



Sensitivity of WRF-ARW for Heavy Precipitation Event over the Eastern Black Sea Region

Onur Hakan Doğan and Barış Önel

Istanbul Technical University, Aeronautics and Astronautics Faculty, Meteorological Engineering, Istanbul, Turkey
(onolba@itu.edu.tr)

In this study, we examined the extreme summer precipitation case over the Eastern Black Sea region of Turkey by using WRF-ARW. 11 people were killed by the flood and many buildings were damaged by the landslides in Artvin province. The flood caused by heavy precipitation between August 23 and 24, 2015 and the station observation is 255 mm total precipitation for the two days. We have also used satellite based observational data (Global Precipitation Measurement: GPM), which represents 150 mm total precipitation during case, to validate precipitation simulations. We designed three nested domains with 27-9-3 km resolutions for the simulations and the inner domain covers the all Black Sea and the surrounded coasts. The simulations have been driven by ECMWF ERA-Interim data and the initial conditions have been generated for 4 different simulations which are 3-days, 7-days, 15-days and 25-days long. WRF-ARW model physics parameters have been tested to improve simulation capability for extreme precipitation events. The microphysics (Kessler and New-Thompson) and PBL (YSU PBL and Mellor-Yamada-Janjic) options have been applied for each simulations separately, therefore 15 sensitivity simulation have been analyzed by using different parametrizations. In general, all simulations underestimated the two days extreme precipitation event which the large scale flow interact with warmer sea surface temperatures and complex topography over the eastern Black Sea region. The 3-days simulation with Kessler microphysics and YSU PBL predicts 148 mm precipitation which is highest simulated precipitation compare to all simulations for the corresponding station location. Moreover 25-days simulation represents better spatial coverage for precipitation pattern compare to the GPM data.