The mixture of mineral matter from soil erosion plus significant contributions of sulfur, nitrogen compounds, soot from combustion sources, and particulate matter from the biosphere, is causing a significant impact on the atmospheric radiation field.

The magnitude and even the sign of the direct radiative dust forcing is uncertain. It depends on the optical properties of dust, its vertical distribution, cloud cover, and the albedo of the underlying surface.

Strong columnar aerosol mass loadings, which are frequently observed over deserts and during long-range transport of dust outbreaks, cause warming of layers aloft and thus changes of the atmospheric stability.

To date no weather model includes any feedback between these strong diabatic heating rates and atmospheric dynamics. A magnitude of direct mineral dust forcing of about $-0.5 \text{ Wm}^{-2}$ to $0.5 \text{ Wm}^{-2}$ is discussed and thus indicates global significance.

The presence of dust may alter cloud optical properties by changing the number of cloud condensation or ice nuclei.