5A.6 **The precipitation mechanisms of typhoon Nari(2001) revealed by radar observation**

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1. Introduction

Typhoon Nari(2001) cast her landfall on 1400Z, Sep 16th and caused flash flood in northern Taiwan , Sui et. al. (2002) had provided a nice review of it's general characteristics. In this conference paper, the radar data sets collected from WSR88D at Wufensan and CAA at CKS airport were edited and synthesized through RASTA (2000), a terrain following Doppler wind synthesis program. The three dimensional thermodynamic field at different stages during Nari's landfall were retrieved by the method developed by Liou et al.(2003). The 2-D video disdrometer provided detail drop size distribution during landfall. Together with the ISS(Integrated sounding system) profiler data, very interesting contrast were found in the microphysical structure.

2. The maintenance of the pressure deficit after landfall

Fig. 1 showed the retrieved perturbation pressure field at 1500,1600 and 1700Z , within the same domain, the pressure deficit were 10,9 and 3hpa respectively. In order to illustrate the topographic effect the wind field and isotach within the northwest region of typhoon at 1600Z were illustrated in Fig. 2 . The vortex center of Nari still could be clearly identified two hours after landfall. We found the wind was still quite circular, however the 20m/sec isotach banded along the terrain, indicating the blocking of terrain forced the strong wind blew around the terrain and converged with the weaker wind at outer skirt at lower level and formed a rainband. This rainband moved slowly toward northwest and brought heavy rain to Taipei. Although the maximum wind radius expanded to 40km in the NW-SE direction, and 20 km in the NE-SW direction, the relative pressure deficit still could be maintained. (Fig. 3) The warm core about 4 degree were found in the circulation center.(Fig.4) The vertical pressure gradient force and warming near the center are responsible for the maintenance of the weaken typhoon.

3. The Drop Size Distribution and rainfall characteristics of the rainband

A quality control sequence was applied to 12hrs raw disdrometer data to get the drop size distribution. Between 0200-0300Z Sep 17th a similar rainband swept through the disdrometer and profiler site. From 0221 to 0233 the rainfall rate was above 90mm/hr, the median diameter is about 1.8 mm and the total number of rain drops reached 13,000. From 0239 to 0300, the total number dropped to 2,000 with median diameter near 1.5mm.

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4. summary

The disdrometer, Integrated Sounding System, rain gauge network and dual-Doppler radar data were collected during Nari's landfall. The terrain following dual Doppler synthesis wind field showed the structure change of circulation and the topographic influence. It explained the location and duration of the heavy rain after the landfall. From the thermodynamic retrieval results, the persistent circulation of Nari after landing maintained the low pressure center, the mean radial convergence at low level provided the moisture need of the convection. The terrain blocking decided the location of rainband, which was responsible for the heavy rain in the basin area. During the heaviest rain fall period, the disdrometer derived DSD indicated the number of drops increased very fast and dumped heavy rainfall. From the dual Doppler synthesis, the localized horizontal convergence of the drops may explain the torrential rainfall rate. The profiler observation of ISS enhanced the microphysical understanding in the vertical direction, the unique three dimensional structure of typhoon Nari and possible precipitation mechanisms were partially revealed.

Reference

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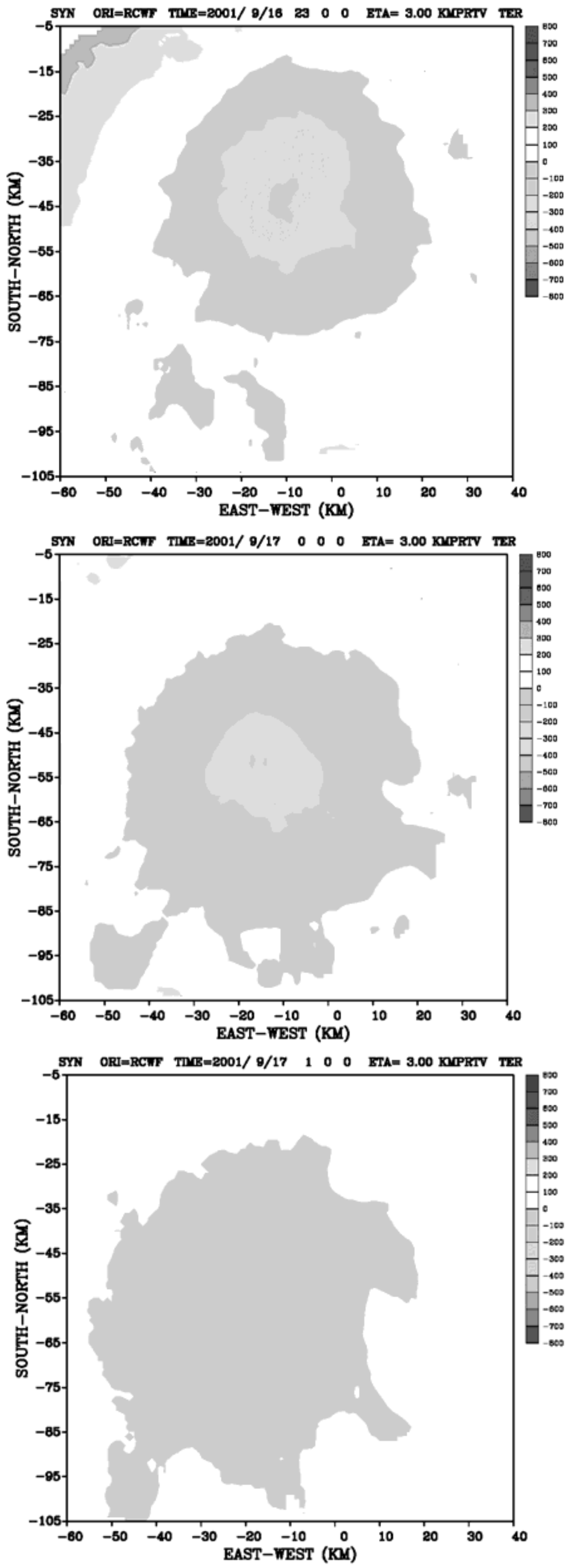

Fig. 1 The perturbation pressure field at 1500Z, 1600Z and 1700Z.

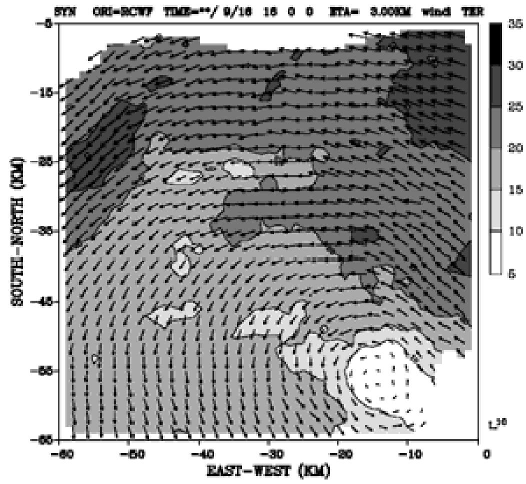

Fig. 2 Wind and isotach at 3km above terrain on Sep. 16 1600Z.

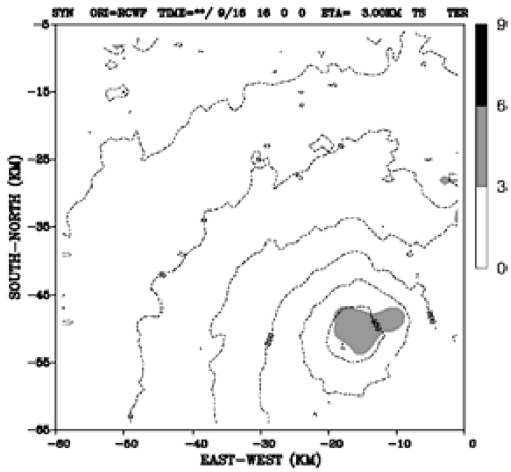

Fig. 3 Same as Fig2. except for pressure and buoyancy perturbation.

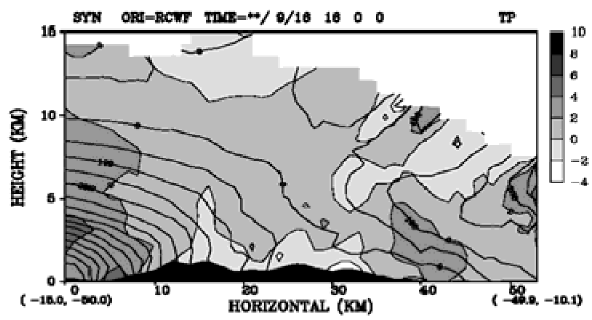

Fig. 4 The cross-section of pressure and buoyancy perturbation through (-15,-50) and (-50,-10) in Fig2.