It should be stressed, however, that although reaction is not necessary for scavenging to occur, it often emerges as an important rate-limiting step. This importance stems primarily from chemical conversion's capability, in some circumstances, of devolatizing absorbed gaseous pollutants and thus inhibiting their tendency for desorption noted earlier. The conversion of dissolved SO_2 to sulfate is an important example.

The final stage of the composite scavenging process is the actual wet delivery of pollutant to the ground. This step is linked closely to rain formation and precipitation processes and thus depends strongly upon the variety of cloud-physics phenomena commonly associated with water extraction. These include autoconversion of cloud elements to form precipitation, accretion and condensation processes, and a host of ice-formation phenomena. The kinetics of such processes often have a significant influence on the rate of the overall scavenging process.

Areal deposition by storm systems is strongly dependent on climatological features of the storms themselves. Although a detailed treatise on North American storm climatology is well beyond the scope of this work, some limited insight in this regard may be gained by a partial classification of storm types and a climatological analysis of storm tracks. Important storm types in this regard include cyclonic or "frontal" storm systems and convective storms. Orographic and lake-effect storms are also important in particular localities, although these are relatively insignificant on an average continental basis. Climatological aspects of both convective and frontal storm types are presented in the existing literature, and climatological maps of cyclonic storm tracks are also available.

Much of what is known presently with regard to precipitation scavenging has been learned as a consequence of field studies. Beginning during the early 1950s in England and Europe, these studies have expanded from simple investigations of simulated plumes to include power-plant plumes, airborne tracer-injection experiments, urban plumes, and regional phenomena. The most comprehensive scavenging experiment pertaining to acidic substances performed to date has been the Oxidation and Scavenging Characteristics of April Rains, which extended throughout the northeastern sector of the U.S. and into southern Canada.