Abstract. A semi-portable flow-through cloud water monitoring system was developed for measurements of cloud water conductivity and pH in remote sites lacking AC line power. This system was tested from May to September on Camels Hump mountain, Vermont. High temporal resolution data from seven cloud events were collected during the 1991 growing season. Mean cloud water conductivity and pH for all events was 467 $\mu$mhos cm$^{-1}$ and 3.2, respectively. The highest conductivity was 997 $\mu$mhos cm$^{-1}$ recorded on 19 September 1991 and the lowest pH of 2.9 was recorded during several events over the summer. Data from this system may be used to achieve a better understanding of the chemical environment in areas experiencing forest decline.

1. Introduction

Mountainous regions in northeastern North America receive a significant portion of their total precipitation as cloud water (Vogelmann et al., 1968; Scherbatskoy and Bliss, 1983). Cloud water typically contains significantly more pollutants than rain (Scherbatskoy and Bliss, 1983; Mohnen 1988; Sigmon et al., 1989) and is responsible for the bulk of acidic precipitation in montane forests (Mohnen, 1988). Red spruce ($Picea rubens$ Sarg.) growing at these elevations has exhibited declines in density and basal area over the last 25 yr (Vogelmann et al., 1985; NAPAP, 1990; Klein and Perkins, 1992). Acidic cloud water deposition may be involved indirectly in these declines by altering soil chemistry (Evans, 1984; Klein and Perkins, 1992) or directly by affecting foliage physiology (Fowler et al., 1988; Joslin et al., 1988; Sigmon et al., 1989; DeHayes et al., 1990; Adams et al., 1991; Jagels, 1991).

Cloud deposition has been characterized by manned stations (Mohnen, 1988; Collett et al., 1990), episodic bulk samples (Scherbatskoy and Bliss, 1983; Kimball et al., 1988; Sigmon et al., 1989), and sequential samplers (Choularton et al., 1992; Kronmiller et al., 1990; Laquer, 1990a). Although these methods have been proven reliable in more accessible areas, they are not suitable for use in remote locations. Until recently the technology for conducting near real-time cloud water conductivity and pH measurements in remote sites was unavailable or extremely costly.

Flow-through instrumentation has improved remote site cloud water monitoring (Laquer, 1990b). These systems can be constructed from battery powered components which are easily transported over steep, rocky trails. Systems can be configured to analyze water at short intervals immediately following collection, eliminating
Fig. 1. Drawing of the Forest Decline Project cloud water collector deployed on Camels Hump mountain in Huntington, Vermont.