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Mercury emission and speciation of coal-fired power plants in China

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Abstract. Comprehensive field measurements are needed to understand the mercury emissions from Chinese power plants and to improve the accuracy of emission inventories. Characterization of mercury emissions and their behavior were measured in six typical coal-fired power plants in China. During the tests, the flue gas was sampled simultaneously at inlet and outlet of Selective Catalytic Reduction (SCR), electrostatic precipitators (ESP), and flue gas desulfurization (FGD) using the Ontario Hydro Method (OHM). The pulverized coal, bottom ash, fly ash and gypsum were also sampled in the field. Mercury concentrations in coal burned in the measured power plants ranged from 17 to 385 μg/kg. The mercury mass balances for the six power plants varied from 87 to 116% of the input coal mercury for the whole system. The total mercury concentrations in the flue gas from boilers were at the range of 1.92–27.15 μg/m^3, which were significantly related to the mercury contents in burned coal. The mercury speciation in flue gas right after the boiler is influenced by the contents of halogen, mercury, and ash in the burned coal. The average mercury removal efficiencies of ESP, ESP plus wet FGD, and ESP plus dry FGD-FF systems were 24%, 73% and 66%, respectively, which were similar to the average removal efficiencies of pollution control device systems in other countries such as US, Japan and South Korea. The SCR system oxidized 16% elemental mercury and reduced about 32% of total mercury. Elemental mercury, accounting for 66–94% of total mercury, was the dominant species emitted to the atmosphere. The mercury emission factor was also calculated for each power plant.

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