A Capability of Storm Scale Prediction based on PC-cluster

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1. Introduction

Climatologically, Korean peninsula is located at the strong baroclinic region suffering from various meteorological disasters. The worst phenomena among the disasters is heavy rainfall whose loss is greater than half of total loss by natural disasters in Korea. Most heavy rainfall usually comes from meso-β scale system such as Changma front, MCC, etc (Lee *et al.*, 1998). Therefore the accurate prediction of meso-β scale phenomena takes priority of that of any other scale's to reduce meteorological natural disasters. Recently data assimilation using non-synoptic data, high resolution numerical schemes, parallel computing technique have been capable to construct the high numerical prediction system to detect meso-β or γ scale phenomena (Albers *et al.*, 1996, Dudhia *et al.*, 2000, Kim *et al.*, 1997).

The Central Meteorological Service Center, KMA (Korea Meteorological Administration) has reported meso-scale numerical products every 12 hour. But this information is not enough to determine storm scale forecast for the regional meteorological office. The resolution of the numerical model is too coarse to resolve the storm scale and the 12 hour, the interval of updated time, is too long to detect suddenly developing storm.

One of the keys to resolve the problems is adopting high resolution NWP system owned by the regional meteorological office. We applied this idea to Cheju island where Cheju Regional Meteorological Office takes the responsibility of the forecast. Although Cheju island is the small island (the area is about 1825 km^2) located in south sea, it has various meterological characteristics by bell shaped Halla mountain located at the center of the island. According to wind direction, local precipitation is suppressed or developed by mountain effect. Land/sea-breeze and mountain-valley wind are also dominant on clear weather. Most of all, the advantage of choosing the Cheju region is to minimize lateral boundary problem induced by the complex terrain. But most of the model domain is sea, so it is very difficult to make a good initial field of NWP model because of lower observing density than that of inland.

The objectives of this study are to examine the capability of storm scale prediction system for regional meteorological office and its usefulness in operation.

2. Storm Scale Numerical Prediction System

We constructed the operational storm scale NWP system for Cheju Regional Meteorological Office(Fig. 1). Local Analysis and Prediction System (LAPS) and the Fifth generation of Meso-scale Model (MM5) were selected for three-dimensional data assimilation and numerical prediction respectively. MM5 prediction was generated by PC-cluster based on 16 pentiums CPUs which was one of the cheapest parallel computer in nowadays. We named this system as Halla Short Range Prediction System (HSRPS).

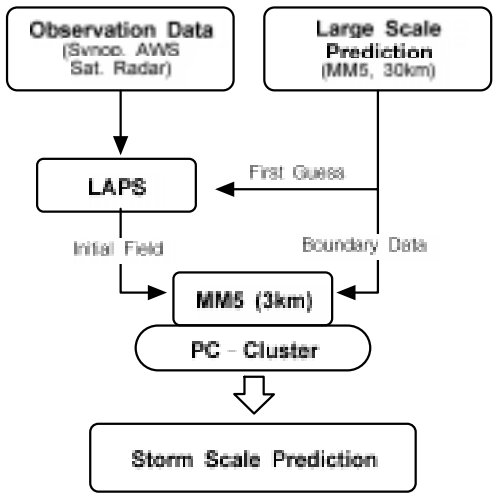

Fig. 1. The concept of Halla Short Range Prediction System.

LAPS has been developed by the Forecast Systems Laboratory (FSL) of the National Oceanic and Atmospheric Administration (NOAA) since the late 1980s. LAPS is a high-resolution analysis and

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