Meso-scale analysis and warning dicussion of "2011.6.9" heavy rainfall event in Hunan province



Kernain strong precipitation period (20:00 9th) 08:0010th BJT) to

K the area of heavy rain (the North of Hunan) X average precipitation (45.2mm)

※ 3.61 million people affected, 36 people died K the direct economic losses (2.218billion)



the maximum precipitation : 275.6mm in the Hefan

the maximum precipitation: 58mm / h at 02:00 10th

2.Analysis of unstable index

time	K index(unit*C)			SI index			Cape		
	Chang	Hua	Chen	Chang	Huai	Chen	Chang	Huai	Chen
	sha	ihua	zhou	sha	bua	Spon		hua	zhou
08:00 9色	40	41	39	-0.6	-1.54	-1.18	1281. 5	499.7	156.7
20:00 9曲	38	39	36	-0.89	-2.36	0.87	1538. 1	1671	957.3
08:00 10th	34	38	41	1.69	-0.71	-2.18	28.6	587.4	82.6
20:00 10th	36	34	42	0.69	2.92	-3.12	0	0	2183.3

>Before and during the heavy rainfall event the larger K index and smaller SI index was

obvious, strong instability energy accumulated > the event was over, the K index and SI index was weaken

K index, index and CAPE values had indication significance before the rainstorm.

1.Summary of event

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The heavy rain occurred mainly in the east of the convective clouds with TBB temperature lower than -70°C. The heaviest rain occurred in the area where the TBB temperature was below -80°C.

4.Doppler radar feature analysis



'high reflectivity region in the storm tilts north-west (inflow side) with strong vertical velocity and big gradient of the reflectivity in the inflow region. ✓Implying new convection cells generated in the rear region of the storm. \checkmark "train effect" of the convection storms was the main reason causing the strong local precipitation event.



The max reflectivity of the zero layer (5km height) was less than 55dBZ and the max of the -20°C layer (6.5 km height) was less than 50dBZ which denied the hail. And the height of the boundary weak echo was obviously low with strong echo, which meant high efficient typical convection precipitation. The velocity also shows that there was obviously negative wind region.

5.Discussion warning

focusing on: the "the train effect" echo, the convergence of warm adDiscussion warning

vection, small-scale negative wind region. If the lower-level warning has been issued, but these features continue to maintain, warning forecaster should consider appropriatly increasing the warning level.



Velocity characteristics of the leeside region had certain forecast prediction. The long maintenance of negative wind region provided valuable reference to the strong radar echo lasting and developing.



the velocity echo feature in different stages

Segmenting stage, the area of negative velocity lager than the positive one(fig a). The lower layer was convergence. the zero lines is obviously clockwise which implies a strengthen of the precipitation within 50km.

opersistence stage,(04:30)(fig. c、b), there was a font area in the range of 60km, the area of negative

velocity lager than the positive one. odecaying stage(fig. d), the area of positive velocity was larger than the negative one, suggesting weakened precipitation in the future.

in the strong precipitation period(04:00-06:00), the radial velocity figure showed there was middle-lower level convergence and warm advection. It implied the persistence, strengthen and disappearance of large area rainfall relating to convergence and divergence of middle-lower levels. Middle-lower level convergence was benefit to heavy precipitation, and vise versa.

