Simulation study of the nearshore convective system on 26 July 2011 in Korea

*Jung-Tae Lee[1], Dong-In Lee[1], Shingo Shimizu[3], Sang-Min Jang[2]

1. Division of Earth Environmental System Sciences, Pukyong National University, Korea, 2. Climate Application Team, Climate Application Department, APEC climate center, Korea, 3. Storm, Flood, and Land-Slide Research Department, NIED, Japan

The coastal zones belong to the most populated habitats worldwide, and the weather phenomena near the coast are immediately related to human life. The coastal weather phenomena are associated with sharp changes in heat, moisture, and momentum transfers between land and water. Those dramatic changes cause an unequilibrated state on the low-level flow, and transfers energy to the upper-side. It is quite crucial for prediction heavy rainfall to consider the effect of the surface, so that the transferring energy to upper-side provides a source of the convection. Especially, in a case of the coastal region has to be a meridional direction in the mid latitude such as the Korean Peninsula, the coast could be an important factor to trigger or enhance a convection of the precipitation system.
The rainfall case on 26 July 2011 caused over 150 mm of accumulated rainfall over 15 hours (26th 1500 to 27th 0600 LST) at wide regions. The narrow distributed heavy rainfall region skewed by over 300 mm to the coast, and the rain was one of the reasons for landslide and flash-floods. The precipitated core skewed to the coast is frequent rainfall pattern in the middle of the Korea.
Cloud Resolving Storms Simulator (CReSS) is implemented to simulate the heavy rainfall. The initial background to run storm simulator is the results of Meso-Scale Model (MSM) forecasted every 3 hours, and were resolved into the nested domain (Δx, y = 1 km). The successfully simulated results show similarly distributed rainfall compared with observation. The amount of rainfall concentrated on nearshore indicates that the simulated environment is sensitive to changed surface condition. The new cells were continuously generated by forced outflow of the pre-existing cell, sustained at nearshore. The cooled surface by the sustained outflow was the major role to propagate convergent region at low layer. On the other hand, the experiment which the land of the Korean Peninsula is assumed to be the sea does not simulate much precipitation and consequent cold pool.

Keywords: nearshore precipitation, surface change, cold pool

©2017. Japan Geoscience Union. All Right Reserved.