

How has acid deposition changed over time?

Acid deposition trends in the Northeast mirror emission trends. Sulfur has declined, whereas nitrogen has remained largely unchanged.

SUMMARY: As expected, acid deposition trends in the Northeast mirror emission trends in the source area which extends to the Midwest. Over the past 30 years, sulfate deposition has declined but nitrogen deposition has remained largely unchanged.

DETAILS: Long-term data from the HBEF show declining concentrations of sulfate in wet deposition since the mid-1960s (see Figure 5). Based on these long-term data, scientists have determined that a strong positive correlation exists between sulfur dioxide emissions in the source area and sulfate concentrations in wet deposition at the HBEF. Therefore, it is now expected that the sulfate concentration of wet deposition will increase or decrease in a direct linear response to the increase or decrease of sulfur dioxide emissions in the source area.

The relationship between sulfur dioxide emissions and wet sulfate deposition extends beyond the HBEF throughout the eastern United States. The portion of the eastern United States with high wet deposition of sulfate decreased markedly between 1983-1997 (see Figure 6). According to recent estimates, wet sulfate deposition in the eastern United States declined 20 percent between 1992-1994 and 1995-1997. These reductions in wet sulfate deposition are consistent with the emissions reductions called for in the 1990 CAAA. However, a recent analysis of the effectiveness of the 1990 CAAA shows that decreases in sulfate concentrations in wet deposition at the HBEF that have occurred since 1990 do not depart significantly from the 37-year trend (see Likens et al. 2000).

In contrast to sulfate trends in wet deposition, concentrations of nitrate or ammonium at the HBEF have not changed significantly since 1963 (see Figure 5). Wet deposition of nitrogen at the HBEF is consistent with the pattern across the entire eastern United States which shows limited change over the last several years (see Figure 7).

LONG-TERM TRENDS IN WET DEPOSITION

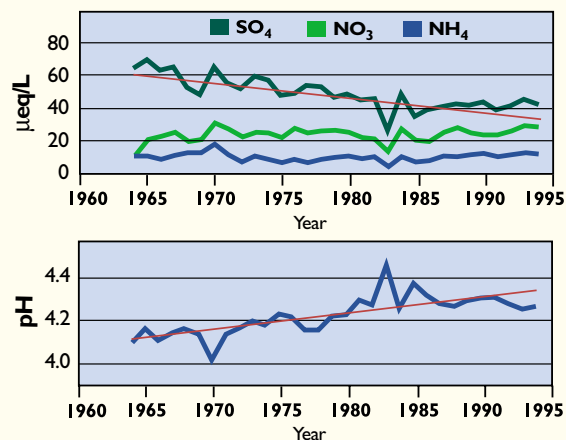
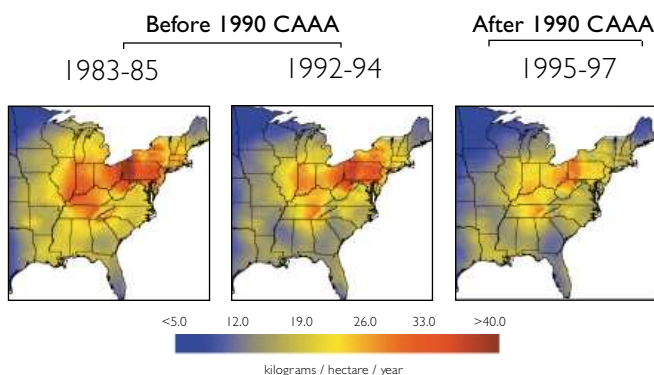


FIGURE 5: Long-term trends in sulfate, nitrate, and ammonium concentrations and pH in wet deposition at the HBEF, 1963-1994. The solid lines indicate statistically significant trends.

FIGURES 6 & 7:

Recent patterns of wet deposition before and after the implementation of the 1990 CAAA (after Grimm & Lynch 1997). Note: 1 hectare equals 2.47 acres. ▼

SULFATE WET DEPOSITION



NITRATE WET DEPOSITION

