Air concentrations and wet deposition of major inorganic ions at five non-urban sites in China, 2001-2003 (part I)

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Introduction

China has high sulphur emissions and widespread acid rain is observed in southern and southwestern China. In addition the NH_3 emissions are high and the NO_X emissions are expected to increase.The monitoring of air pollutants in China has been focused on sulphur, and the sites have mainly been located in urban areas. There has been a strong need for multicomponent monitoring at more representative background stations to address the potential influence of long range transported air pollutants to rural areas. This is the background for establishing five high quality monitoring stations in the Sino-Norwegian project Integrated Monitoring Program on Acidification of Chinese Terrestrial Systems (IMPACTS).

Results

The air concentrations of SO_2 reflect the different site characteristics with annual averages ranging from 0.5 to above 40 μSm^{-3}. The concentrations at LGS are comparable to background sites in e.g Europe in contrast to the other four sites have a much higher pollution level. At the sites with intensive measurements (TSP, CJT and LGS), the main component in airborne particles is $(NH_4)_2SO_4$, but in TSP and CJT, $CaSO_4$ is also a considerable contributor. NH_4NO_3 is contributing as well in CJT and TSP but of less significance. Reduced nitrogen has a considerable higher concentration level than oxidised nitrogen. Both gaseous and particulate nitrogen are important in the total nitrogen concentration.

As for the air concentrations, the highest concentrations in precipitation are seen in LCG and TSP. Highest wet depositions are of sulphate, calcium and ammonium, table 1 (below).

Table1 *Total wet deposition of SO_4-S, Ca, NH_4-N and NO_3-N, $gm^{-2}y^{-1}$.*

		mm	SO_4-S	Ca	NH_4-N	NO_3-N
TSP	2003	1168	3.4	1.4	1.2	0.6
	2002	1558	3.9	1.3	1.6	0.7
	2001	959	3.1	1.1	1.2	0.5
LCG	2003	621	2.5	1.9	0.4	0.2
	2002	1080	3.5	2.8	0.8	0.3
	2001 *	407	1.2	0.9	0.3	0.1
LGS	2003	1367	1.6	0.7	0.6	0.5
	2002	2208	1.5	4.0	0.9	0.4
	2001*	1271	1.1	5.3	0.3	0.1
CJT	2003	1196	3.3	1.4	1.9	1.0
	2002	1611	2.6	1.3	1.3	0.7
	2001*	947	1.9	1.3	1.1	0.4
LXH	2003	1620	2.1	1.7	0.5	0.3
	2002	1253	1.2	1.5	0.4	0.5

* underestimates due to missing sampels.

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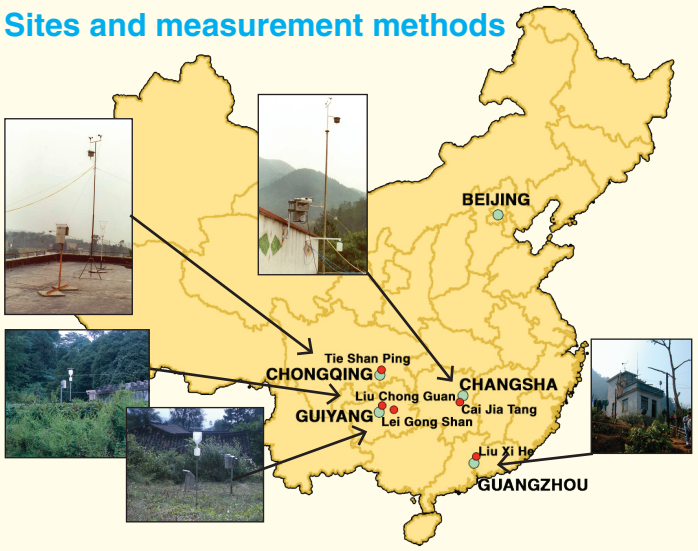
Sites and measurement methods



The monitoring sites are located in South and Southwest China and belong to the defined acid rain control zone. TSP and LCG located relatively near big cites (suburban sites) while the three others are situated in regional representative areas, LGS in the most undisturbed area. The air concentrations and particles at TSP, LGS and CJT are measured using a three stage filter-pack, NO_2 is measured by NaI impregnated glass sinters. The precipitation is measured using a wet only collector. Both air and precipitation sampels are collected weekly.

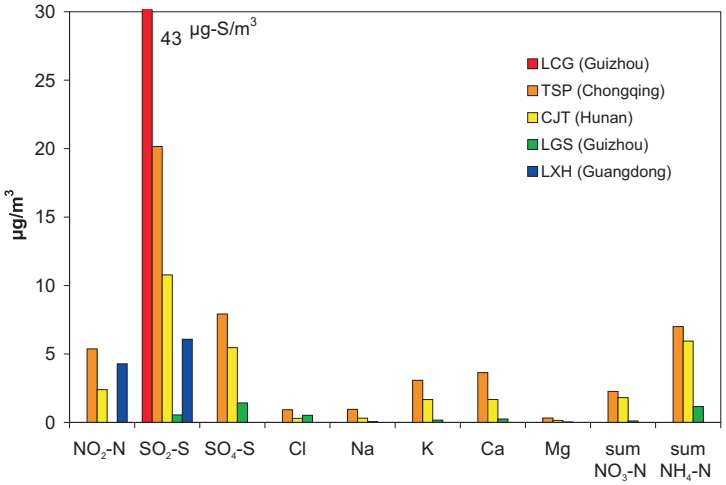


Figure 1 *Annual average concentration in 2003 in air and particles.*

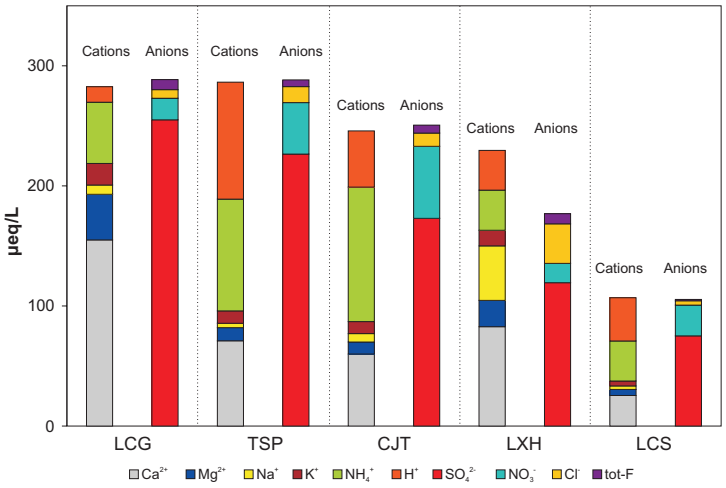


Figure 2 *Volume weighted concentration in 2003 in precipitation.*