



Suppression of winter orographic precipitation on a continental scale: documentation from surface, cloud physics aircraft and satellite measurements

D. Rosenfeld and A. Givati

Inst. of Earth Sciences, The Hebrew University of Jerusalem, Israel

The discovery that pollution tracks in the clouds suppressed precipitation downwind of power plants, smelters and major urban areas led us to suspect that precipitation amounts would decrease downwind of these pollution sources from clouds that are susceptible to these aerosols. Such are short-living shallow clouds that typically form over topographical barriers in post frontal flow. These clouds are susceptible because time is a limiting factor in their precipitation efficiency, and enhanced pollution aerosol concentrations slows further the conversion rate of cloud droplets into precipitation. Givati and Rosenfeld (2004) quantified these effects for the coastal mountain ranges in California and Israel.

Additional analyses reveal that the decreasing trend of winter orographic precipitation is not limited to coastal regions, but rather occur well inland, all the way to the Colorado Rockies in North America and to the Swiss Alps in Europe.

Additional satellite and radar observations from California show conspicuous pollution tracks devoid of precipitation there. These observations prompted a cloud physics aircraft campaign planned for the duration of February 2005 based in Sacramento. The intention is to measure aerosols properties, cloud microstructure and precipitation forming processes in pairs of polluted and pristine cross sections across the Sierra Nevada, downwind of major urban areas and side wind of them. Hopefully preliminary results will be available for reporting in the presentation.