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PRESENT DAY CLIMATE CHANGE BY AIR POLLUTION SUPPRESSING PRECIPITATION

D. Rosenfeld
Institute of Earth Sciences, The Hebrew University of Jerusalem, Jerusalem, Israel

The impact of anthropogenic pollution aerosols on clouds microstructure and drizzle has become obvious with the discovery of the ship tracks in pristine marine shallow clouds, soon after Multispectral satellite images became available at the mid-1980's. The pollution aerosols serve as cloud condensation nuclei (CCN) that create greater number of smaller cloud droplets that are slower to coalesce into raindrops. Clouds over land were assumed to be already "continental" and not susceptible to the additional pollution aerosols. This view started to change in the last 5 years with advancements in satellite measurements that facilitated the discovery of "pollution tracks" in the deeper clouds over land. It was found that anthropogenic emissions can create ship track like features in clouds well inland, and that these features are devoid of precipitation whereas adjacent thermodynamically similar clouds precipitate readily. The pollution tracks were evident well inland mainly in the least inhabitant areas of the world, such as Australia and Canada, but not in USA or Europe. This supports the suggestion that the background concentrations of CCN aerosols are already dominated by anthropogenic emissions, and that cloud microstructure and precipitation properties over land are far removed from the natural state. Precipitation loss over hills downwind of densely populated coastal areas in California and Israel amount to 15 to 25% of the annual precipitation. In deep convective clouds the slowing down of the conversion of the cloud drops into precipitation allows the transport of more water to the high parts of the clouds, where it contributes to the invigoration of the storms. These changes in precipitation amounts, time, location and intensity are also associated with changes in the latent heat release, which have substantial impact on the global weather systems and storm tracks. This situation was recognized in a resolution adopted by the 14th Council of World Meteorological Organization, Geneva, May 2003, stating: "Congress noted with concern the new additional evidence, also presented at the 8th WMO Scientific Conference on Weather Modification, that was pointing to an apparent substantial reduction of the rainfall efficiency of clouds by plumes of smoke caused by biomass burning (agricultural practices, forest fires, cooking and heating) and industrial processes. Congress also noted the evidence that such non-raining clouds could regain their raining ability once they moved over oceans or large bodies of water because sea-salt was then mixed into the clouds and overrode the detrimental effect of the smoke particles.