National Institute for Environmental Studies (NIES) Monitoring of Atmospheric Halocarbons

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Monitoring of atmospheric halocarbons was carried out at two remote sites in Japan; Hateruma Island (123.8°E, 24.1°N, 2004~) and Cape Ochiishi (145.5°E, 43.2°N, 2006~), as well as over the western Pacific Ocean (every ten-degree between 30°N and 30°S, 2005~) and over the Southeast Asian Sea (2007~) (Figure 1). The former is based on on-site hourly measurements and the latter is based on monthly sampling using NIES Voluntary observing ship (VOS) program (M/V Transfuture 5 for the western Pacific, M/V Fujitrans World for SE Asia). The target compounds included six CFCs, six HFCs, five HCFCs, three PFCs, SF_6, and some natural halocarbons. Figure 2 shows the results for HFC-134a and HFC-152a as examples. Long-term changes of their baseline concentrations at low- and mid-latitudes in East Asia were derived from the data at Hateruma and Ochiishi, respectively. Occasional short-term enhancement, on the order of hours to days, could be used to analyze their emission rates from surrounding countries (China, Japan, Korea and Taiwan). The measurements over the western Pacific showed the gradients of halocarbon concentrations between northern and southern hemisphere. The gradients were lowest in summertime, when halocarbons observed at Hateruma were sometimes on a similar level as in the southern hemisphere. Over the Southeast Asian Sea, some halocarbons (e.g. HFC-152a) were found to be mostly close to the baseline concentration from the Western Pacific, while others (e.g. HFC-134a) were sometimes highly enhanced.

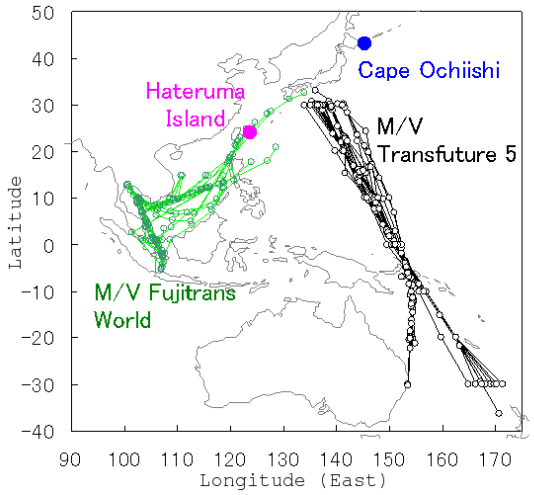

Figure 1. Monitoring and sampling points.

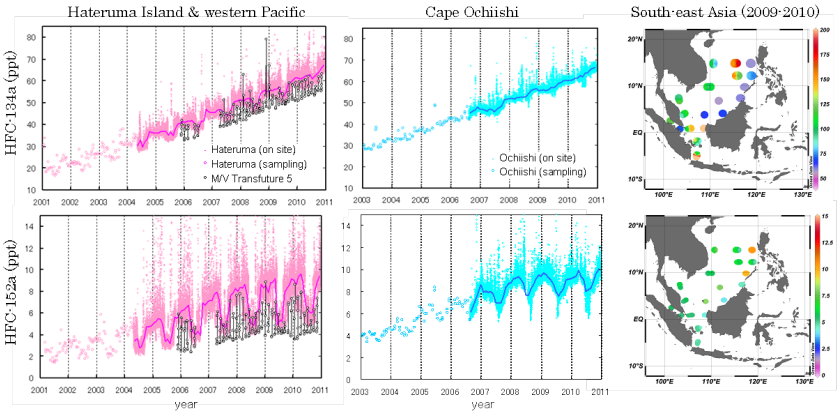

Figure 2. NIES measurements of HFC-134a (upper) and HFC-152a (lower) from Hateruma Island and over the Western Pacific (canister sampling), from Cape Ochiishi (on-site), and from over the Southeast Asian Sea (canister sampling). The thick color lines are the baseline mixing ratios. Gridded fields are shown for Southeast Asia.