

10.1.1 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. Some studies of both point and urban sources indicate that as little as a few per cent of the sulfur emitted from a source is converted to sulfate and deposited within 50 or 100 kilometers of its source. If this is the case, then most of the emitted sulfur is available for long range transport. Other studies indicate that under certain circumstances most of the emitted sulfur is converted and deposited within 100 kilometers, leaving little pollutant available for long range transport. 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.

These apparently contradictory results may be due to several 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 the least of which is whether or not dry and wet deposition is occurring. If precipitation is not occurring, the rate of dry deposition by diffusion to the surface will depend upon the nature and roughness of the surface, the height at which pollutants are emitted into the atmosphere, the height to which they are mixed into the atmosphere, and the form (species) of the sulfur. The last point is important because the rate of dry deposition of sulfur dioxide is greater than that for sulfate. The more quickly the sulfur dioxide is converted to sulfate, the lesser is the fraction of emitted sulfur that will be deposited locally in the absence of precipitation. The processes which control the rate of conversion to sulfate have been described in detail in Chapter 4.