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Investigating NWP initialization sensitivities in heavy precipitation events

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This study aims to investigate the effect of different types of model
initialization applied to extreme storms simulations. Storms with extreme precipitation can usually produce flash floods that cause several damages to the society. Lives and property are destroyed from the landslides when they could be speared if forecasted a few hours in advance. The forecasts depend on several factors; among them the initialization fields play an important role. These fields are the starting point for the simulation and therefore it controls the quality of the forecast. This study evaluates the sensitivities of WRF to the initialization from two perspectives, (1) resolution and (2) initial atmospheric fields. Two storms that lead to flash flood are simulated. The first one happened in Northeast Italy in 04/09/2009 (NI), and the second in Germany, in 02/06/2008 (GE). These storms present contrasting characteristics, NI was a maritime originated storm enhanced by local orography while GE was a typical summer convection. Three different sources of atmospheric fields defining the initial conditions are applied: (a) ECMWF operational
analysis at resolution of 0.25 deg, (b) GFS operational analysis at 0.5deg and (c) LAPS analysis at $\sim$15km, produced operationally at HCMR. The rainfall forecasted is compared against in situ ground radar and surface rain gauges observations through a set of quantitative precipitation forecast scores.