



A 15-year dataset of mountain cloud chemistry observed in northern Taiwan

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The purpose of this study is to characterize the chemistry of the wintertime clouds observed in northern Taiwan. The experiment of cloud water collection on an hourly basis for each event was conducted at Bamboo Mt. (~1100 m MSL) during the winters of 1996-2010. In total, 130 events with 4589 samples were obtained. In general, there cloud events can be categorized into two cloud types associated with northeast monsoon flow and frontal passage. The average pH for all events ranged in 3.21-5.85, with a mean of 4.26 for all samples. On average, the dominant ions in collected cloud water were Na^+ , Cl^- , SO_4^{2-} , NO_3^- , and NH_4^+ . The first two seasalt ions generally can account for more than 50% of total ion concentration. In addition to the statistic analysis, the parameters of Acidifying Potential (AP), Neutralizing Potential (NP and Seasalt Potential (SP) were also introduced to characterize the cloud water chemistry. Associated backward trajectories of airflows for corresponding events were calculated in order to investigate the long-range transport of regional air pollutants. As a consequence, most of the backward trajectories were primarily originated from eastern coastal areas of China for cloud events associated with prevailing northeast monsoon flows. In contrast, the source regions of air mass can extend to central China for the cloud events associated with frontal passages. The source/receptor relationship between source regions and cloud chemistry was further studied. The results indicated that regional air pollutant can be possibly carried through clouds to Taiwan via the long-range transport.