Ability of the new high-resolution atmospheric reanalysis ALADIN/PERUN to simulate heavy convective precipitation

Vojtech Bliznak and Petr Zacharov
Institute of Atmospheric Physics CAS, Department of Meteorology, Praha 4, Czechia (bliznak@ufa.cas.cz)

Atmospheric reanalysis are powerful tool to obtain information about the past state of the atmosphere by combination of the observations and numerical weather prediction (NWP) modelling through various data assimilation schemes. Major developments in NWP modelling have recently enabled to increase model resolution by nesting the regional reanalysis into the global reanalysis using a limited-area model. However, the relatively small area limits the use of those reanalyses for further meteorological, climatological and/or hydrological applications. A new atmospheric reanalysis ALADIN/PERUN was recently calculated to simulate various meteorological variables at high horizontal (2.3 km) and temporal (1 h) resolution over most of Europe in the 1989–2020 time span. Due to the high-resolution of the reanalysed data, precipitation fields can well capture the small-scale processes and thus well reproduce heavy convective precipitation. The contribution will evaluate this ability using adjusted radar-derived precipitation estimates as ground truth in the warm parts of the years 2002-2019 over the Czech Republic. Heavy convective precipitation will be selected from the dataset using defined criteria and their location and total amount will be evaluated for two different NWP model runs. The first one (A) includes the full assimilation of the observed data every 6 hours using the 4D-VAR assimilation scheme. The second one (B) uses only the boundary conditions from the ERA-5 global reanalysis and the prognostic data are not modified in any way. Comparing the two runs will provide us with information about the level of physical description in the NWP model as well as the effect of assimilation on the resulting precipitation fields.