

the case of SO_2 , in which case absorbed SO_2 can increase the acidity of the surface moisture layer to the extent that further SO_2 transfer is cut off. Work by Liss and coworkers addressing the case of trace gas transfer to liquid water surfaces shows a clear influence of the Henry's Law constant as a determining factor (Liss and Slater, 1974). For readily soluble gases the evaporation analogy appears adequate in most cases, an assumption that leads to rather simple descriptions of deposition velocity as functions of windspeed (as done by Hicks and Liss, 1976).

Wind tunnel studies of particle transfer to water surfaces all show exceedingly small deposition velocities of particles in the 0.1 to 1 μm range. Several workers have suggested mechanisms by which larger deposition velocities might exist in natural circumstances. Slinn and Slinn (1980) suggest that the growth of hygroscopic particles in highly humid, near-surface air can cause accelerated deposition of such particles. On the other hand, Hicks and Williams (1980) suggest that breaking waves might provide a route for transfer that bypasses the otherwise limiting quasi-laminar layer in contact with the surface. Once again field observations are lacking.

One of the few sets of field data that is available (Wesely and Williams, 1980) shows clear differences in general behavior patterns for very small particles of the order 0.05 to 0.1 μm diameter, and optically active particles of size about 0.6 μm . The cause for much of the difference in behavior is assumed to be the production of particles by breaking waves themselves. The net consequences on deposition of atmospheric acidic materials to underlying water surfaces is not clear.

While large deposition velocities of soluble trace gases to open water surfaces appear quite likely, water bodies are frequently sufficiently small that the large expectations cannot be achieved. Air blowing from warm land across a small cool lake, for example, will not rapidly equilibrate with the smooth, cooler surface. Flow will then be largely laminar, with the consequence that very small deposition velocities will apply for all atmospheric quantities. In many circumstances, especially in daytime summer occasions, deposition velocities are likely to be so small as to be disregarded for all practical purposes. On the other hand, during winter,