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On the relationship between space-time properties of rainfall and near-surface air temperature at the minute and kilometre scale

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An analysis of rainfall characteristics in space and time was conducted using a 24-year dataset obtained from a C-band weather radar located in Israel. The radar images (5-min and 1-km resolution) were associated with near-surface air temperature, relative humidity, dew point temperature and CAPE information, and the relationship between the climatic variables and the rainfall characteristics were explored on four 60 km by 60 km regions, covering sea and land areas and Mediterranean to semi-arid climates. Similar P-T trend patterns were found for all regions. Results show that increase in temperatures is leading to reduction in total rainfall amounts and increase in rainfall heterogeneity in space. Moreover, heavy rainfall (larger than 10 mm per hour) were observed to intensify with increasing temperatures, while low rainfall intensities (lower than 10 mm per hour) were observed to weaken. This implies the existence of a potential mechanism of redistribution of humidity in space toward high rainfall intensity cell formations with warming temperatures.