

4 SUMMARY AND RECOMMENDATIONS

4.1 Concentrations and Deposition on a Local Scale

Although the emphasis in transboundary pollution has been for travel distances of the order of 1000 km or more, the understanding and prediction of atmospheric processes occurring in the local to mesoscale range (up to several hundred kilometers from the source) are also important. Concentrations and deposition from sources within local and mesoscale distances may augment or even dominate those from long-range transport and may be a factor that has to be taken into account if we are to develop accurate regional sulfur and nitrogen budgets. Finally, apart from the aspect of mesoscale transboundary transport, improved knowledge and modeling of mesoscale effects may improve the predictions of the models that are used for long-range transboundary transport.

(a) Sulfur Compounds

There is a wide range of estimates in the literature of the importance of nearby sources to the concentration and deposition of sulfur compounds at a given point. Most studies of both point and urban sources indicate that from a few percent to about 20% of the sulfur emitted from a source is converted in the long term to sulfate and deposited within 50 or 100 km of its source. If this is the case, then in the long term most of the emitted sulfur is available for long-range transport. There is less agreement with respect to deposition of emitted sulfur during precipitation events. Some investigators have found that 10 to 20% of deposited sulfur is accounted for by nearby sources, while in other studies the local contribution may account for most of the total deposition. The fraction deposited during a precipitation event may be as important as the long-term fraction because some receptors respond on short as well as long time scales.

These apparently contradictory results may be due to data interpretation or they may be due to real factors, including strength, composition and emission height of the local sources; the degree of pollution in the incoming air mass interacting with the local emissions; and meteorological factors, not