

Högström's study may have contained relatively high ammonia concentrations which would have speeded up the sulfate removal. More experimental data are needed, however, to elucidate the various mechanisms involved in removal in different circumstances.

As far as the local impact of a point source on the surrounding wet deposition field is concerned, the results depend (as expected) on such factors as the strength and composition of the local emissions, and the extent to which the air mass entering the region of interest has been polluted by upwind sources. For example, Dana et al. (1975) found that the capability of a storm to wash out SO_2 from a power plant plume depends on the chemical makeup of the scavenging precipitation, since the solubility of SO_2 is very sensitive to the acidity of the absorbing raindrops (Hales, 1978). Similarly, Chan et al. (1981) found that during rainstorms the relative contribution of the INCO smelter to wet deposition in the Sudbury Basin depends on the weather system passing through the area. Wet removal of SO_2 is greater for cold frontal storms, which come from northern Canada and are significantly less acidic on arrival than the warm frontal storms associated with southerly air masses. This particular source contributed about 10 to 20% of the total wet deposition of sulfur out to 50 km or so. The smelter contribution of the total deposition of copper and nickel within the same area was roughly 40%.

For a large part of the period between June 1978 and May 1979, the Sudbury area INCO smelter was shut down due to strikes or scheduled shutdown. A detailed analysis was carried out by the Ontario Ministry of the Environment of the H^+ and SO_4^- in bulk and wet-only deposition samples collected by a network of monitoring stations in the local area (100 km). Comparisons of this data have been made with that obtained during periods when the smelter was operational. The results of this analysis did not show any significant change in the rainwater pH or acid deposition in the local area as a result of the smelter shutdown, thus providing evidence that long-range transport has a large impact on the acidic deposition in the Sudbury Basin. The comparison did show that the shutdown had a small but detectable effect on the amounts of sulfates collected within 20 km of the source. The results are of interest not only when assessing the potential impact of a large point source on the local area, but also in showing the important impact of long-range transport