forecasting system designed to run on a small workstation system using all available data sources. The LAPS analysis and assimilation routines are made up of a surface analysis and three dimensional wind, temperature, cloud, and moisture analyses. A complete description of LAPS analyses is given by McGinley et al. (1991), Albers (1995), and Albers et al. (1996). In this study, synoptic observations from GTS, local observations from AWS (Automatic Weather Syatem), T_{BB} data from GMS satellite and the composite reflectivity data from 5 radar sites were used in the LAPS data assimilation for producing the initial data.

MM5 is the non-hydrostatic version of the PSU/NCAR meso -scale model (Dudhia et al., 2000). The model configuration is summarized in TABLE. 1. The model contains 31 vertical layers utilizing a terrain-following σ-coordinates. The computation is done separately in the 3 kinds of domain(FIG. 2). The fine grid models are relaxed by the values at lateral boundaries which are computed from the their mother domains. The coarse grid model is relaxed with the prediction of large scale model operated in KMA (MM5, 30km). The model utilizes Grell as cumulus parameterization, Mixed-Phase (Reisner) as explicit moisture scheme and MRF as PBL scheme. Grell scheme is utilized only the coarse grid model. We supposed that the precipitation can be simulated enough in the fine grid models without cumulus parameterization.

TABLE 1. The configuration of MM5-3km.

domain	domain 1	domain 2	domain 3
resolution	27 km	9 km	3 km
# of grid	57 ×51	61 ×55	61 ×55
vertical layer	31 layer (model top : 100 hPa)		
cumulus	Grell	Off	
explicit moisture	Mixed-Phase(Reisner)		
PBL	MRF		
shallow convection	On	Off	
topo data	global 30second data of USGS		
initial data	Assimilated by LAPS		
lateral boundary	MM5/KMA (30km)	1 way nesting	
prediction length	21 hour		

MM5-3km forecasts were performed on the PC-cluster (FIG. 3), one of the distributed parallel computers, It is an attempt to move a highly-computational task from an Cray T3E to a group of PCs running Linux. It is base on the 16-node Pentium II PCs (400 Mhz) and fast ethernet switch (100 Mpbs). It works using MPI which stands for "Message-Passing Interface" and is a cross -platform method of inter-process communication. The wall-clock was about 2.5 hours to integrate 21 hours.
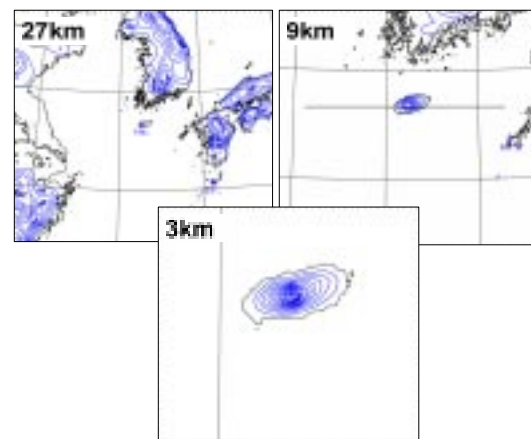

FIG. 2. The domians and their terrains in MM5-3km.

FIG. 3. The PC-cluster operated in Cheju Regional Meteorological Office.

3. Results and Conclusion

The heavy rainfall event on July 9 1999 was one of interesting cases to experiment due to not only a significant rainfall amount but also spacial distribution of the rainfall amount. The 24 hourly accumulated rainfall amount observed by Automatic Weather System (AWS) were 32mm to 312mm. According to synoptic weather charts, upper-level trough blocked by Okhotsk high continuously developed surface low over the Yellow sea and this low induced heavy rainfall over Korean peninsula, especially Cheju