emissions, followed by Japan. The estimated total emissions of each PFC from East Asia, 0.859 Gg/yr for PFC-116, 0.310 Gg/yr for PFC-218, and 0.562 Gg/yr for PFC-318, contributed greatly to global emissions as derived from the annual increases in the baseline mixing ratios, accounting for more than three-quarters of global PFC-218 and PFC-318 emissions and for approximately 40% of global PFC-116 emissions.

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