EMS Annual Meeting Abstracts
Vol. 14, EMS2017-212, 2017

Radar-based diurnal cycle of summer precipitation in the Czech Republic

Vojtěch Bližňák (1), Marek Kašpar (1), Miloslav Müller (1,2)

(1) Institute of Atmospheric Physics, Department of Meteorology, Praha 4, Czech Republic (bliznak@ufa.cas.cz), (2) Charles University in Prague, Faculty of Science, Department of Physical Geography and Geoecology, Prague 2, Czech Republic

Radar-based precipitation data collected over the summer seasons of a 10-year period (2002-2011) have been used to study a diurnal cycle of precipitation over the area of the Czech Republic. Radar reflectivity data were obtained from two C-band Doppler weather radars (Brdy and Skalky), integrated in time and merged with daily precipitation totals from rain gauge measurements. Using radar measurements, daily adjusted precipitation totals were later divided in 10-minute precipitation totals that were continuously accumulated in a series of time windows ranging from 30 minutes to 24 hours. Diurnal cycle of precipitation has been studied for mean and maximal seasonal precipitation with respect to altitude and length of precipitation accumulation. The diurnal cycle of mean seasonal precipitation showed that the precipitation frequency rapidly increases in the morning hours and culminates in average of two hours earlier in the mountains (around 13 UTC) compared to lower altitudes (around 15 UTC). The fact can be explained by the faster labialization of the troposphere above high-elevation areas due to solar irradiation. As a result, because the mean precipitation intensity in the mountains does not decrease until 21 UTC, the mean precipitation intensity culminates at that time only if precipitation episodes are considered. In a similar way, maximal seasonal precipitation concentrates in the afternoon and evening hours in almost all of the Czech territory, regardless of the altitude. Nevertheless, a detailed regional study demonstrates that short-term precipitation maxima usually start earlier in the afternoon in and around mountainous regions. Long-term (mainly 6-hour) precipitation maxima occur later than short ones but are substantially less concentrated in time. Decrease of concentration in time is even more pronounced for pixels above 900 m a. s. l. These differences between mountains and lowlands can be explained by smaller relative proportions and earlier onset of convective precipitation in mountains.