Temporal variation of total gaseous mercury around the Korean Antarctic Station, King Sejong, in King George Island

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Total gaseous mercury (TGM) is primarily composed of the elemental mercury (Hg^0) vapor along with a trace amount of reactive gaseous mercury (RGM) and particle bounded mercury (PBM). The Hg^0 vapor may even, in particular in the remote areas, be >99% of the total gaseous mercury in air where the particulate mercury is significantly lower. The concentrations of TGM were monitored in the ambient air of the Korean Antarctic research station, King Sejong (62˚13'S 58˚47'W) from March 2009 to August 2011 at an time-resolution of one hour using an automated analyzer with the atomic absorption spectroscopic technique. Maximum concentration of 9.1 ng/m^3 has been detected due likely to the pollution from the station. The mean value of TGM during the whole period of observation is 0.8(±0.5) ng/m^3 which is within the range of mean values obtained in the Antarctic Stations. TGM shows seasonal variation of high concentration in summer and low concentration in late winter. Lower TGM level has already been reported in the past studies, in particular in the Antarctic early spring, due primarily to the so called phenomenon “mercury depletion events (MDE)” during the polar sunrise mainly governed by the BrO radicals. Low TGM reported during the polar spring perhaps because oxidation of the Hg^0 vapor producing highly reactive and soluble oxidized mercury species followed by absorption on the surface of the atmospheric aerosols and eventual deposition to the ecosystem. Additional analysis on backward trajectories to find origin of the air masses for MDE will be useful.