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Cloud-desert dust interactions impacts on cloud microstructure and precipitation forming processes

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Desert dust affects clouds profoundly by serving as small and giant cloud drop condensation nuclei (CCN) and ice nuclei (IN). Combined aircraft and satellite measurements show that clouds dominated by desert dust produce moderate cloud drop concentrations, larger than in typical "maritime" clouds and smaller than in typical "continental" clouds. Therefore, the desert dust usually acts to suppress warm rain processes relative to pristine maritime clouds and to enhance these processes relative to polluted continental clouds. In addition, the ice nucleating activity of the dust is observed to glaciate clouds drops at temperatures of -20C even in very thin clouds. In deep convective clouds with warm rain the dust freezes supercooled rain already at few degrees below 0C.

The impacts are two directional. Precipitation also affects desert dust. Huge dust storms occur over the Sahara at the gust fronts of heat generated storms, which feed back to their microstructure, dynamics and precipitation forming processes.

Aircraft and satellite examples of clouds interacting with dust and the impacts on their microstructure and precipitation will be shown in the presentation.