臺灣地區豪雨觀測與預報觀測實驗(TAHOPE):回顧與研究成果

Taiwan-Area Heavy rain Observation and Prediction Experiment (TAHOPE): Overview and Research Results

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臺北市士林區華岡中國文化大學校園

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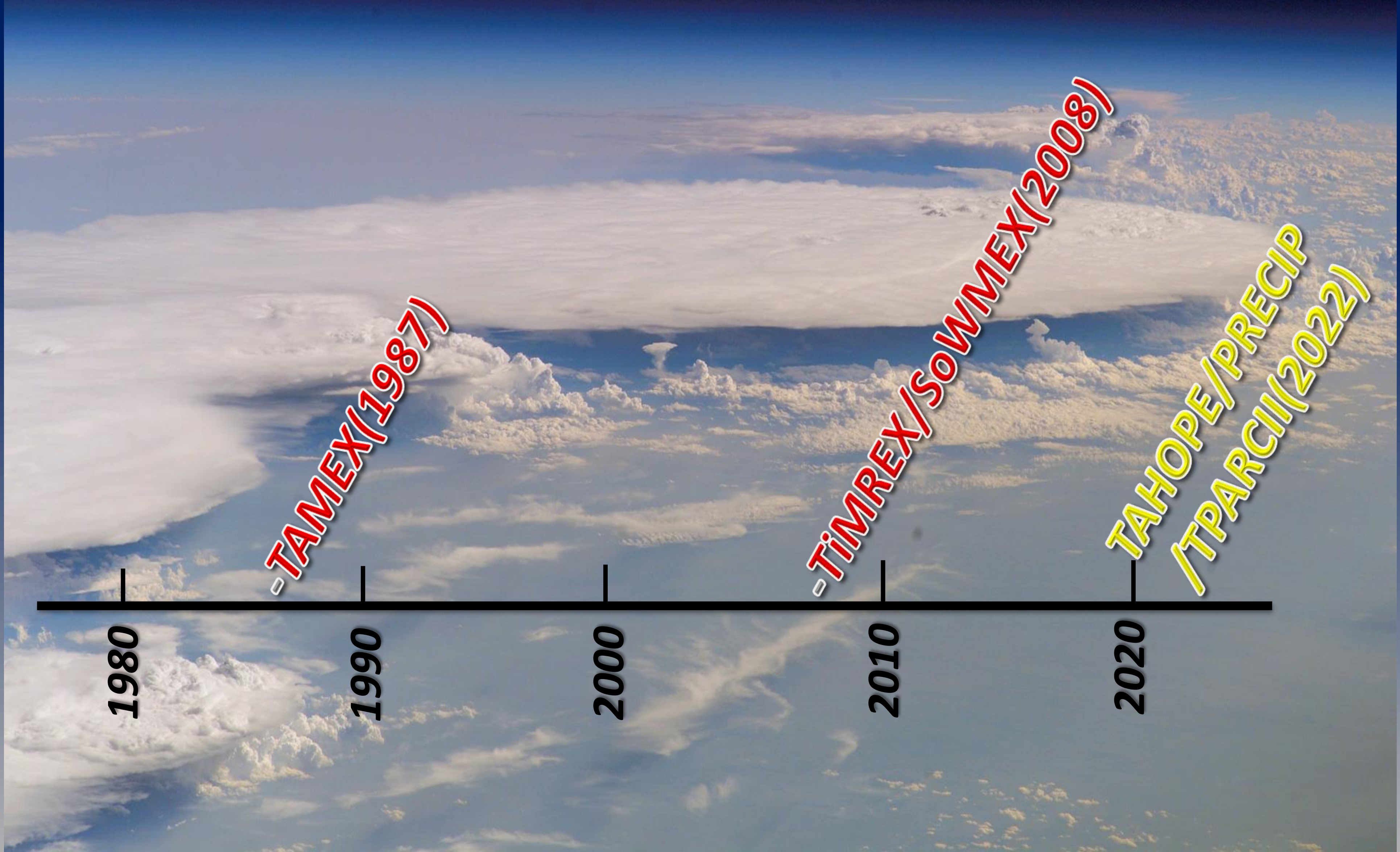
International Field Campaigns on Taiwan Investigating Extreme Rainfall



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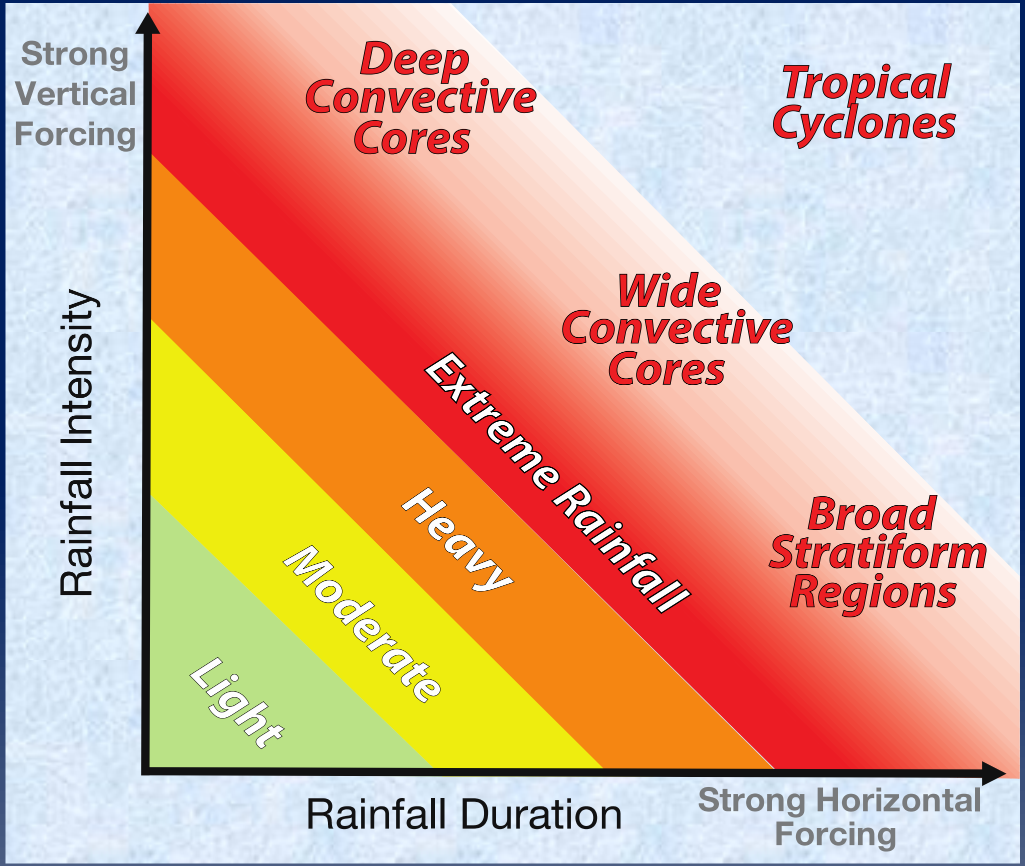
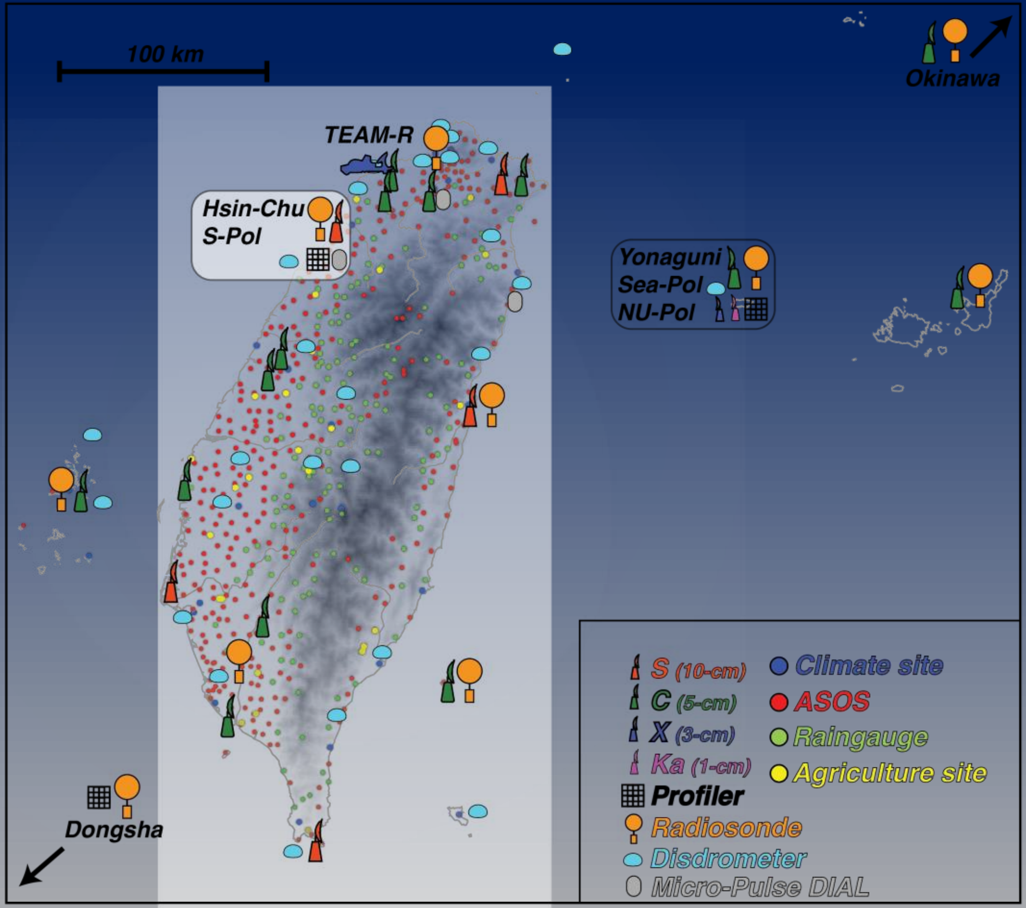


Figure from Michael Bell

- ***Primary objective*** is to simplify complexity of multi-scale interactions by identifying key ingredients and processes in the two limiting cases of high intensity and long duration events in a ***moisture-rich environment***

TAHPOPE/ PRECIP/ T-PARCII ~~2020~~ 2022

--Endorsed by WMO



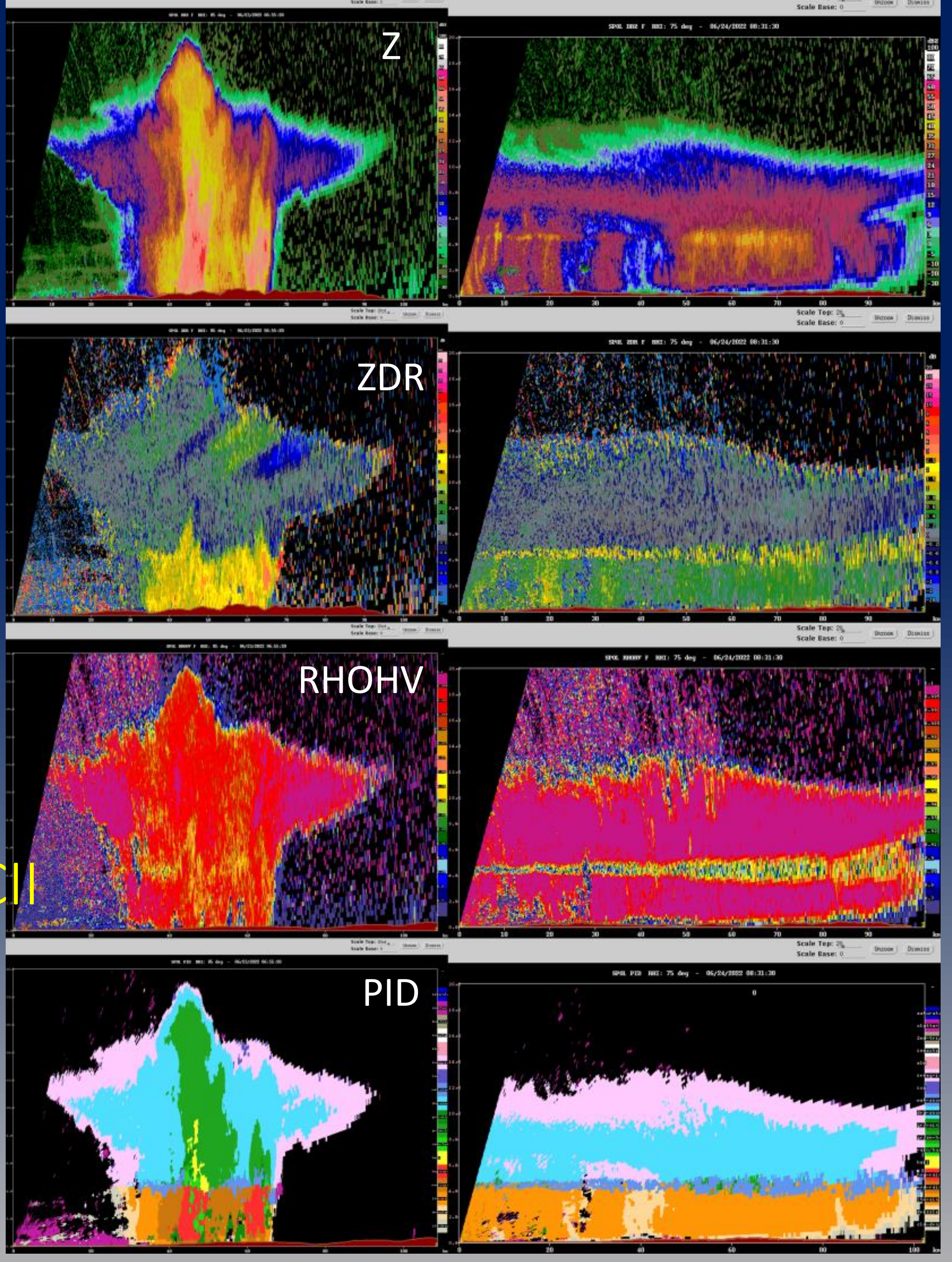
Slide from
Michael Bell

TAHOPE/PRECIP 2022
S-Pol Radar Antenna Assembly

Video from
李文兆資深科學家 (NCAR)

Over 286,000 RHI scans in 2022

- S-Pol operated from 5/25 – 8/10 (78 days)
  - Over 176,000 RHIs
- SEA-POL operated from 6/10 – 8/22 (74 days)
  - Over 100,000 RHIs
- TEAM-R operated from 5/15 – 7/31 (78 days)
- 3 MPDs operated from 5/28 – 8/10 (75 days)
- 1,341 soundings from TAHOPE/PRECIP/T-PARCII
- 11 Intensive Observing Periods (IOPs) & 8 Special Observation Periods (SOPs)



List of IOPs & SOPs during TAHOPE 2022 (5/25 to 8/10 : 11 IOPs totally)

	Period	Description
SOP1	5/25 00Z – 5/26 00Z	Mei-Yu front and MCS
IOP1	5/26 00Z – 5/28 00Z	Mei-Yu front and MCS (Backbuilding MCS on 5/26)
IOP2	5/31 00Z – 5/31 12Z	Afternoon thunderstorm (Thunderstorms with seep echo top of 16-km over Yilan)
IOP3	6/06 06Z – 6/12 12Z	Quasi-stationary Mei-Yu front on Taiwan (Backbuilding MCS over Miaoli; a squall line approaching northern Taiwan on 6/10)
IOP4	6/15 00Z – 6/16 00Z	Prefrontal southwesterly in a weakening Mei-Yu front (Dry air intrusion at low level over northern Taiwan)
SOP2	6/23 00Z – 6/24 00Z	Afternoon thunderstorm
SOP3	6/24 00Z – 6/25 00Z	Afternoon thunderstorm (Hail case at Taipei Basin)
IOP5	6/25 00Z – 6/25 15Z	Afternoon thunderstorm (Intense thunderstorms over Taipei, Taoyuan, and Miaoli)
SOP4	6/29 00Z – 6/30 00Z	Afternoon thunderstorm
IOP6	7/01 00Z – 7/04 00Z	Rainfall associated with TC Chaba and TC Aere (Heavy rainfall on eastern and southern Taiwan)

List of IOPs & SOPs during TAHOPE 2022
(5/25 to 8/10 in Year 2022: 11 IOPs totally)

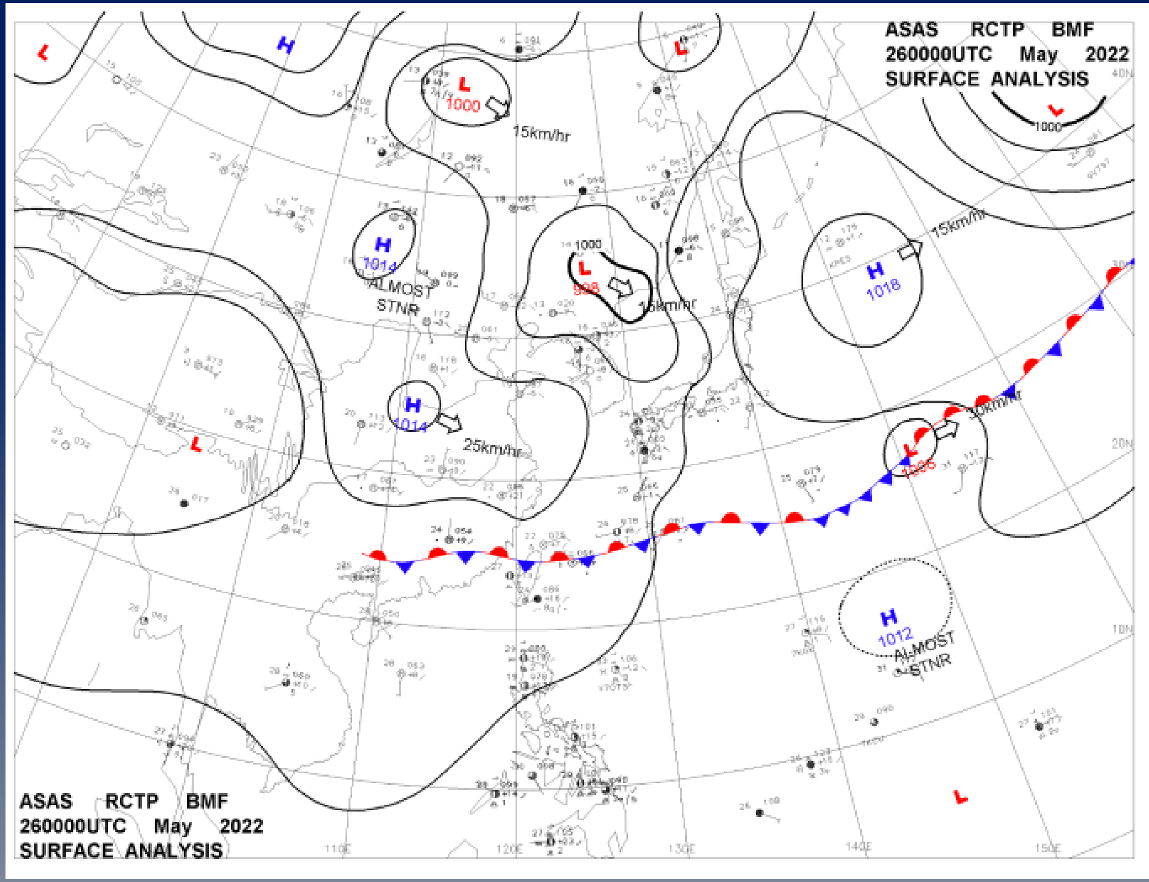
IOP7	7/05 00Z – 7/05 04Z	Typhoon Aere approaching Kyushu with dropsondes observation (Heavy rainfall over Kyushu and Honshu)
SOP5	7/05 00Z – 7/06 00Z	Afternoon thunderstorm at Taipei Basin
SOP6	7/06 00Z – 7/07 00Z	Afternoon thunderstorm at Taipei Basin
IOP8	7/13 06Z – 7/16 06Z	Rainfall associated with TD 90W (Heavy rainfall on eastern and southern Taiwan)
SOP7	7/19 00Z – 7/20 00Z	Afternoon thunderstorm at Taipei Basin
SOP8	7/20 00Z – 7/21 00Z	Afternoon thunderstorm at Taipei Basin
IOP9	7/29 00Z – 7/29 12Z	Moisture transport by low pressure and afternoon thunderstorm (Heavy rainfall in the evening; thunderstorms and lightning over northern Taiwan)
IOP10	8/01 00Z – 8/03 18Z	Moisture transport by low pressure (Heavy rainfall in Taipei Basin, central and southern Taiwan)
IOP11	8/04 00Z – 8/04 12Z	Afternoon thunderstorm (Thunderstorms in Taipei Basin)

備註：

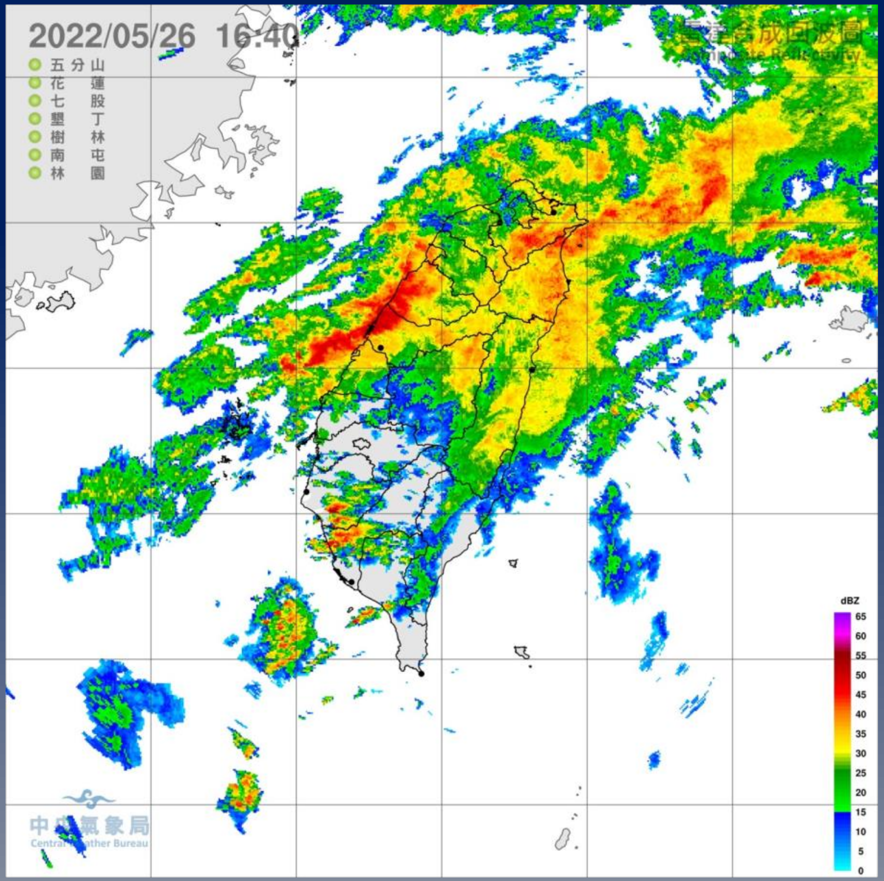
IOP (intensive observation periods)為有劇烈降水天氣且有額外密集觀測之個案。

SOP (special observation periods)為有劇烈降水天氣，但沒有額外密集觀測之個案(無探空加放)。

IOP1 weather feature: Backbuilding MCS along a Mei-Yu front

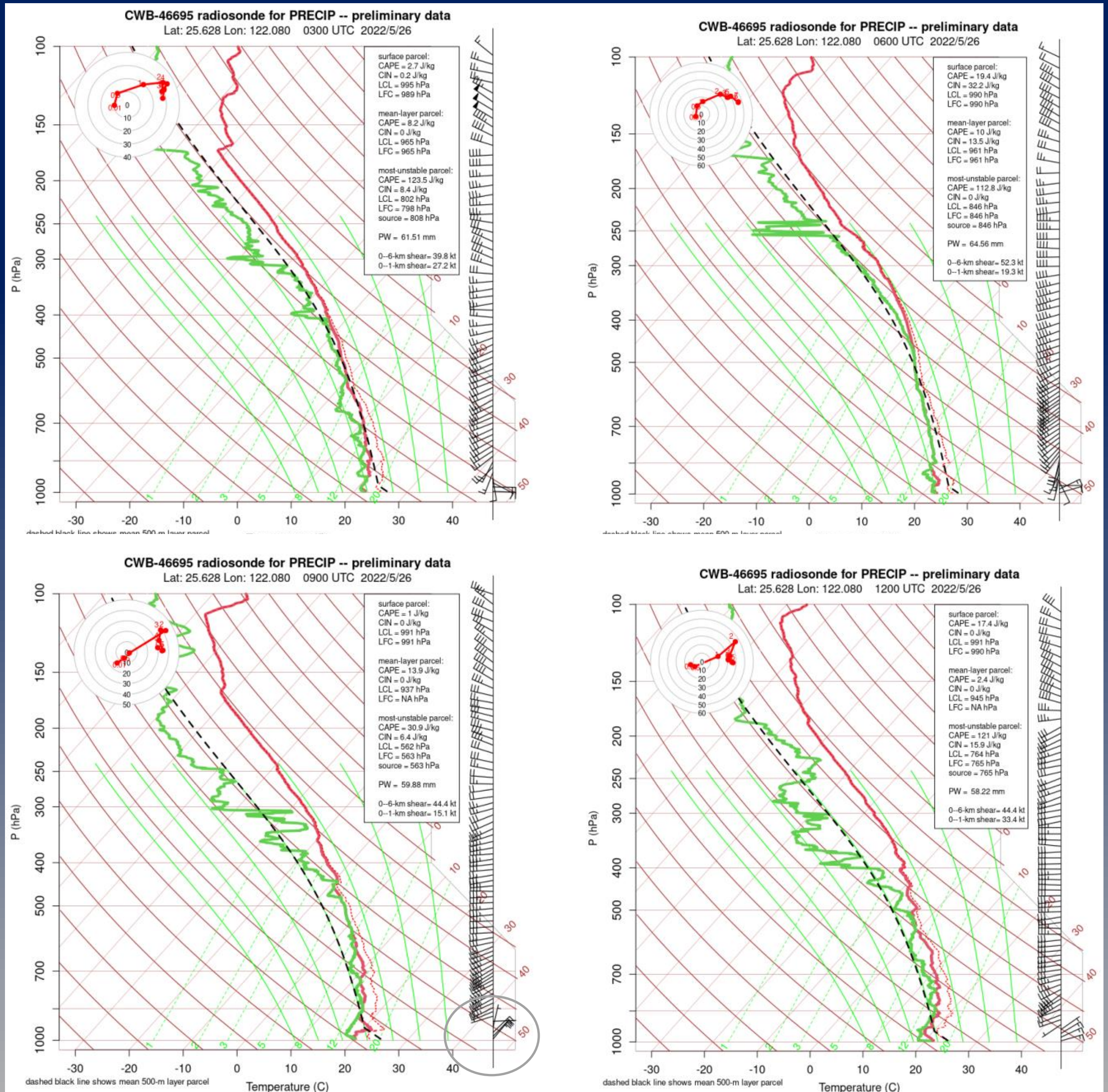


Surface weather map on 00 UTC 26 May:
A May-Yu front is approaching from southeastern China to Taiwan



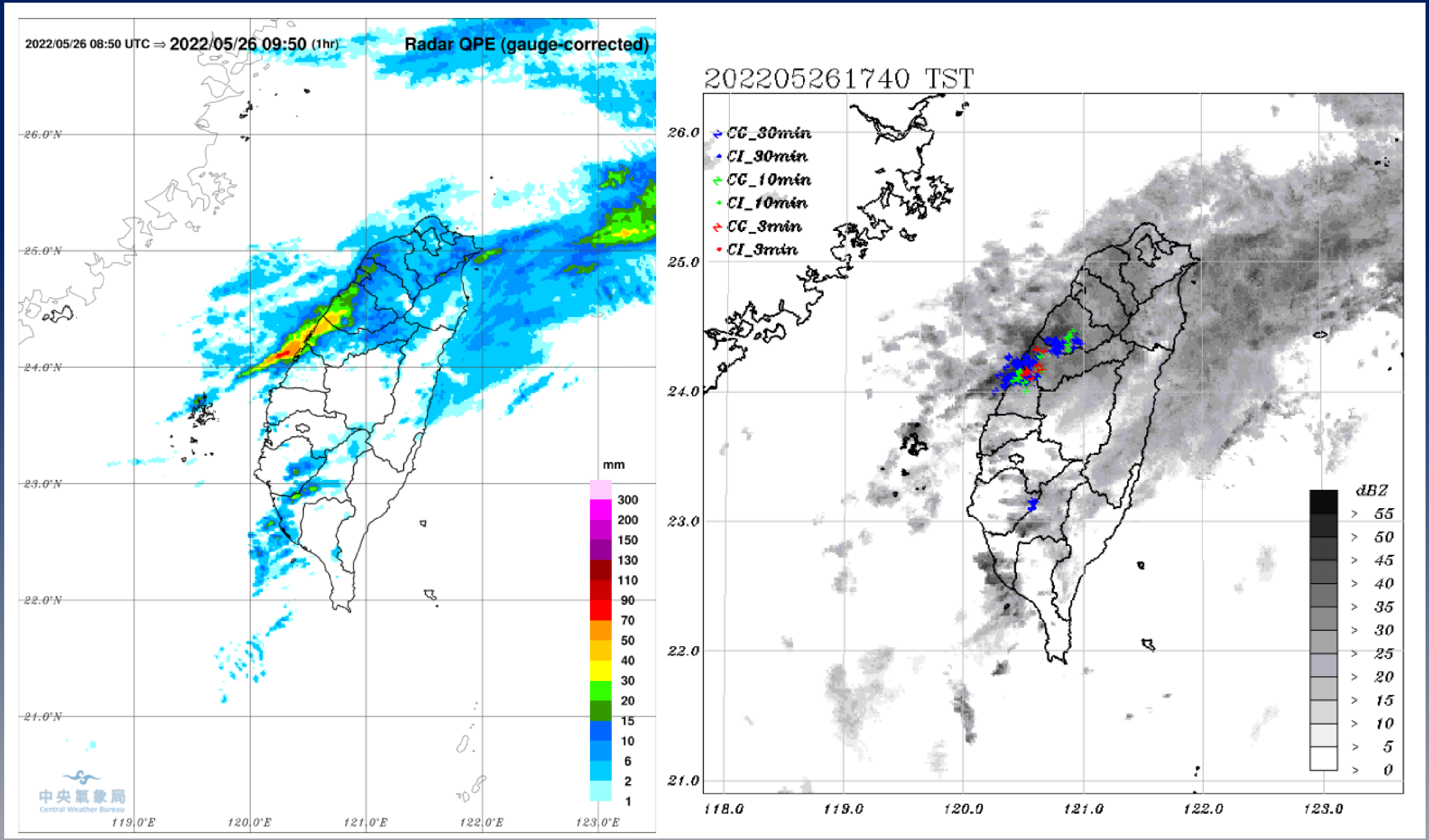
An MCS with backbuilding structure on 26 May for IOP 1

3-hourly Pengjiayu soundings at 03, 06, 09 and 12 Z on May 26



Pengjiayu surface wind turned to northerly at 09 UTC, indicating the passage of the Mei-Yu front.

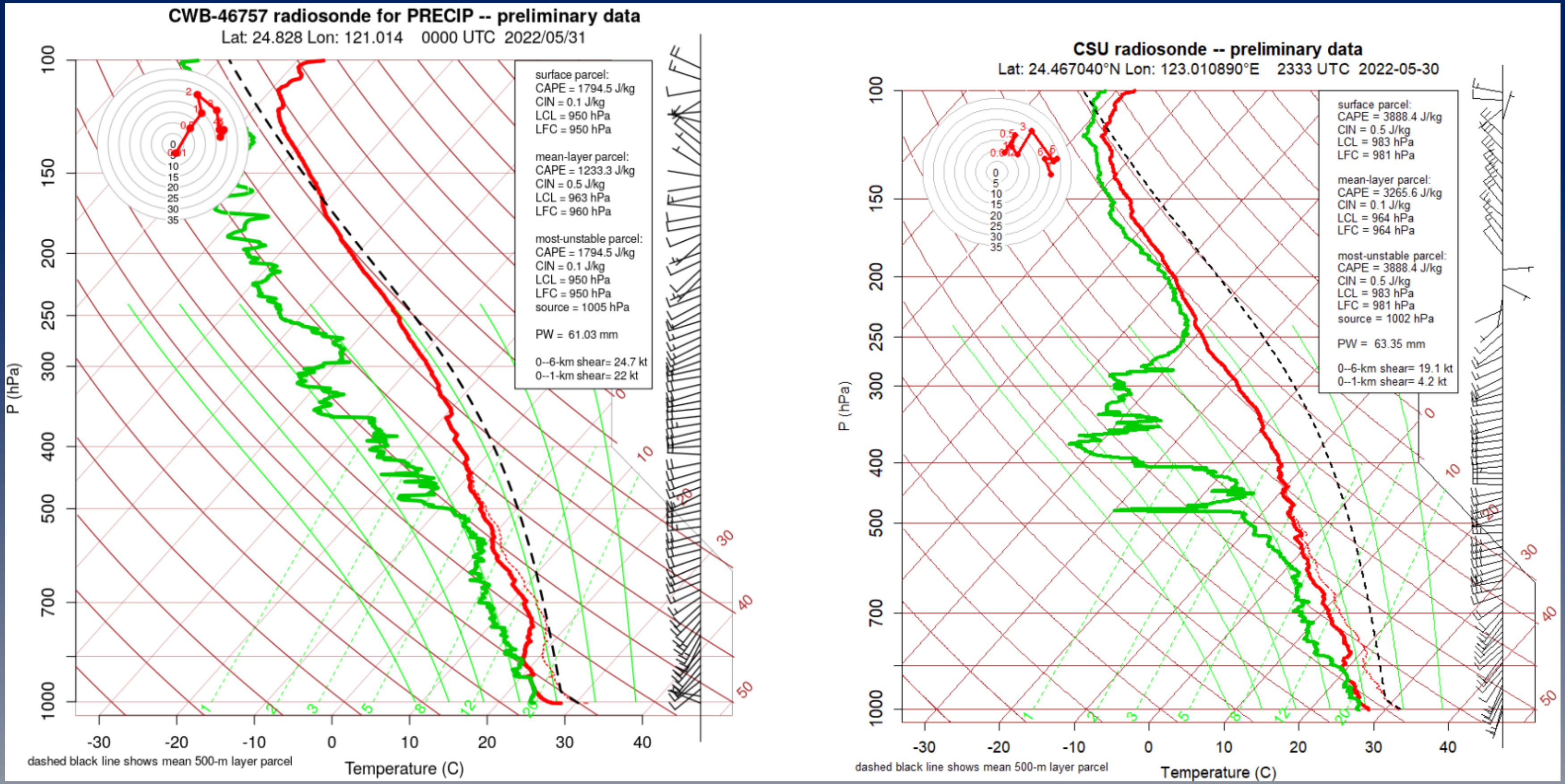
Notable period of 1-h radar-estimated rainfall and lightning at 1740 LST on May 26



Hourly rainfall > 70 mm/h and intense lightning over central Taiwan.

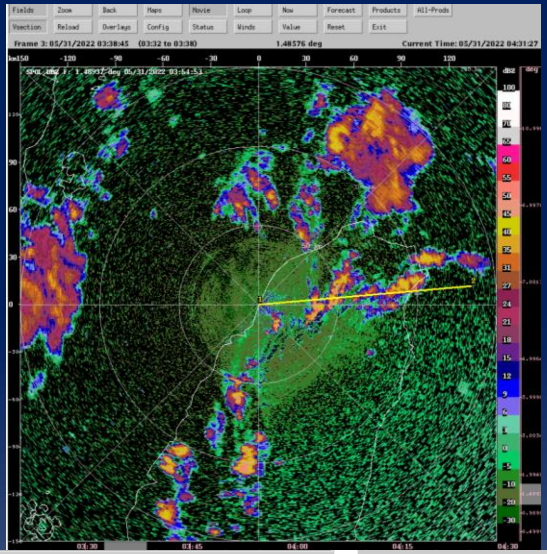
IOP2: Strong convective instability indicated by 00 UTC soundings at Hsinchu (left) and Yonaguni (right)

CAPE ~ 1800 J/kg
at Hsinchu

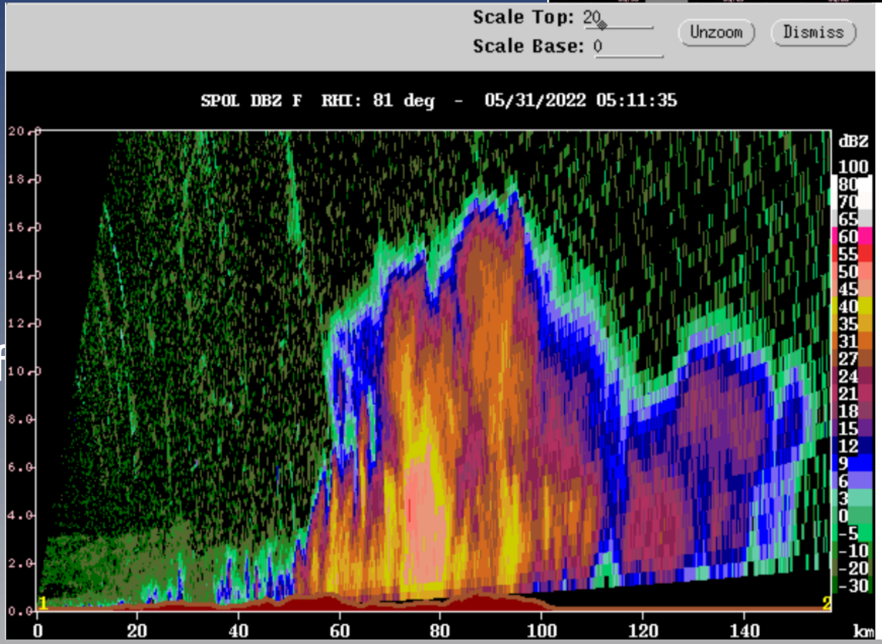


CAPE ~ 3900 J/kg
at Yonaguni Island

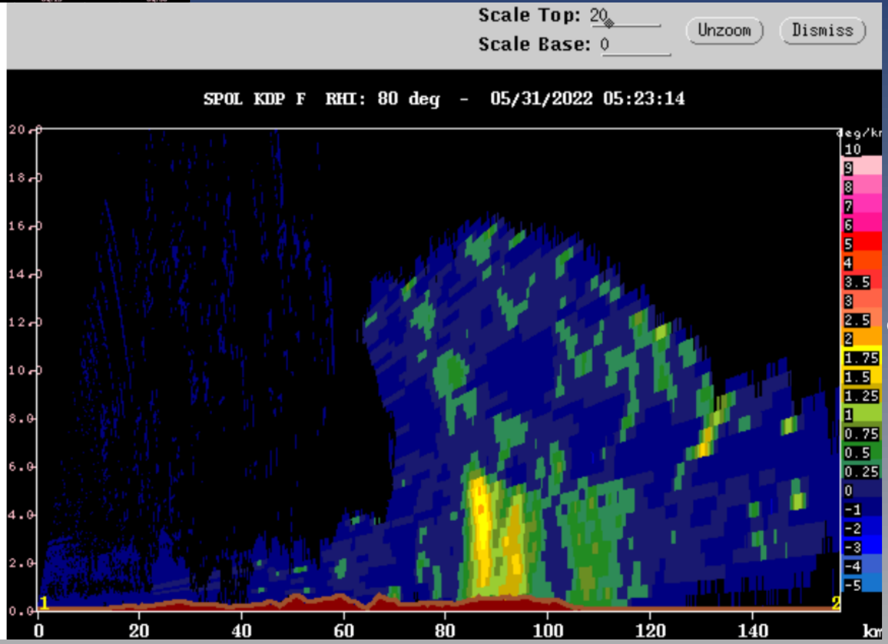
S-Pol radar observations of deep convective cells for the IOP2 afternoon thunderstorms



Reflectivity PPI at 0431 UTC

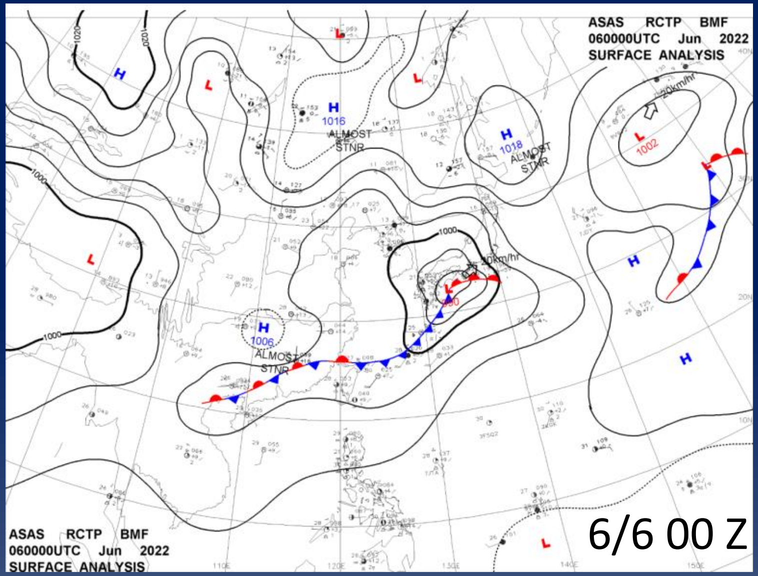


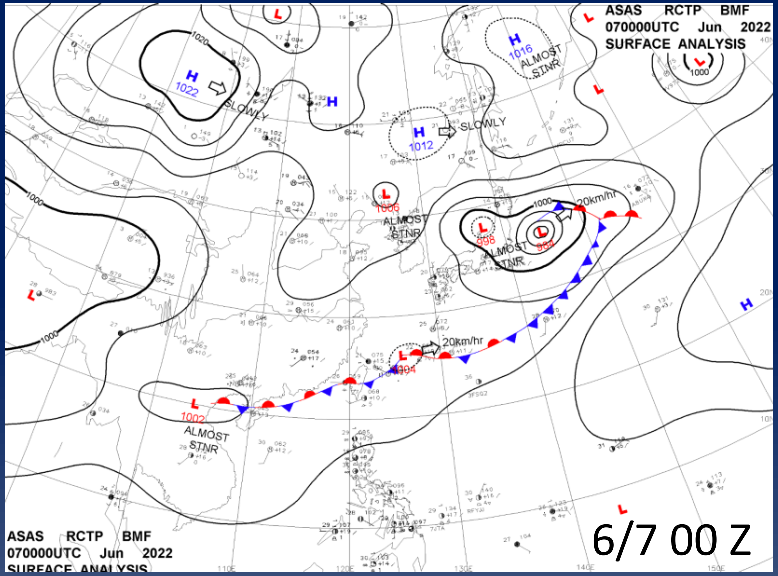
81-degree RHI of Z echo top ~ 16 km at 0511 UTC

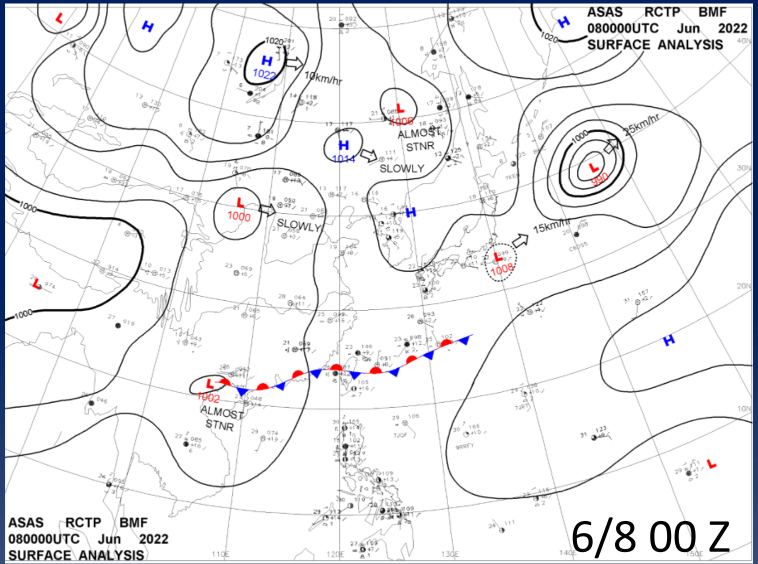


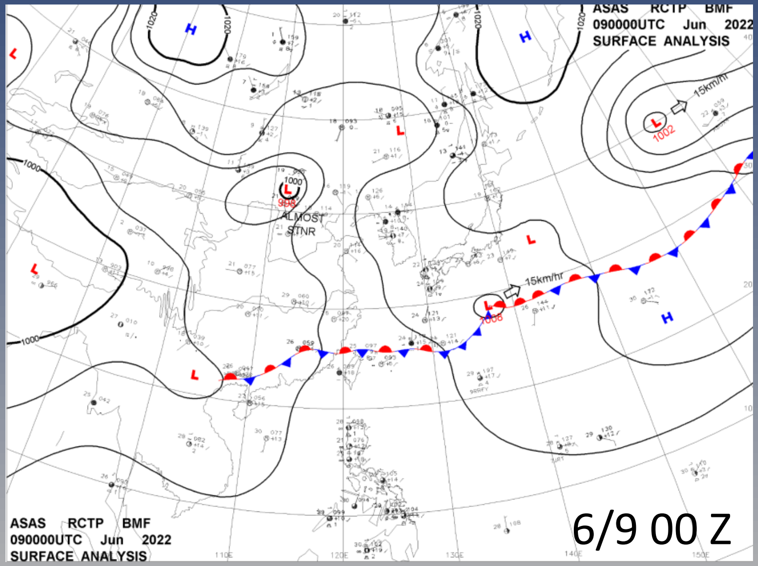
81-degree RHI of KDP at 0511 UTC

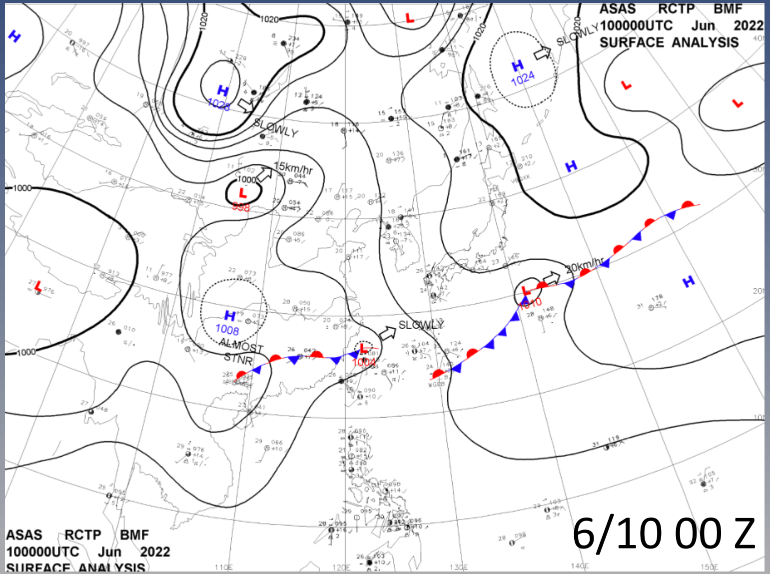
IOP3: Passage of a quasi-stationary Mei-Yu front with embedded MCSs and squall lines

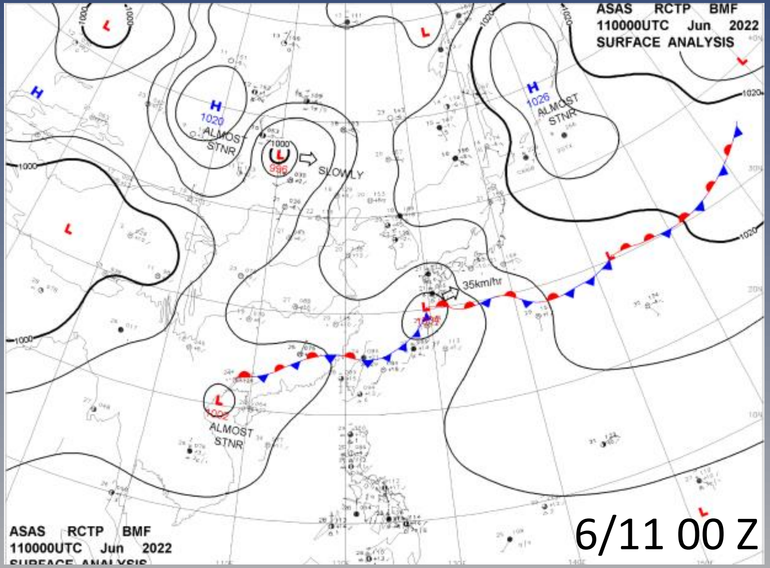












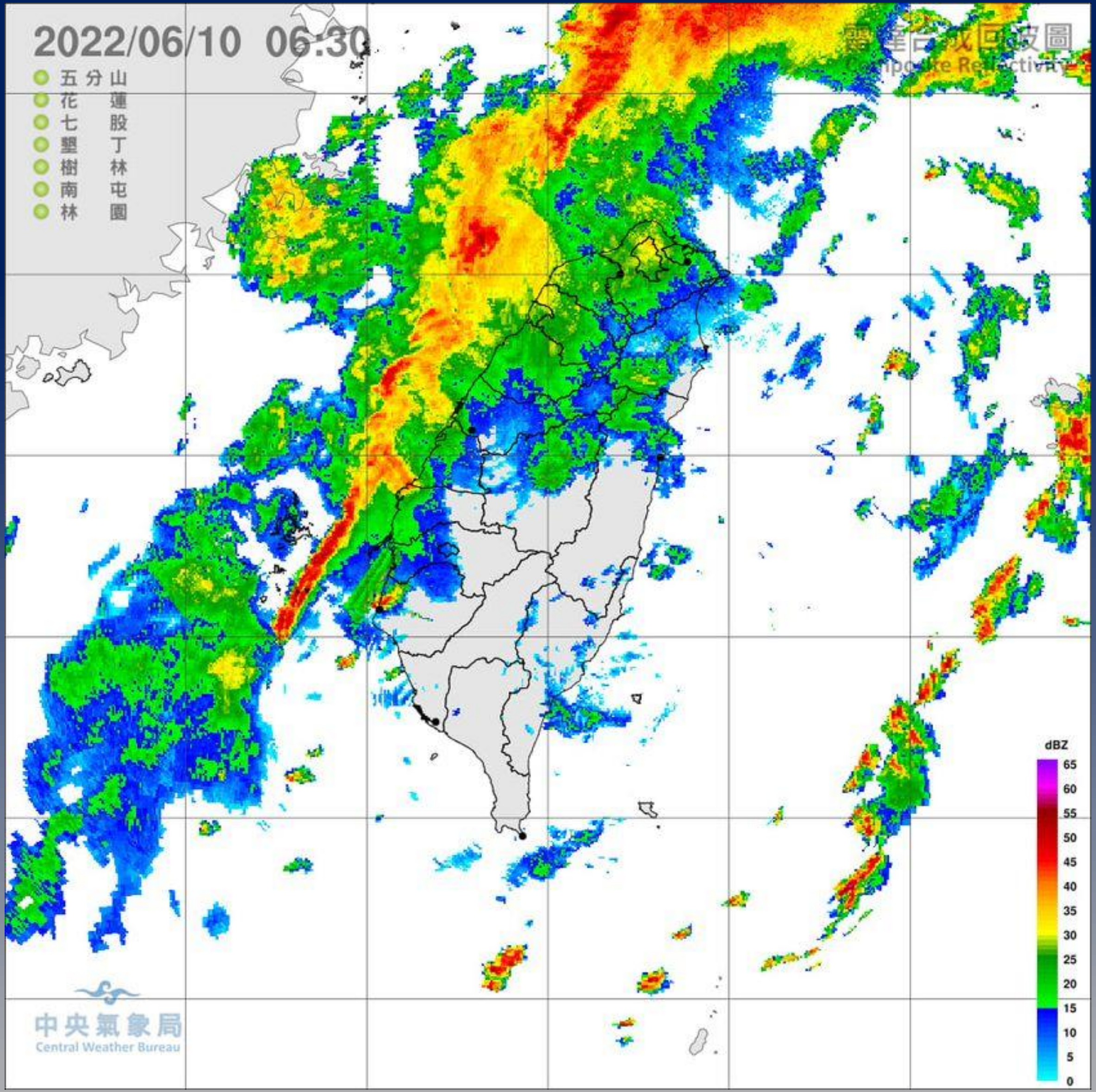
A Comparison of Two Meiyu Front Cases during TAHOPE 2022: Exploring the Physical Mechanisms for the Precipitation Feature Differences

Zhu, Pin-Rui, 2025: Radiosonde Observations of Environments Supporting Convection Initiation under weak synoptic condition during TAHOPE. *NTU Master Thesis.*

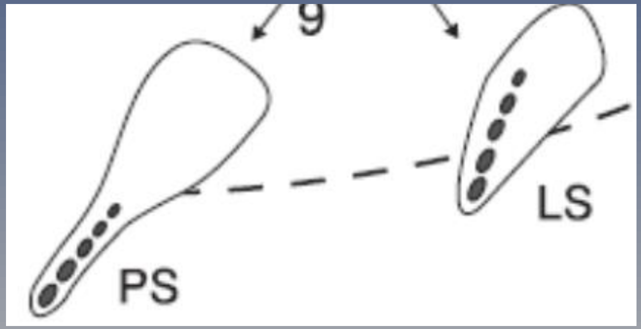
Short Summary for Synoptic-scale Analysis

Categories	Fields (Domain 1)	IOP1	IOP3 (first sub-period)
Dynamic Factor	Frontal Slope		😊
	Frontal Intensity		😊
	925 mb Wind (MBLJ)		😊
	850 mb Wind (SLLJ)		😊
	700 mb Wind (SLLJ)		😊
Thermodynamic Factor	925 mb Specific Humidity	(😊)	
	850 mb Specific Humidity	(😊)	
	700 mb Specific Humidity	(😊)	
Dynamic Factor + Thermodynamic Factor	900~1000 mb IVT		😊
	900~1000 mb IVT Divergence	😊	
	700~900 mb IVT		(😊)
	700~900 mb IVT Divergence		😊

IOP3: Leading-stratiform and parallel-stratiform MCSs on June 10



For IOP 3, Leading-stratiform (LS) and parallel-statiform (PS) MCSs occurred over the Taiwan Strait on 10 June.



Parker and Johnson (2000)

The Development of a Squall Line during IOP3

Liao, Chiu-Ling, and Ming-Jen Yang, 2024: The Development of a Squall Line during IOP3 in the TAHOPE 2022. *The 2024 AOGS Annual General Meeting*, Pyeongchang, Korea, 23–28 June 2024, Asian Oceania Geoscience Society (AOGS), AS76-A009.

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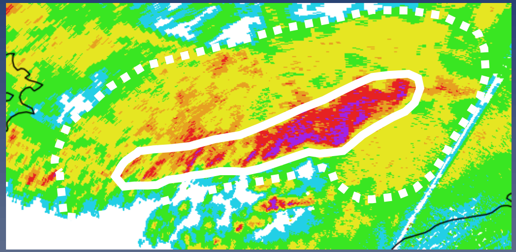
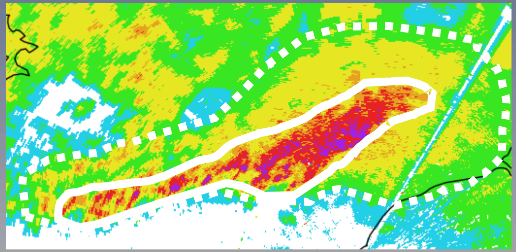
Low-Level Winds

- strong southwesterly winds in front of the convective line & northwesterly winds behind the convective line



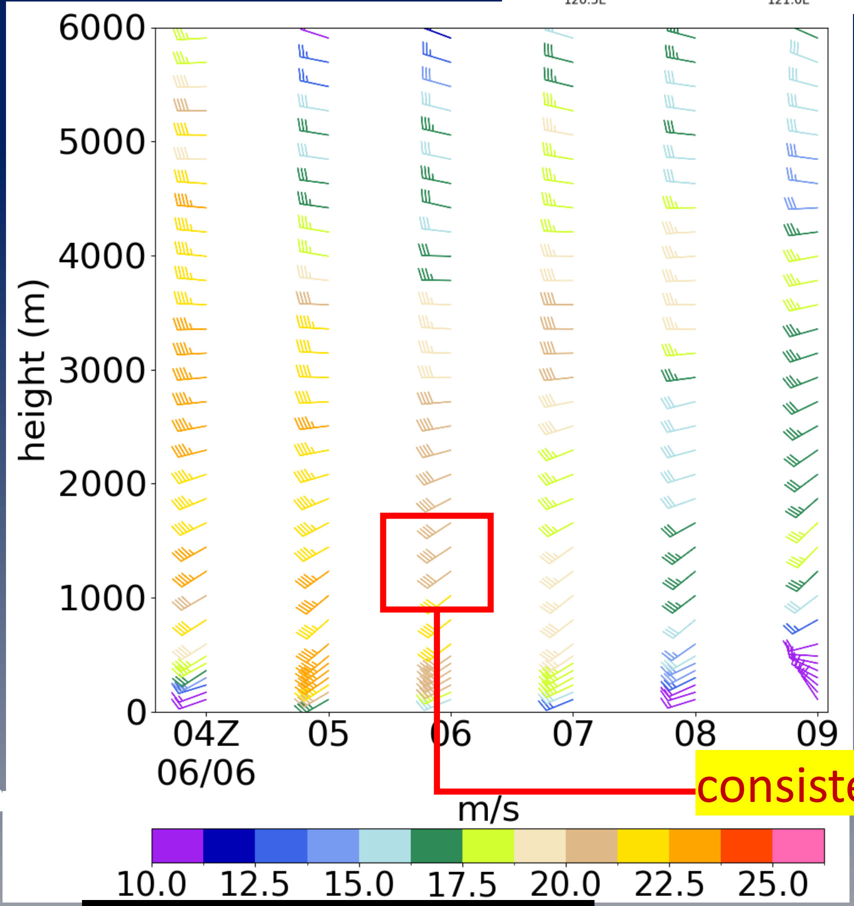
05:36
Trailing Stratiform (TS, Parker and Johnson 2000)

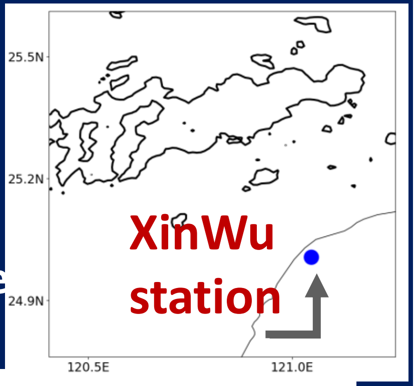


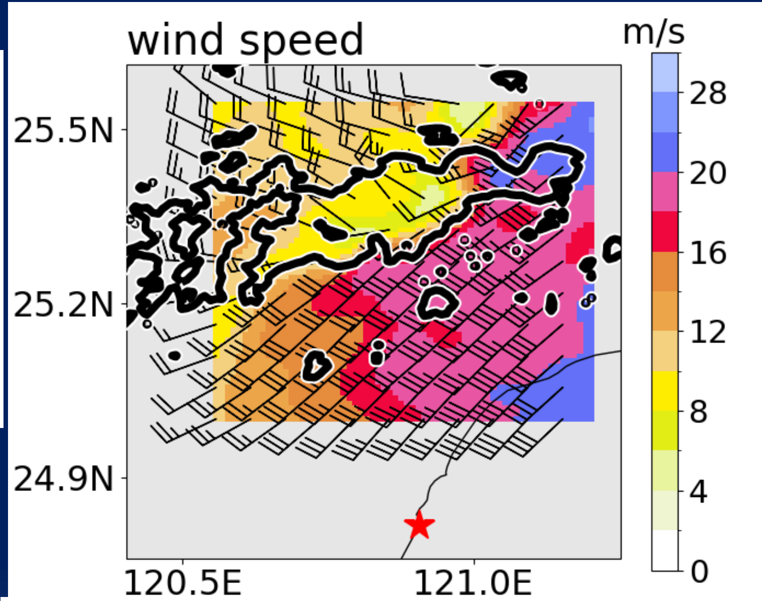
06:36
Parallel Stratiform (PS, Parker and Johnson 2000)

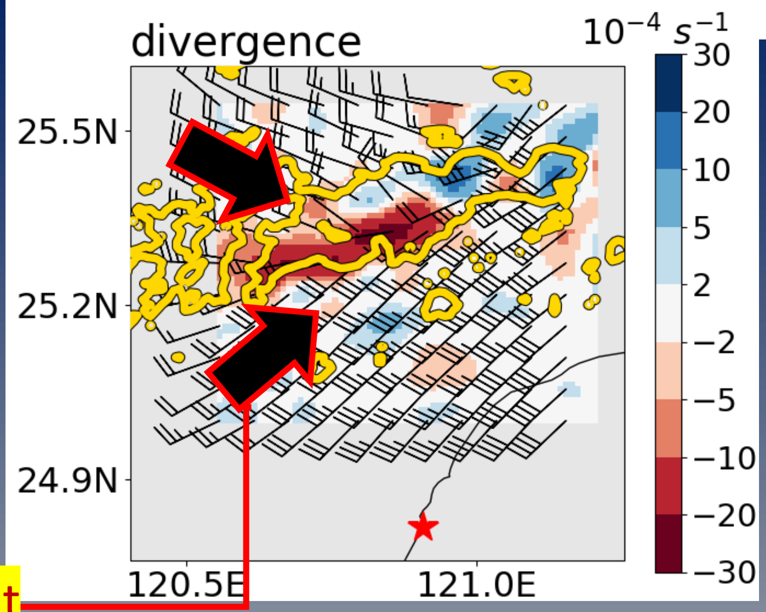
strong echo ⋯⋯⋯ weak echo

vertical wind profile from wind profiler





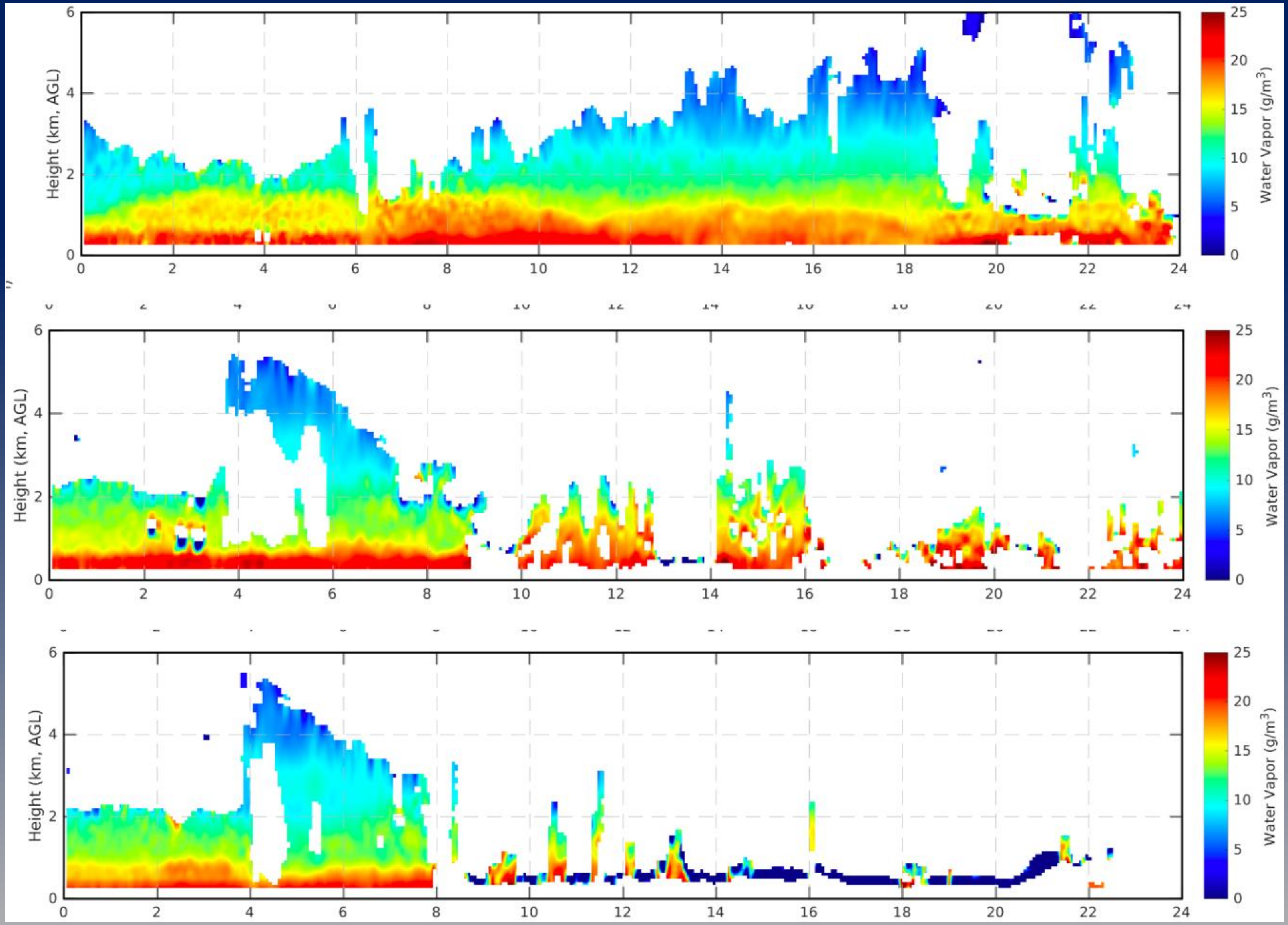




location:	XinWu
time:	04:00 to 09:00

colors:	(a) wind speed (b) divergence
contour:	40 dBZ
time:	06:00
height:	1.5 km

Water vapor time series on June 6 from MPDs at Yilan (upper), Hsinchu (middle), and NCU (bottom) stations



Low-level moisture is increasing with time, particularly after 06 UTC, leading to precipitation at Hsinchu and NCU at 08 UTC.

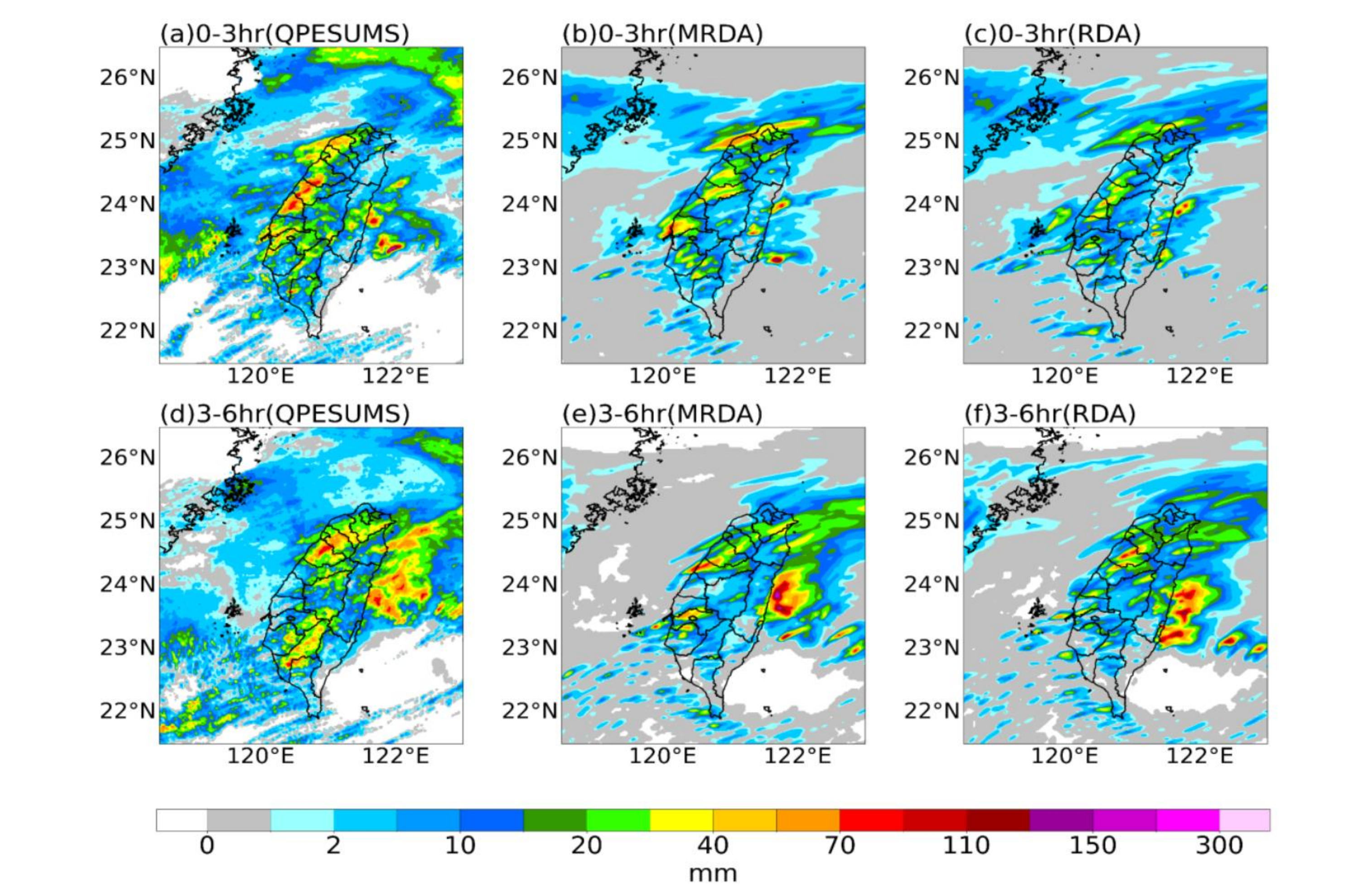


Fig. 7. Three-hourly accumulated rainfall from (top) 0300 to 0600 UTC and (bottom) 0600 to 0900 UTC on 7 June from (a, d) QPESUMS and model forecasts from (b, e) MRDA and (c, f) RDA initialized by the ensemble analysis mean at 0300 UTC on 7 June.

Source:
Prof. Shu-Chih Yang (NCU) &
Prof. Shu-Hua Chen (UC Davis)

Assimilating the S-Pol radar data improves the QPF skill!

Yang, S.-C., S.-H. Chen, L. J.-Y. Liu, H.-L. Yeh, W.-Y. Chang, K.-S. Chung, P.-L. Chang, and W.-C. Lee, 2024: Investigating the mechanisms of an intense coastal rainfall event during TAHOPE/PRECIP-IOP3 using a multiscale radar ensemble data assimilation system. *Mon. Wea. Rev.,* Early Online Release.

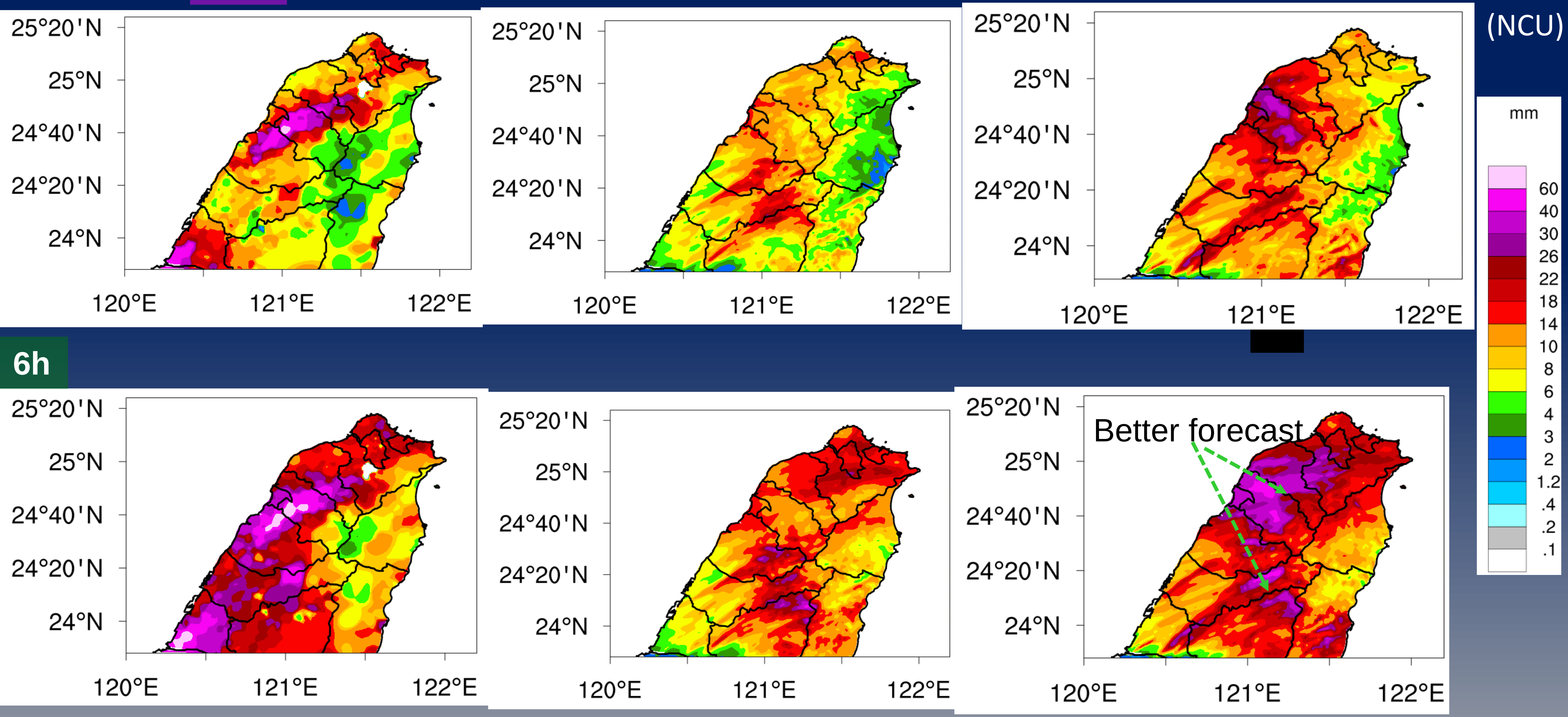
Results of forecast (forecast from 0600 UTC)

Accumulated rainfall

Source:
Prof. Kao-Shen Chung
(NCU)

3h **OBS** **3Rad** **3Rad_Qv**

6h

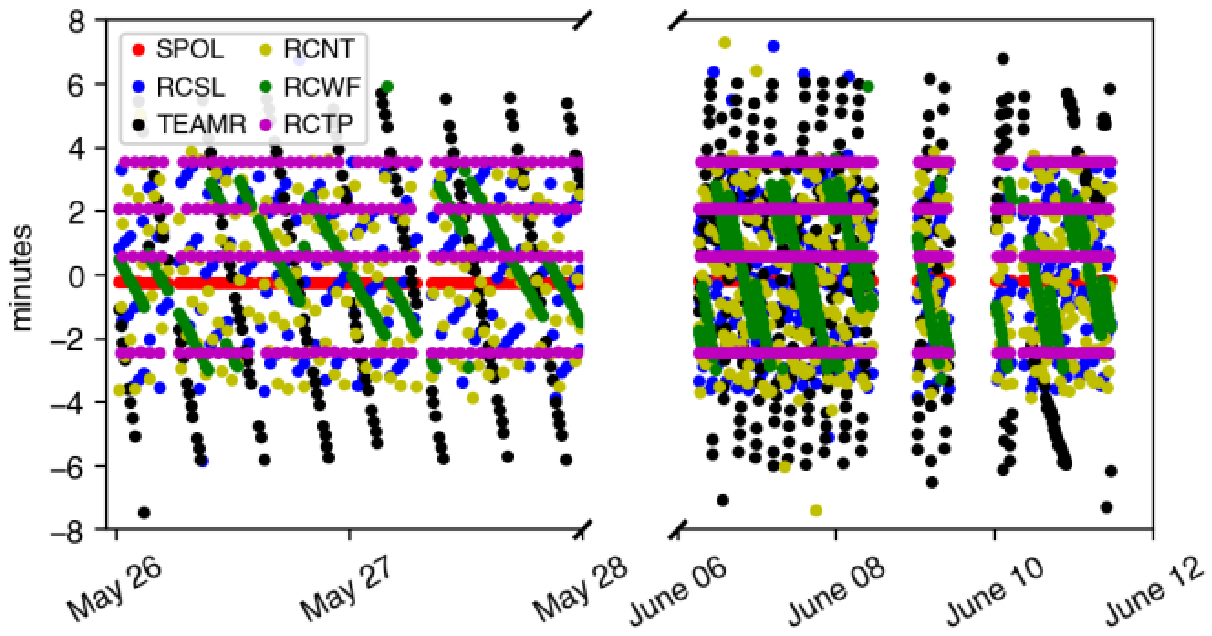


Chung, K.-S., and others, 2024: Aanalyzing and Assimilating Humidity Profiles through the MPD Data: Insights from the TAHOPE IOP3 Case Study. *ICMCS-16 meeting, Korea*.

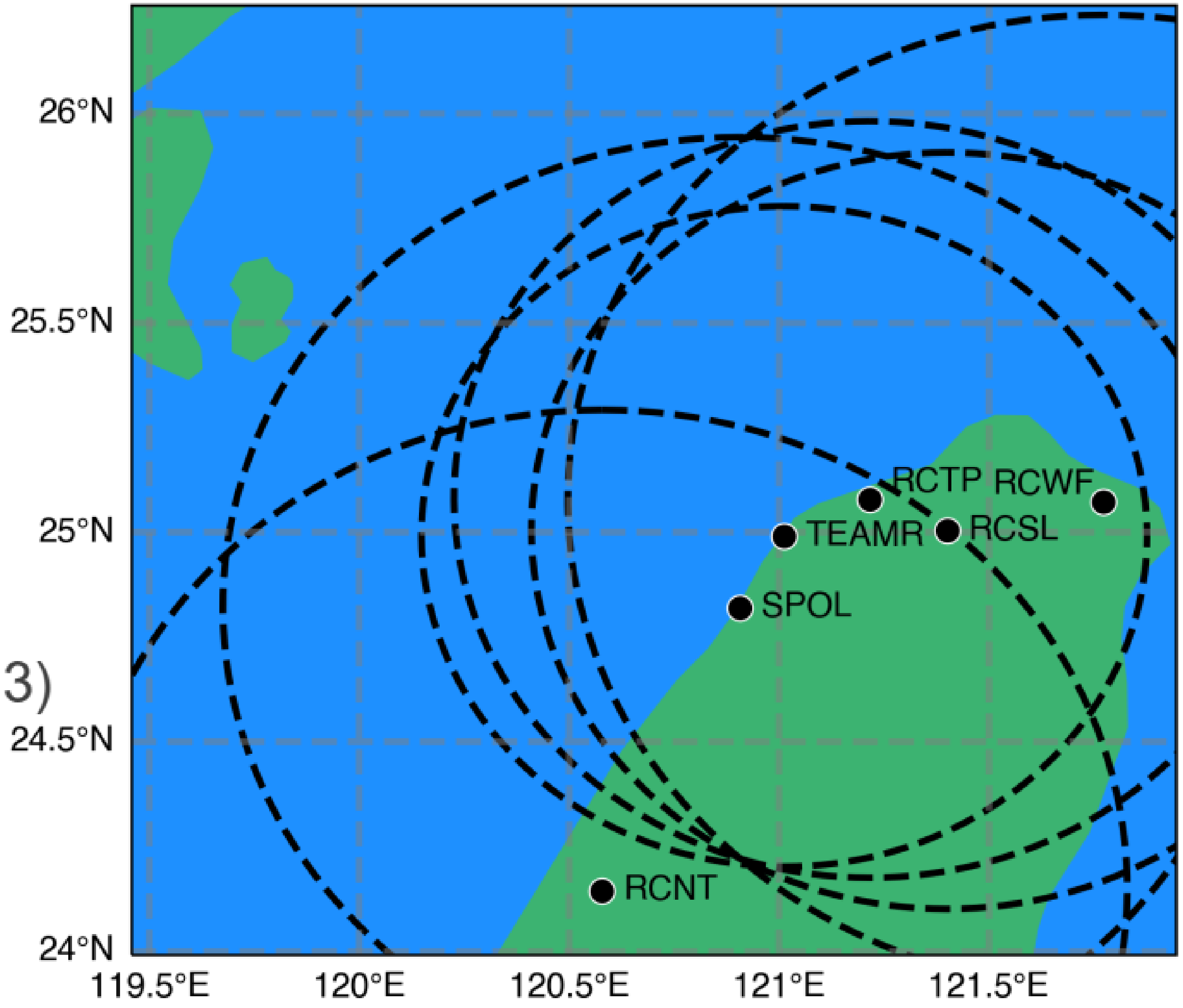
- Assimilate 3 radars (S-Pol, TEAM-R, and RCWF)
- Observation errors: 5 dBZ for Z, 3 m/s for V_r, 1 g/kg for Qv
- Horizontal localization: 12 km for updating Qv

Multi-Doppler analysis with 6 radars from PRECIP/TAHOPE and CWA

Slide from Michael Bell



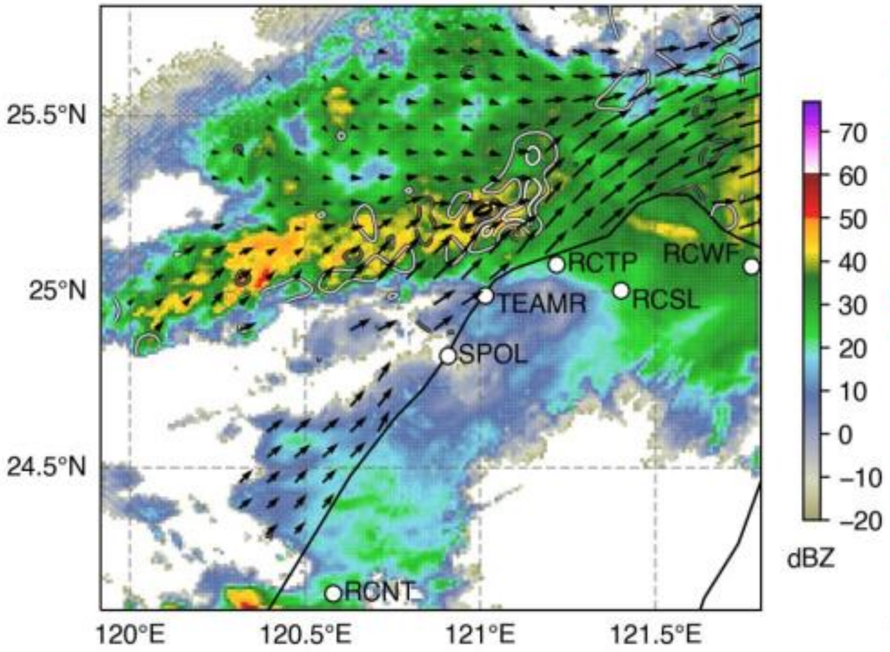
- SAMURAI-terrain analyses (Cha and Bell 2023)
  - 1 km horizontal grid spacing with 4 km low-pass filter
  - FRACTL condition number threshold to remove winds with poor multi-Doppler geometry
  - **545** analyses anchored on S-Pol times (every 12 min)

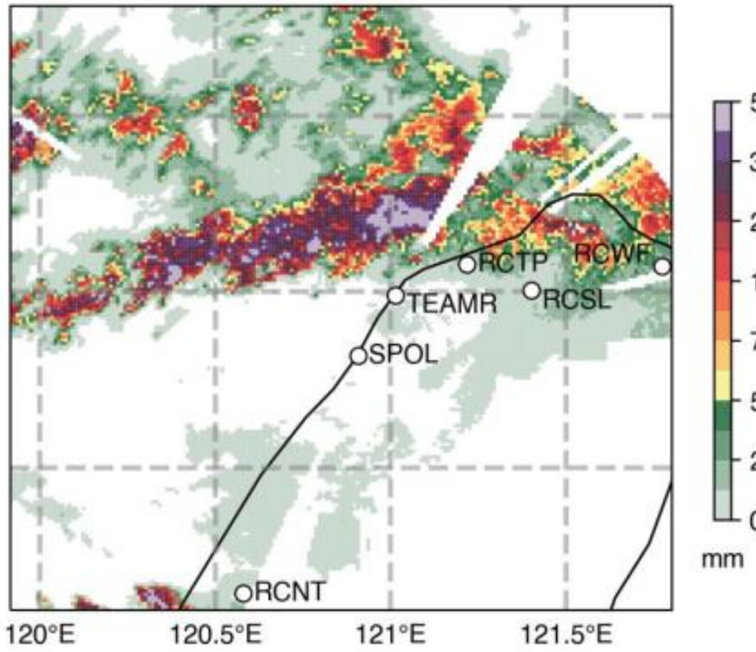


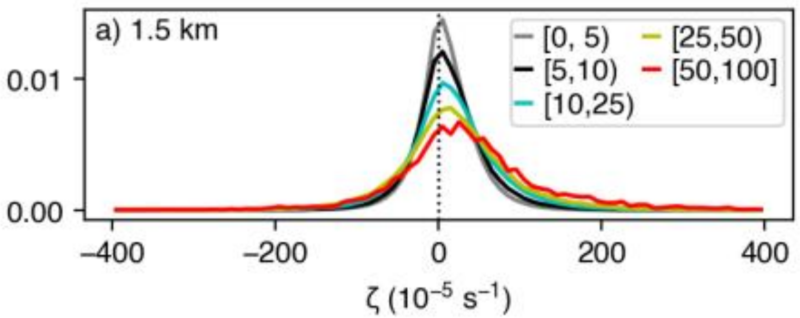
Evaluating the relationship between dynamics and rain rate

- Grid point by grid point comparisons (only over the ocean)
- Composite according to rain rate at 1.5-km
- Examine **vorticity, vertical motion**, **divergence**, and convective/stratiform partitioning

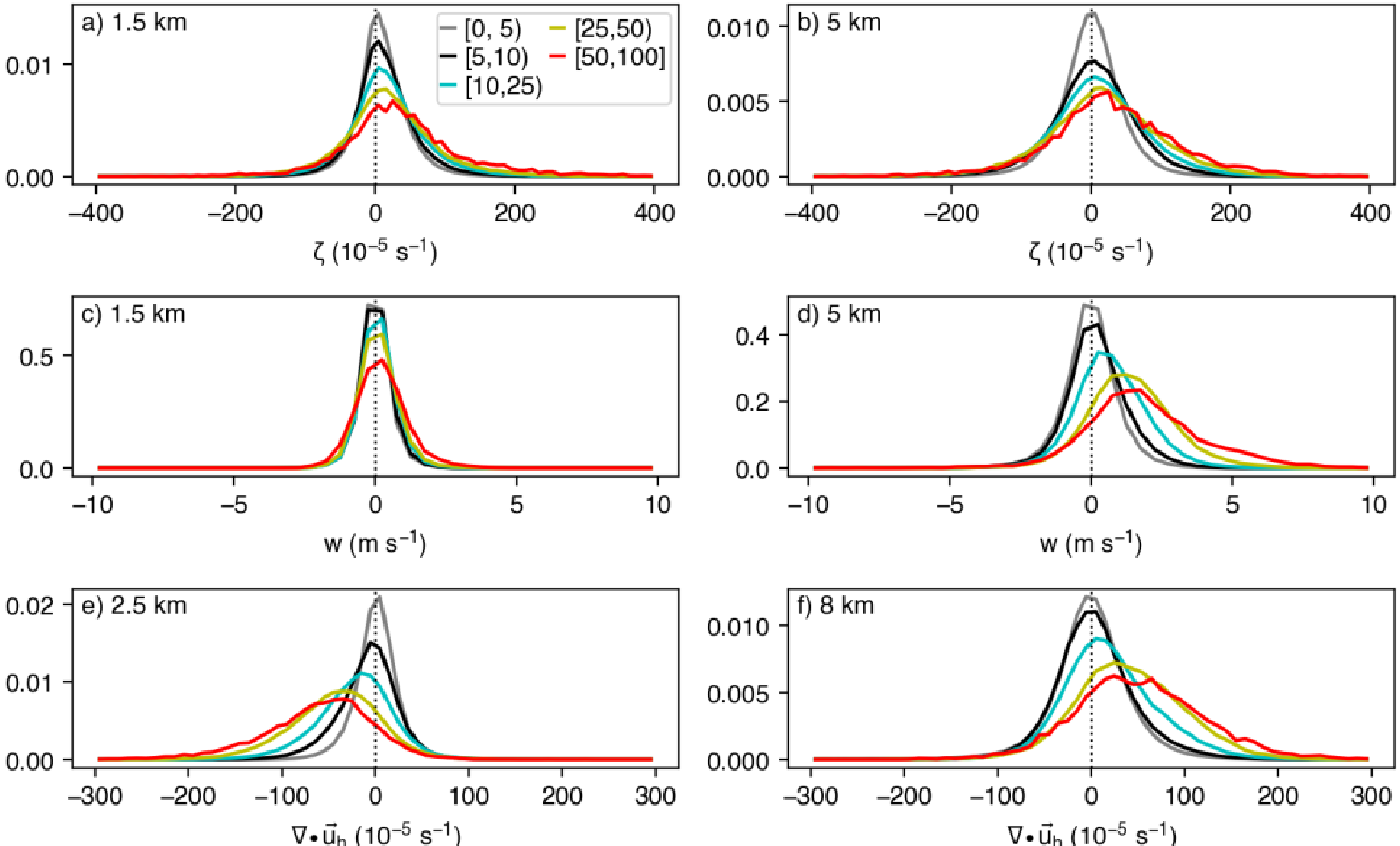
Slide from Michael Bell







Vorticity, vertical motion, and divergence distributions are functions of rain rate



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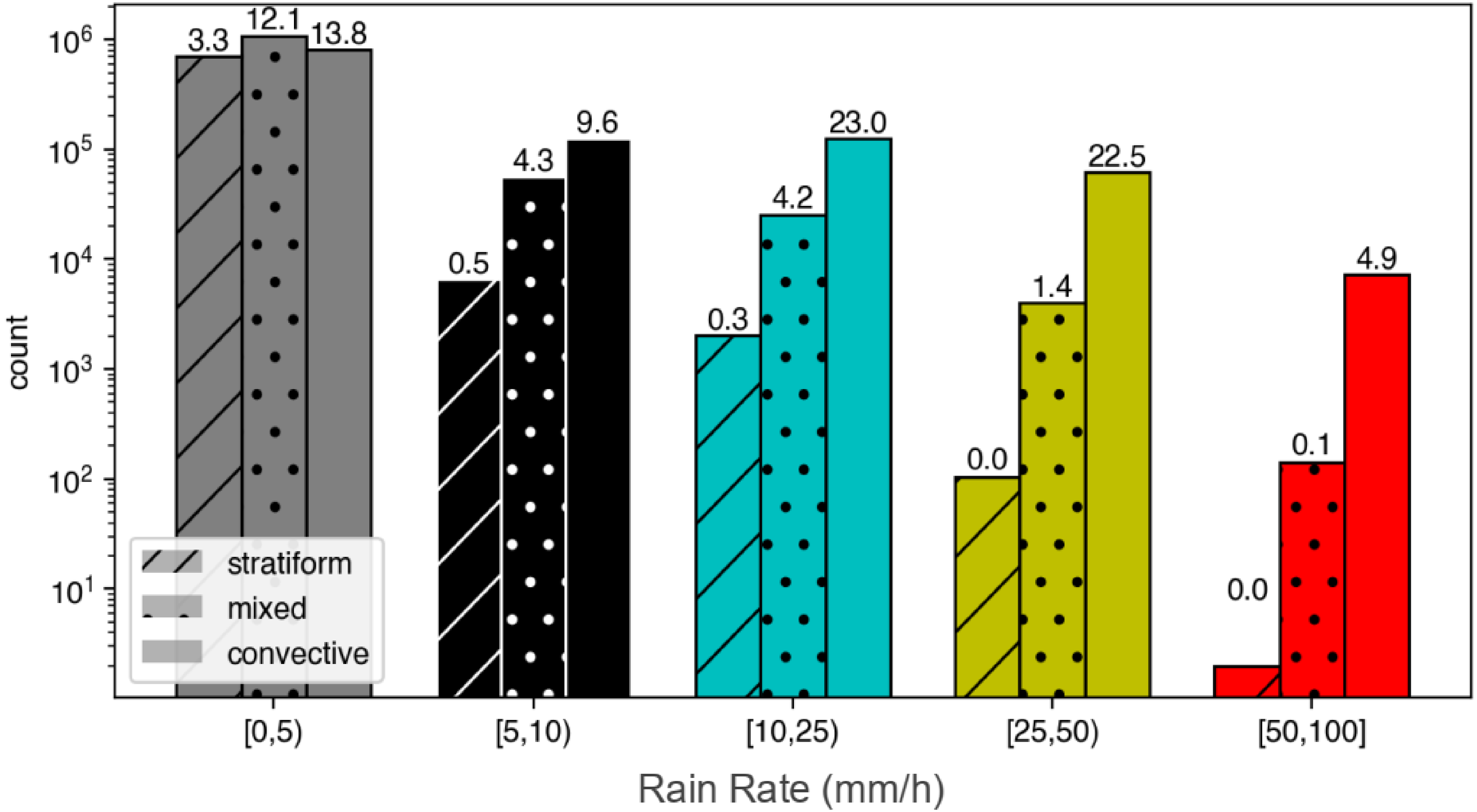
Michael Bell

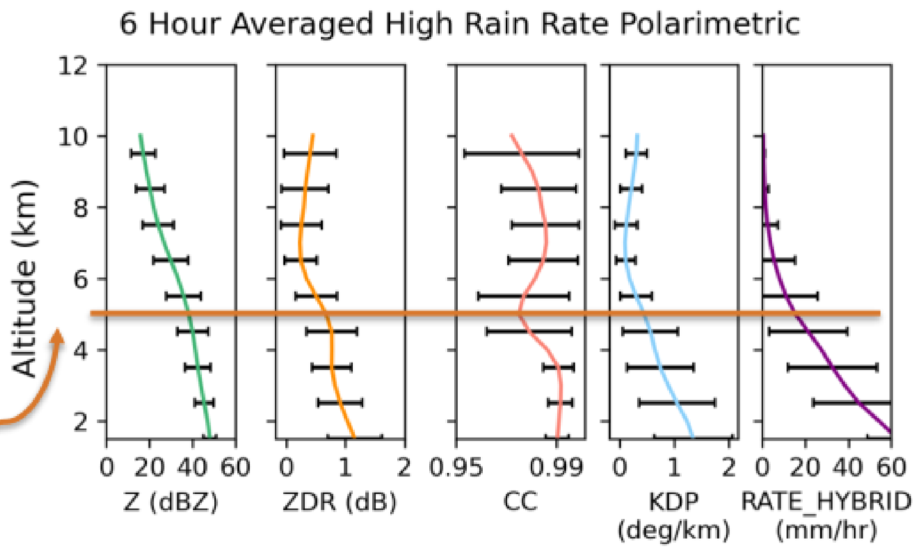
Intense rainfall is increasingly convective and comprises 50% of rainfall total

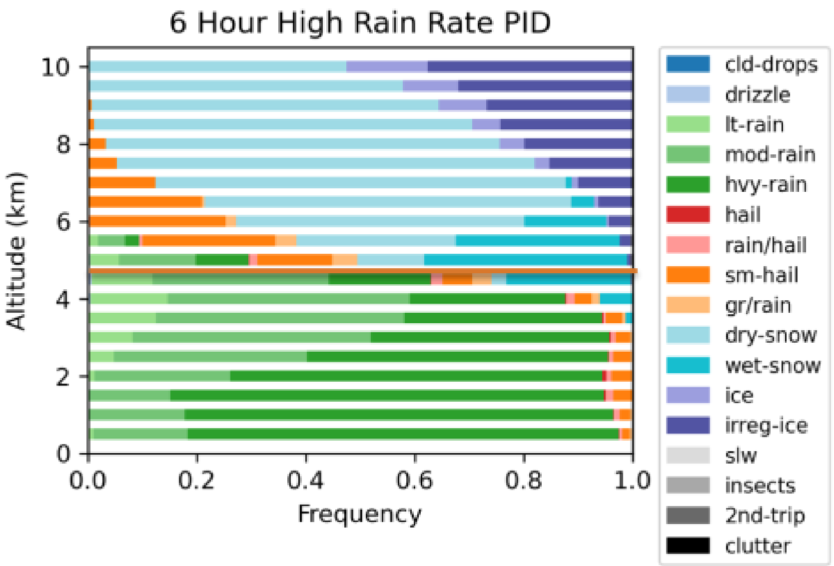


Slide from
Michael Bell

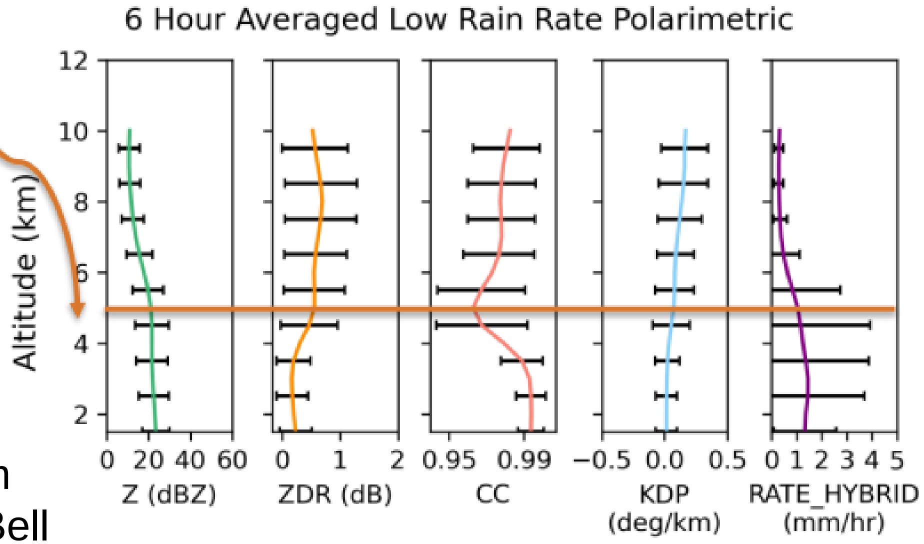
Heavy Rain vs. Light Rain

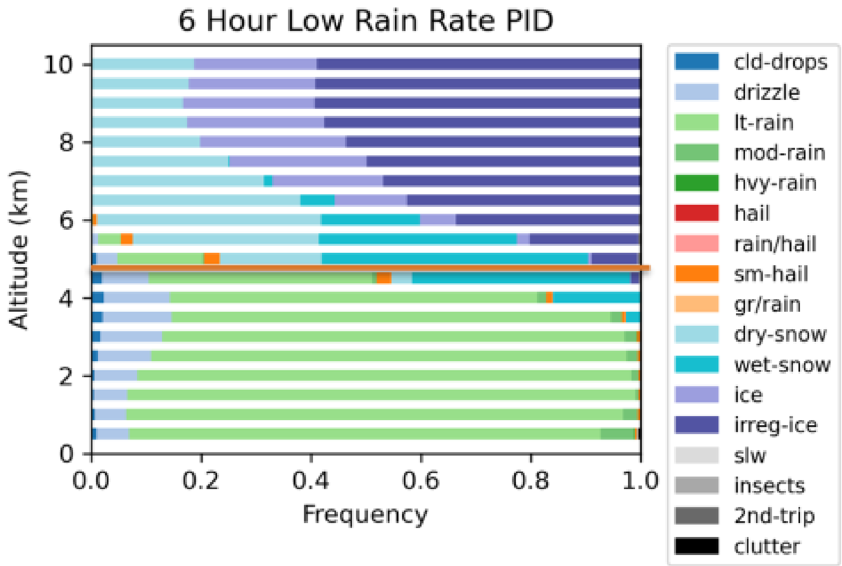
Low: 0-5 mm/hr
High: 50+ mm/hr





Melting layer





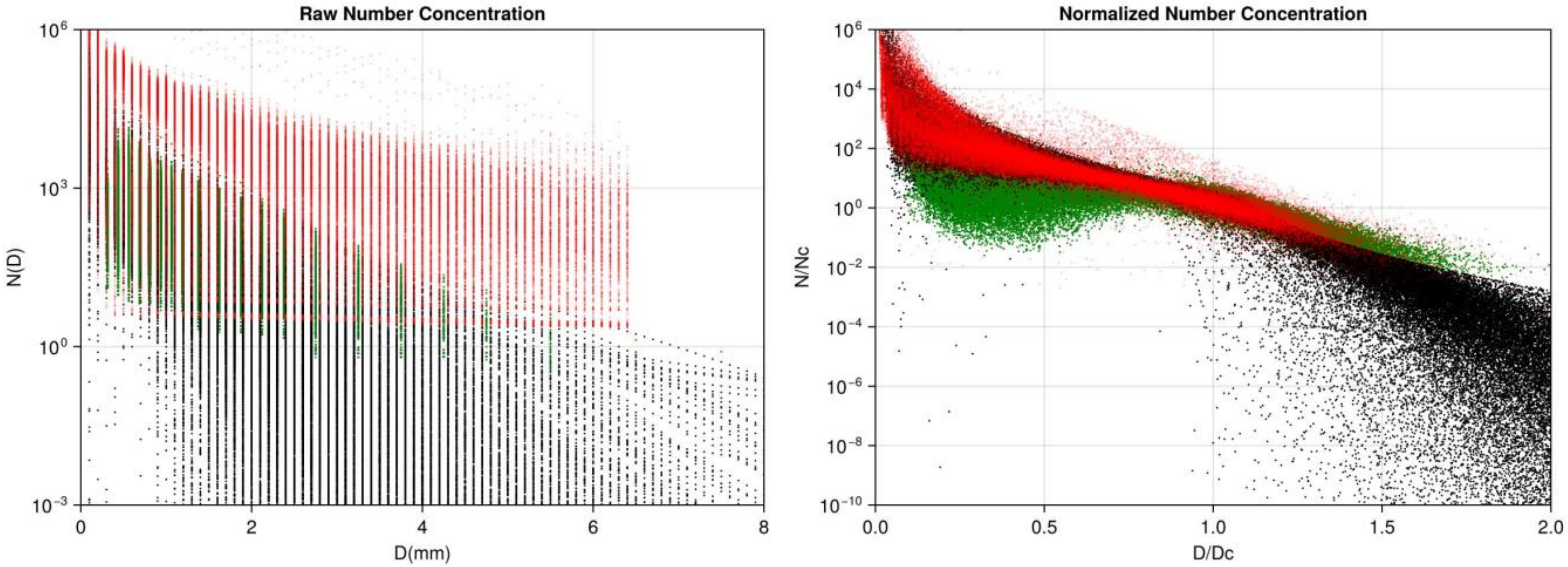
Slide from Michael Bell

Heavy Rain

- Polarimetric variables show that rain intensifies primarily through collision-coalescence below the melting level
- Accretion helps seed intense rainfall

Light Rain

- Higher concentrations of irregular ice and wet snow aloft
- Very little graupel and supercooled water
- Dominant processes are ice aggregation and melting

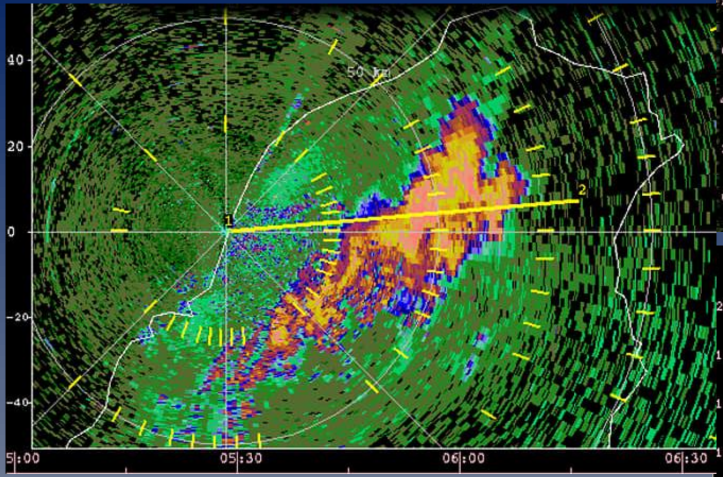


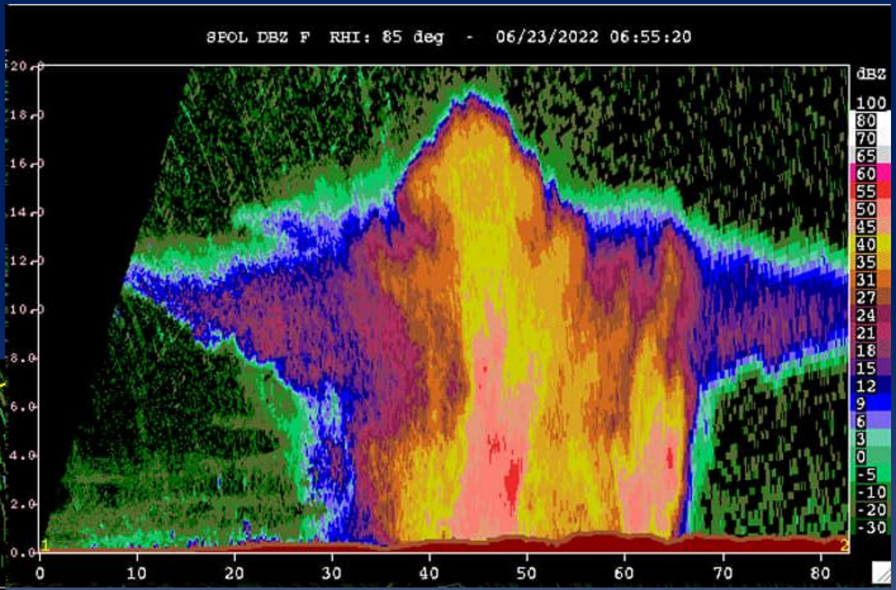
DSDs from 2,928 3-min averaged spectra (~1.8 km) from merged MPS and 2DVD disdrometers in Greeley, CO and Huntsville, AL (black)
DSDs from 11,778 1-min averaged spectra (~0.6 km) from Parsivel disdrometers in Hsin-Chu, Taiwan and Yonaguni, Japan (green)
HSDs from 2,432 10-sec averaged spectra (~1.1 km) from PIP measurements in mixed phase region of 33 tropical cyclones (red)

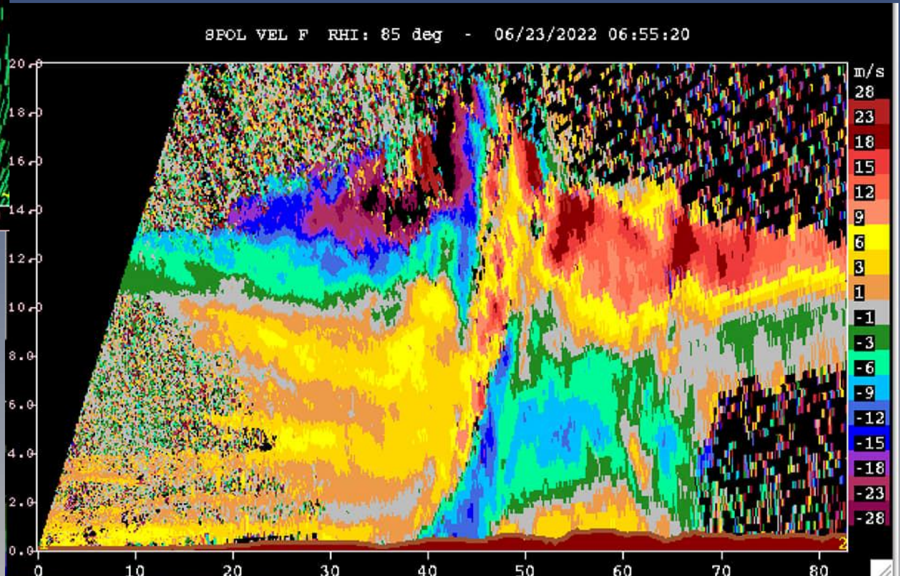
- Use of 3-moment Dc based on temprian collapses variability of DSDs substantially
- If normalized shape is climatologically invariant, knowledge of the temprian and only one of Z (M6) or V (M3) is sufficient to retrieve the entire DSD

Slide from
Michael Bell

Special Observation on June 23 (SOP2): S-Pol radar observations

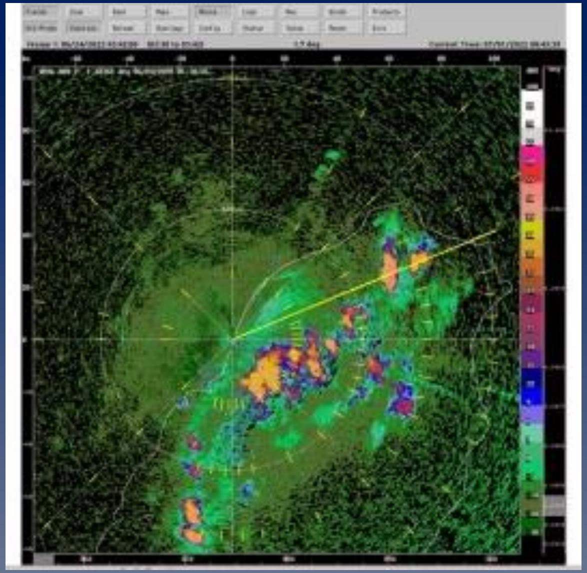


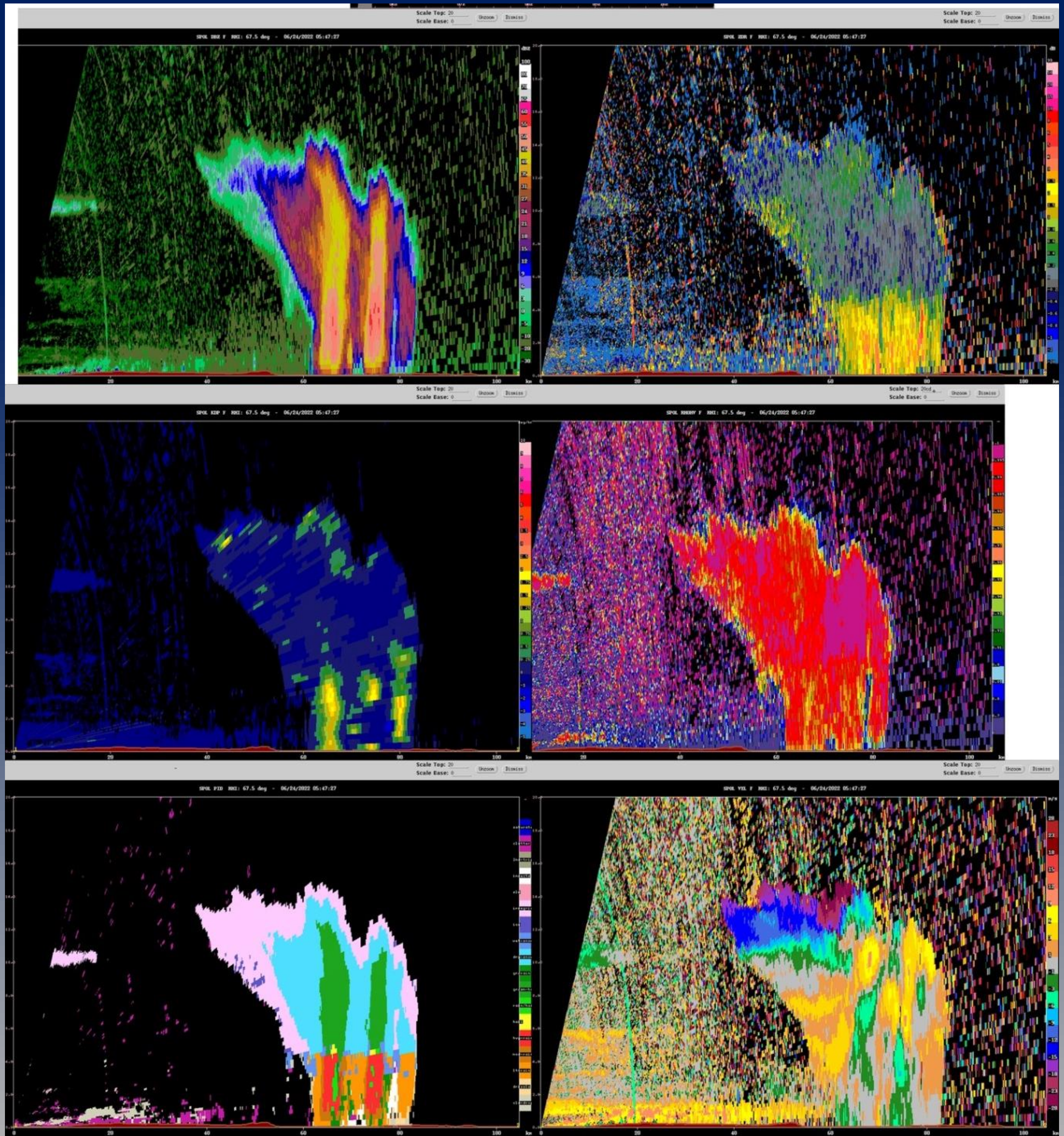




Deep convection with overshooting cloud top and anvils (with low-level convergence and upper-level divergence) over northern Taiwan as seen from S-Pol radar on 07 UTC 23 June.

Special Observation on June 24 (SOP3): Hailstone in central Taipei

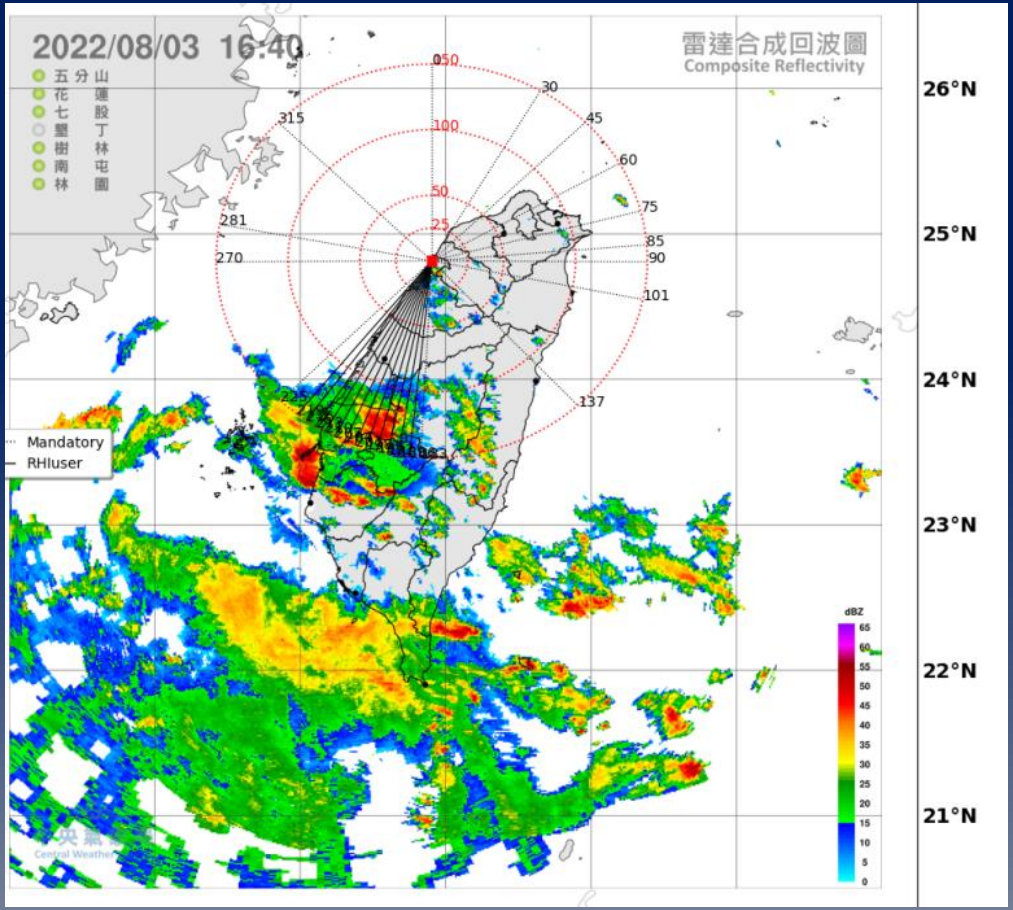




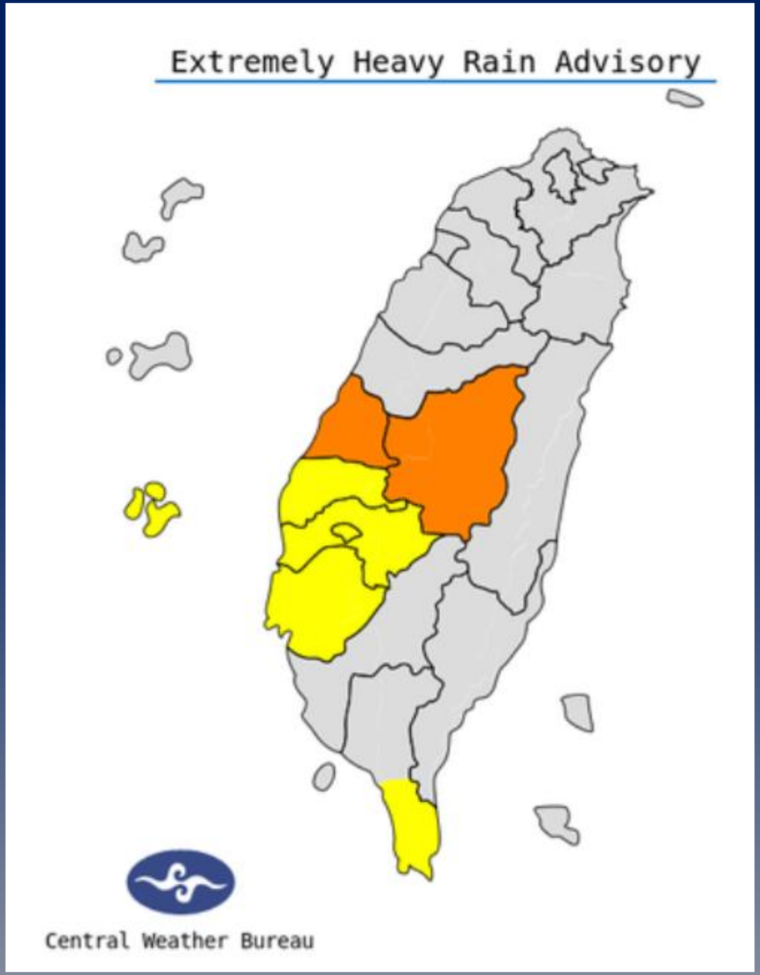
On 24 June, an intense downburst with hail particles in the center of Taipei (near CWB).

The RHI cross sections from SPOL radar showed intense convective storms with horizontal width less than 10 km.

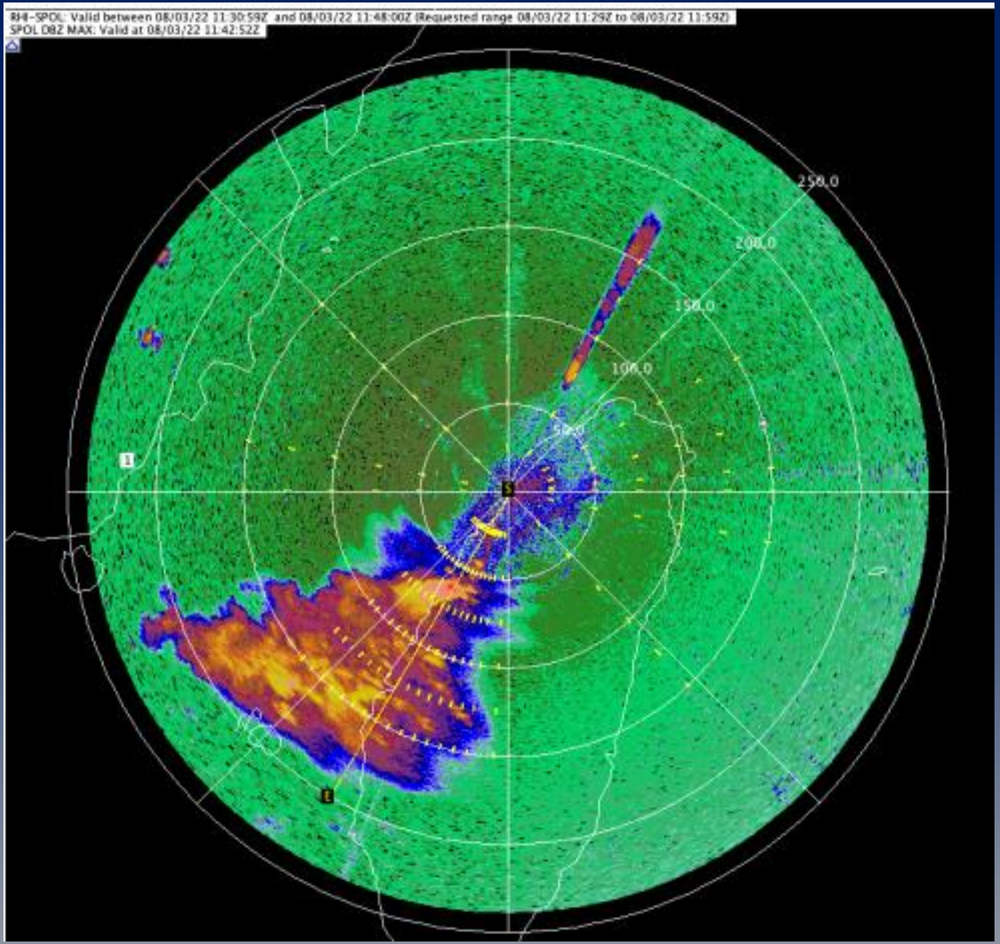
IOP 10: Moisture transport from low pressure during 1-3 August



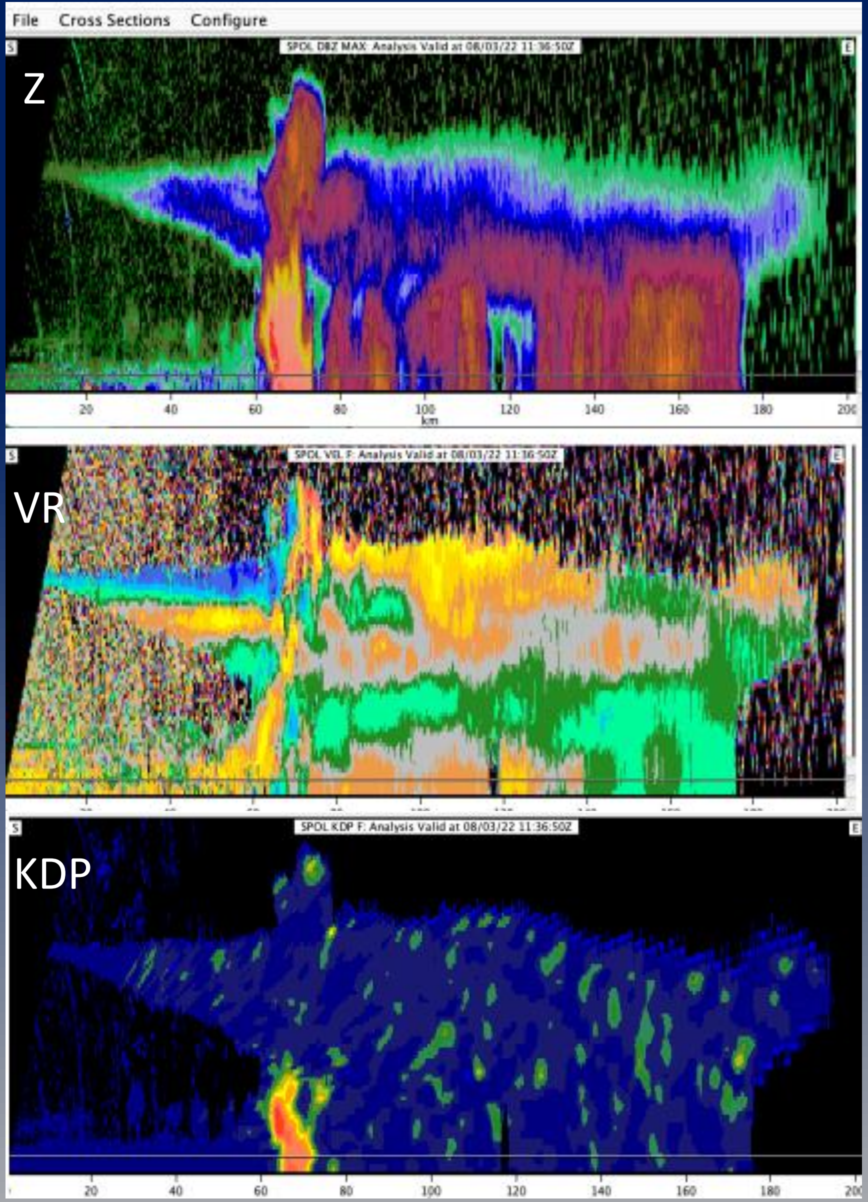
S-Pol intense RHI scans on the thunderstorms on August 3 over central Taiwan



IOP 10: Moisture transport from low pressure during 1-3 August



S-Pol intense RHI scans of Z, VR, and KDP on the thunderstorms on August 3

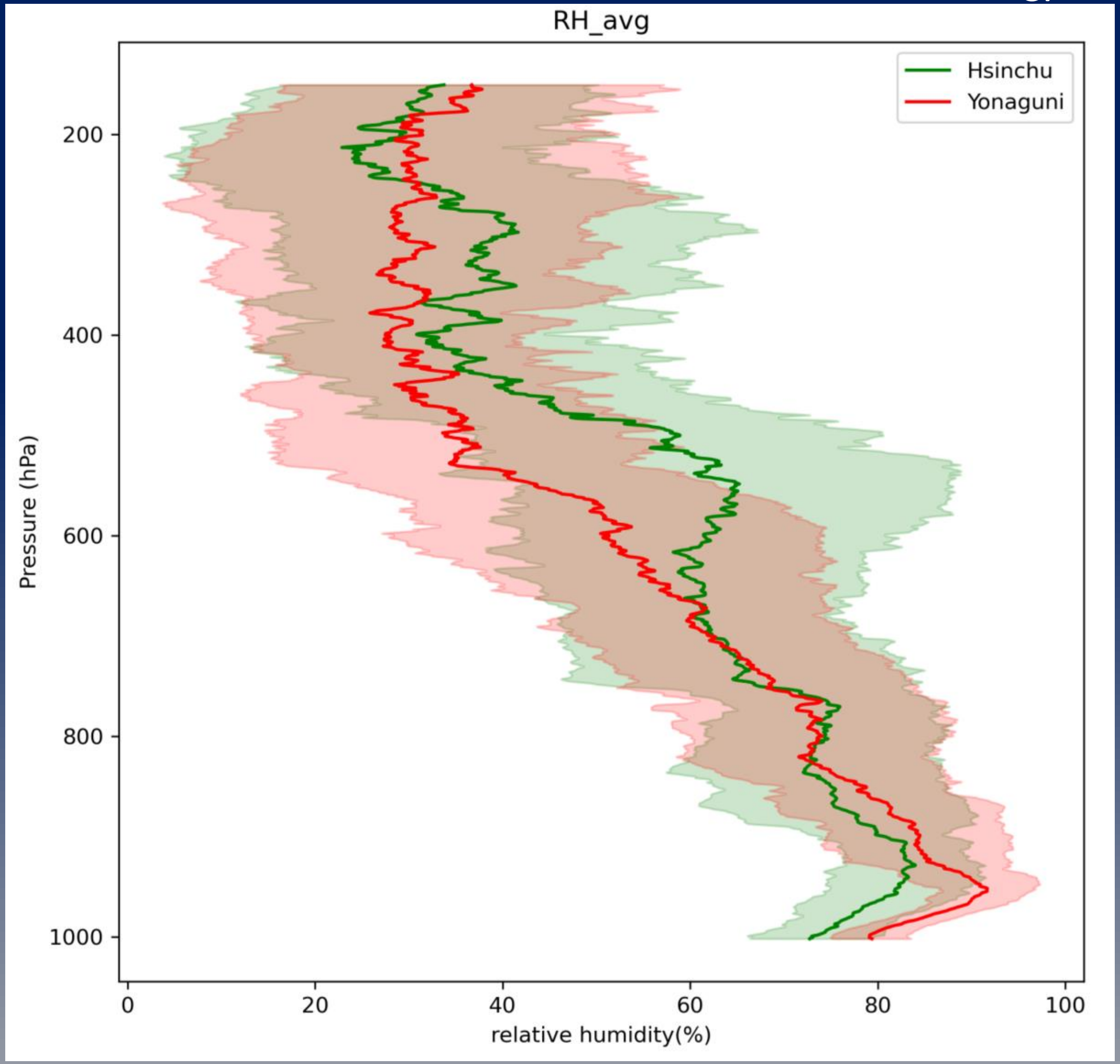


Convection Initiation (CI) during TAHOPE/PRECIP 2022

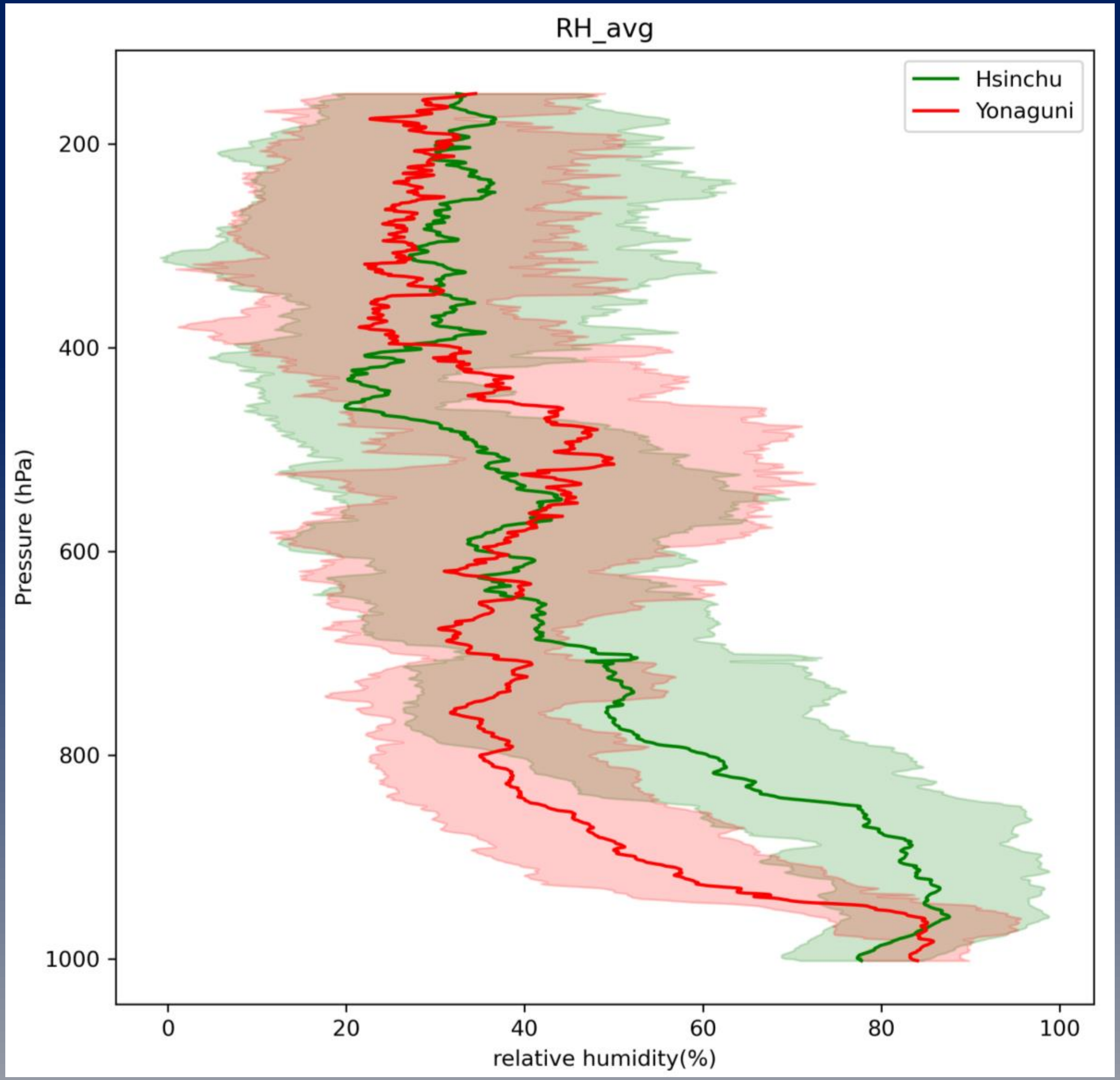
Liu, Yu-Ming, 2025: Radiosonde Observations of Environments Supporting Convection Initiation under weak synoptic condition during TAHOPE. *NTU Master Thesis.*

CI events – Hsinchu(00 UTC) and Yonaguni(00 + 06 UTC)

CI



nonCI



Hsinchu CI rh

Yonaguni CI rh

Hsinchu nonCI rh

Yonaguni nonCI rh

Afternoon thunderstorms case on IOP 2

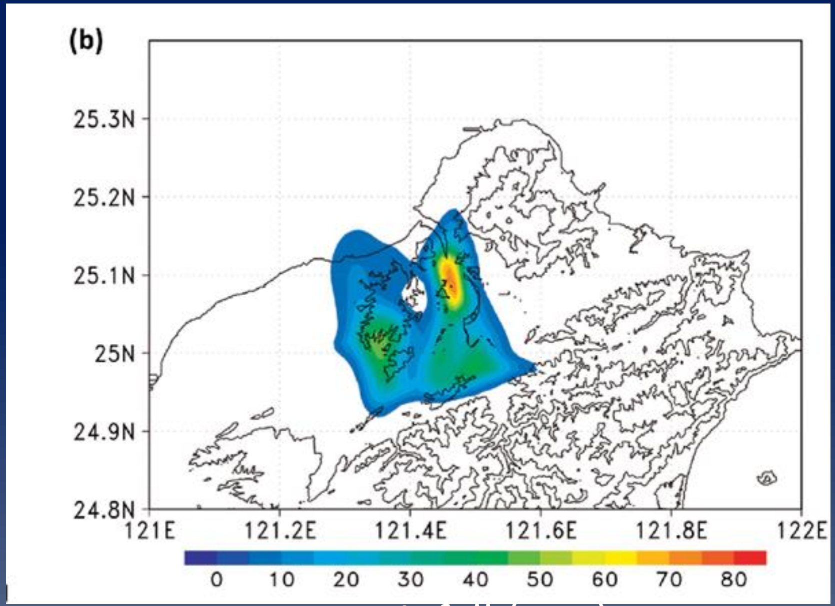
Miao, J. E., **M-J. Yang***, K. L. Rasmussen, M. M. Bell, H.-C. Kuo, and T.-Y. Cha, 2024: Microphysical and kinematical characteristics of merged and isolated convective cells over the complex terrain of the Taipei Baisn, *J. Geophys. Res. Atmos.,* in review.

Multiscale Interactions Contributing to Orographic Extreme Rainfall

- Multiscale interactions of various processes: large-scale wind, local circulation, microphysics, cold pool, and terrain effects (Houze 2012; Xu et al. 2012).
- Cell merger (Tao and Simpson 1989; Carey and Rutledge 2000; Jou et al. 2016; Miao and Yang 2018; Wu et al. 2021; Miao and Yang 2022; Jung and Jou 2023).
- Microphysical processes leading to the generation of extreme rainfall (Morrison et al. 2020; Chen et al. 2022)

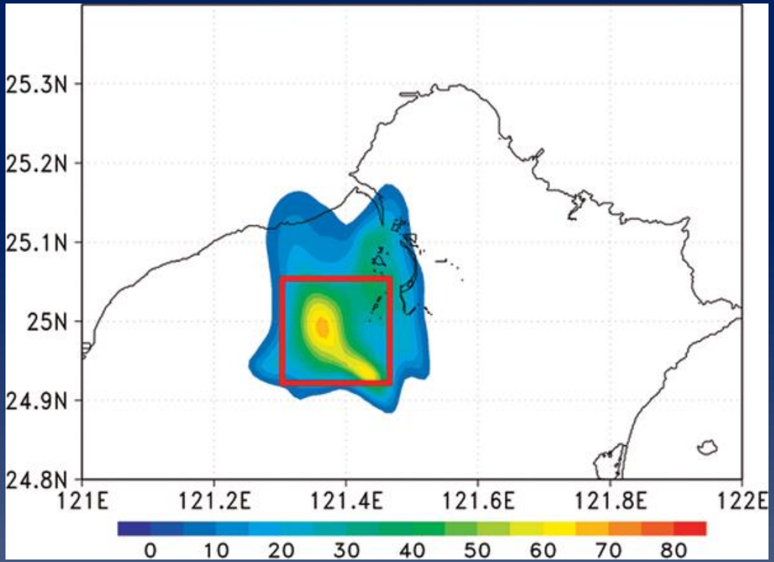
Impacts of terrain

CTL



Rainfall (mm)

NO_TER

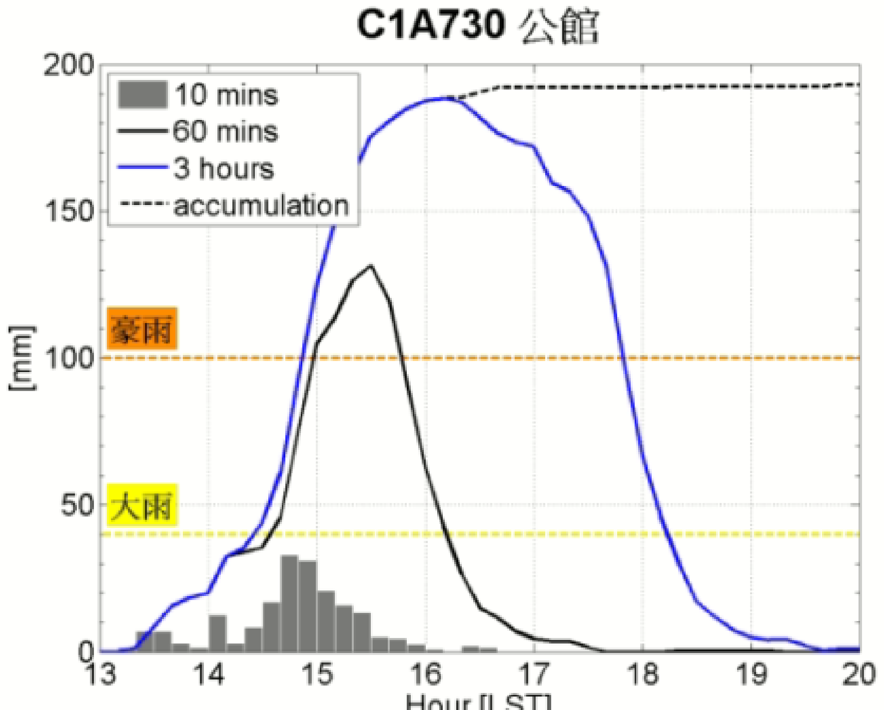


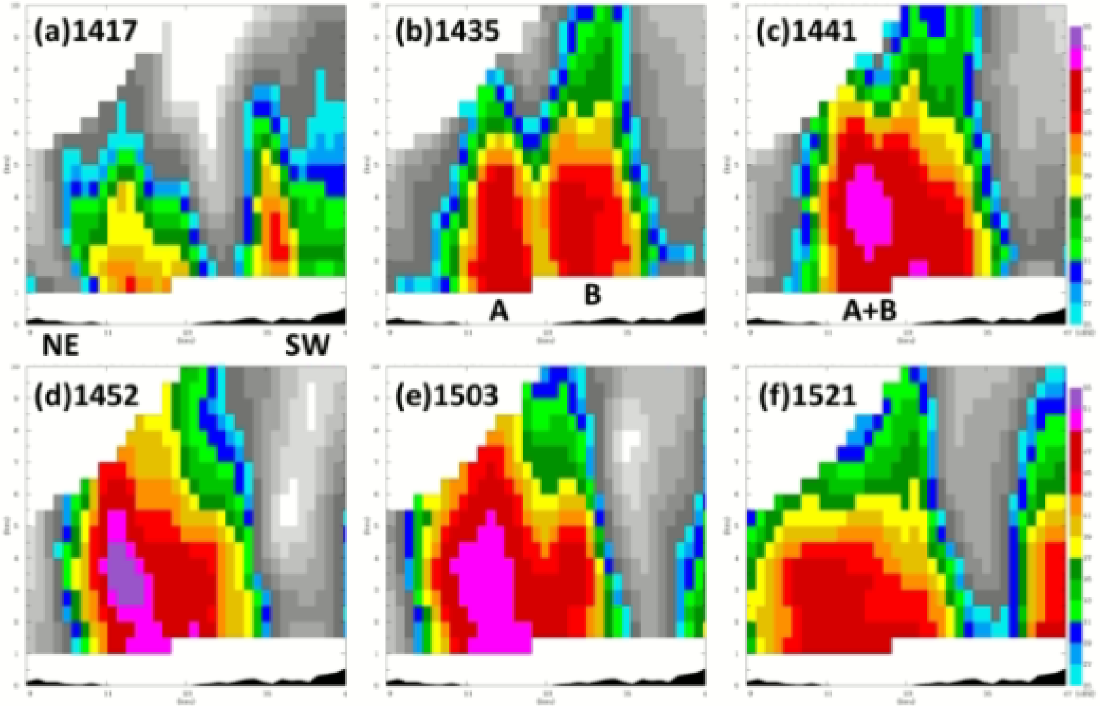
Rainfall (mm)

- ATS case is investigated using observations and IBM_VDRAS. (Wu et al. 2021)
- Location of maximum rainfall in NO_TER is shifted, compared to that in CTL.
- Terrain confines and intensifies the rainfall inside the Taipei Basin.

Extreme rainfall associated with cell merger

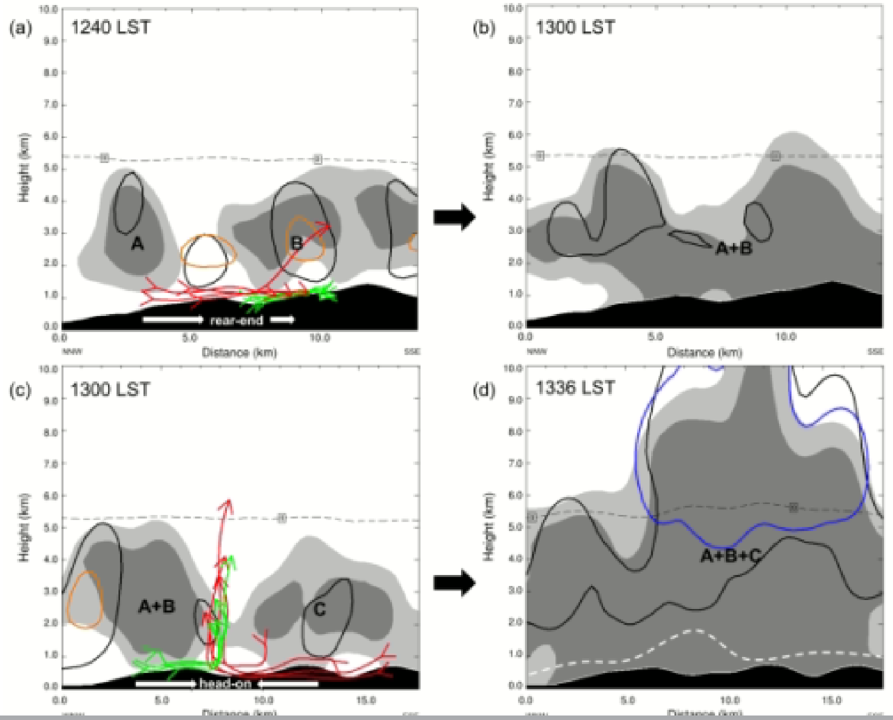
- Urban flooding case on14 June 2015 was closely related to the merger of convective cells. The merger of convective cells produced an enlarged precipitation area and stronger radar echoes extending to much higher altitudes. (Jou et al. 2016)
- Wu, Liou et al. (2021) investigated the ATS event (19 August 2014) in Northern Taiwan They found that after cell merger, the convective system became stationary and produced heavy rainfall over Taipei Basin.
- 7 July 2017 (Lo 2019); 22 July 2019 (Chen 2021); 4 June 2021 (Huang et al. 2022);



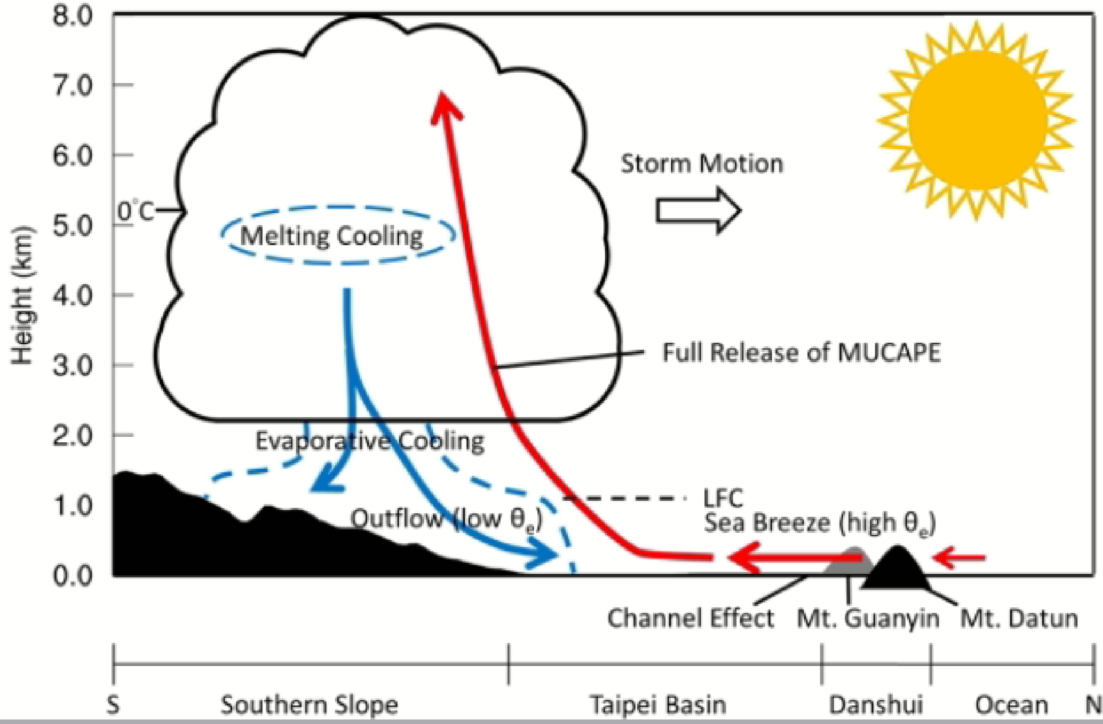


Jou et al. (2016)

Sea breeze and cold pool play an important role in the initiation and development of weakly-forced thunderstorm over Taipei Basin.
(Chen et al. 2007; Jou et al. 2016; Miao and Yang 2018; Kuo and Wu 2019; Miao and Yang 2020; Wu et al. 2021)

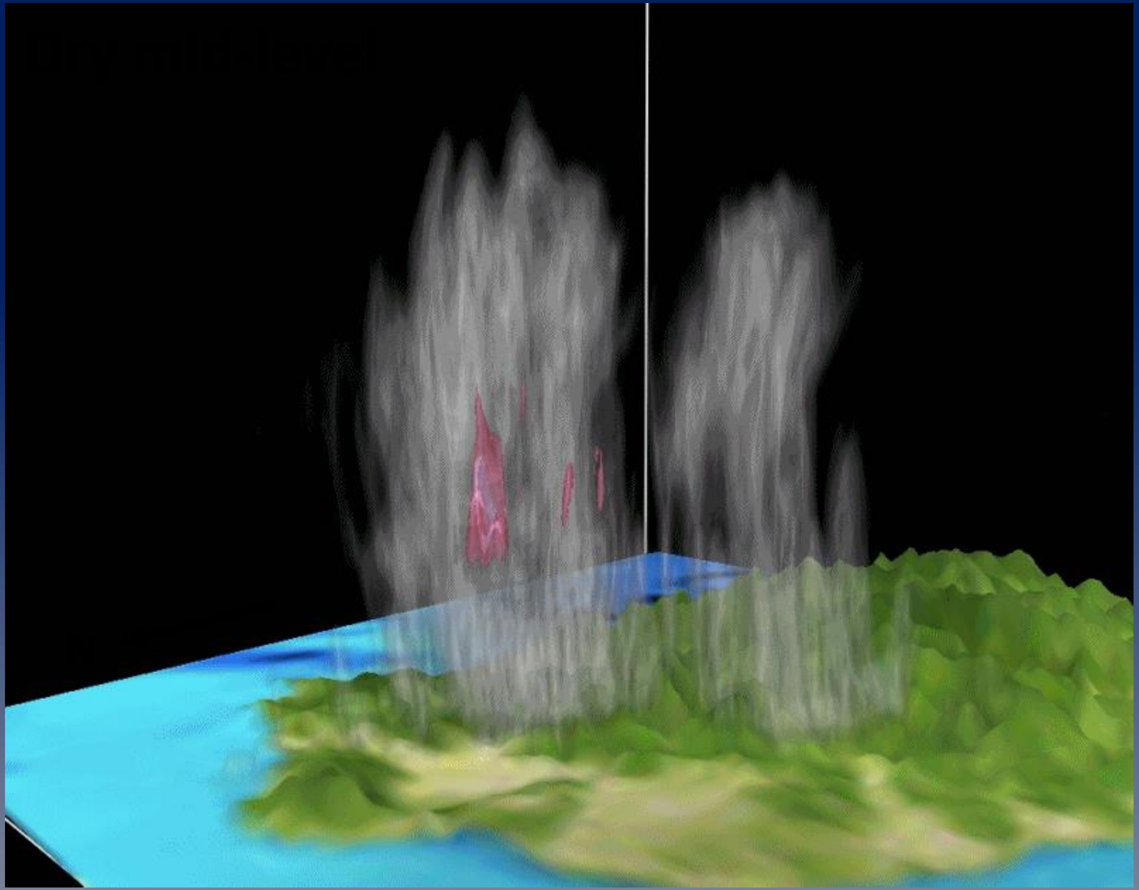


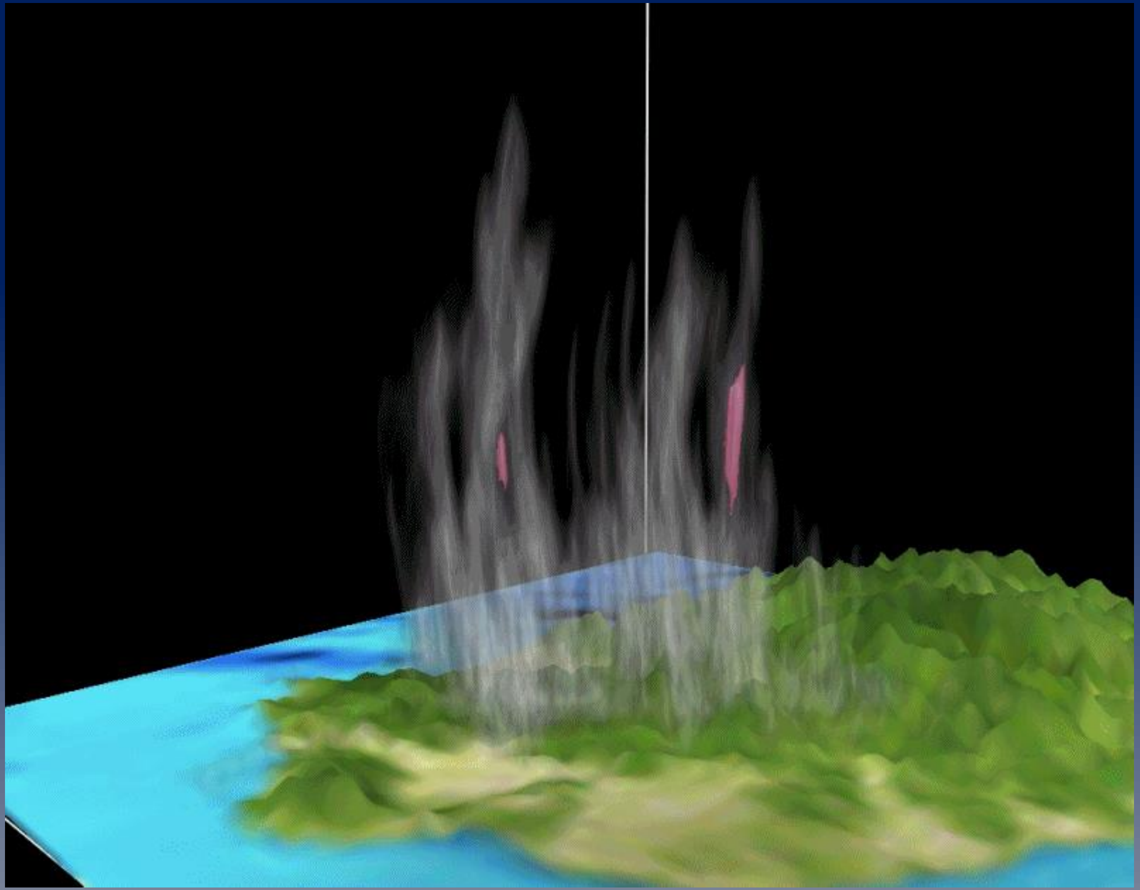
Miao and Yang 2018



Miao and Yang 2020

Impacts of mid-level moisture and terrain





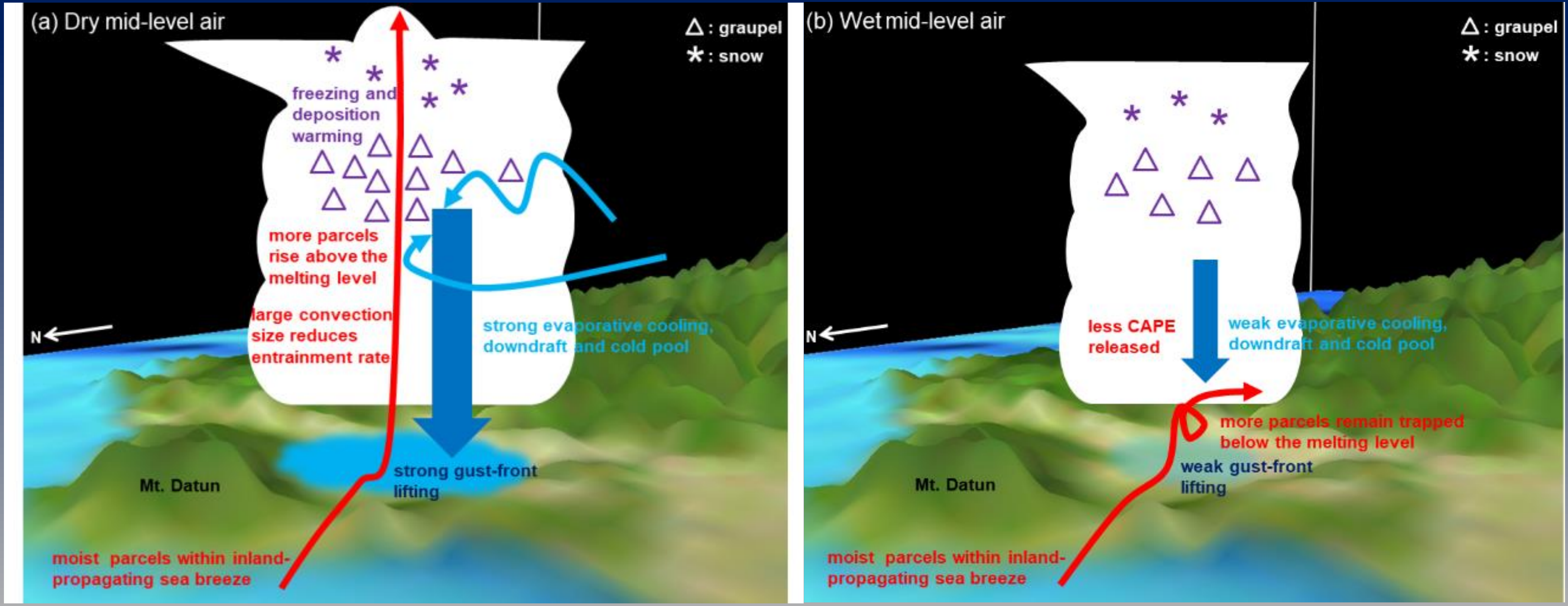
- Forward trajectories
- 200 air parcels originating north of the gust front

Miao and Yang 2022, JAS

Mid-level RH and terrain play an important role in evolution of weakly-forced ATS over Taipei Basin.

(Wu et al. 2021; Tsujino et al. 2021; Miao and Yang 2022)

Miao and Yang 2022, JAS



Jung and Jou 2023

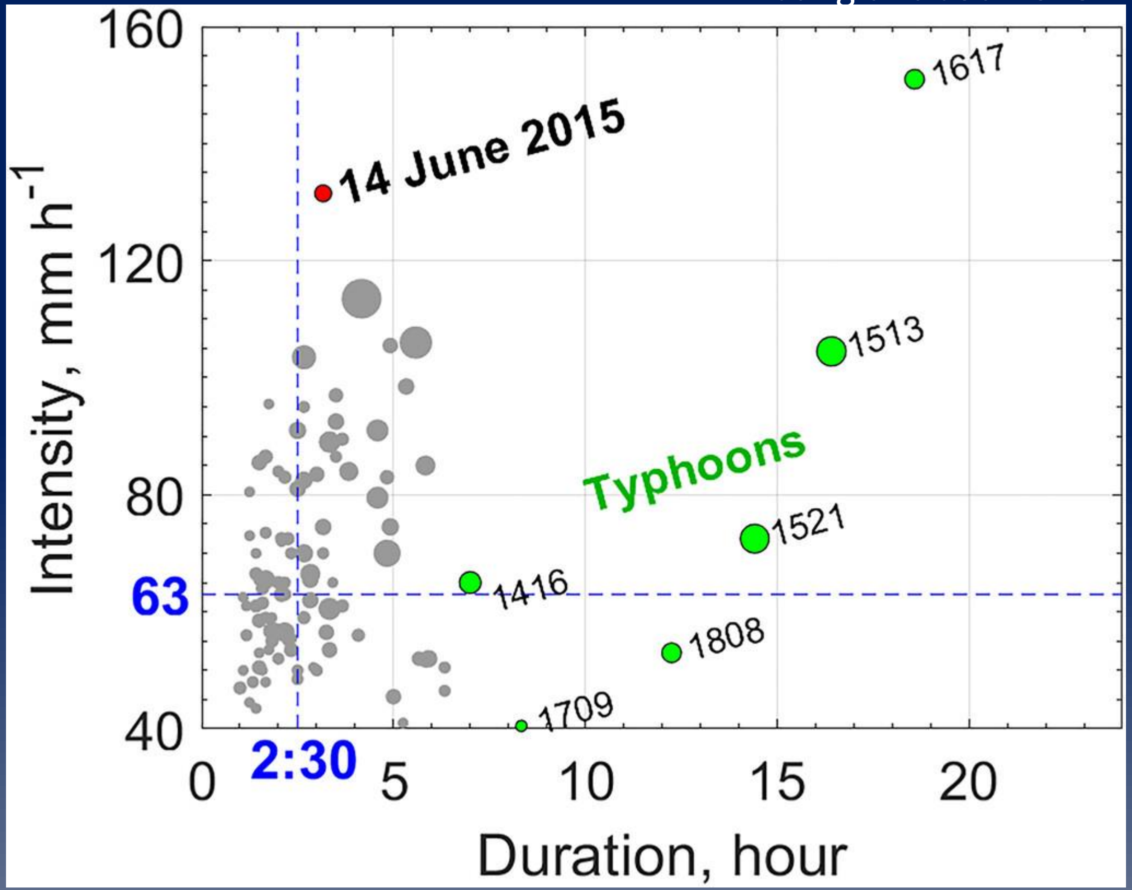
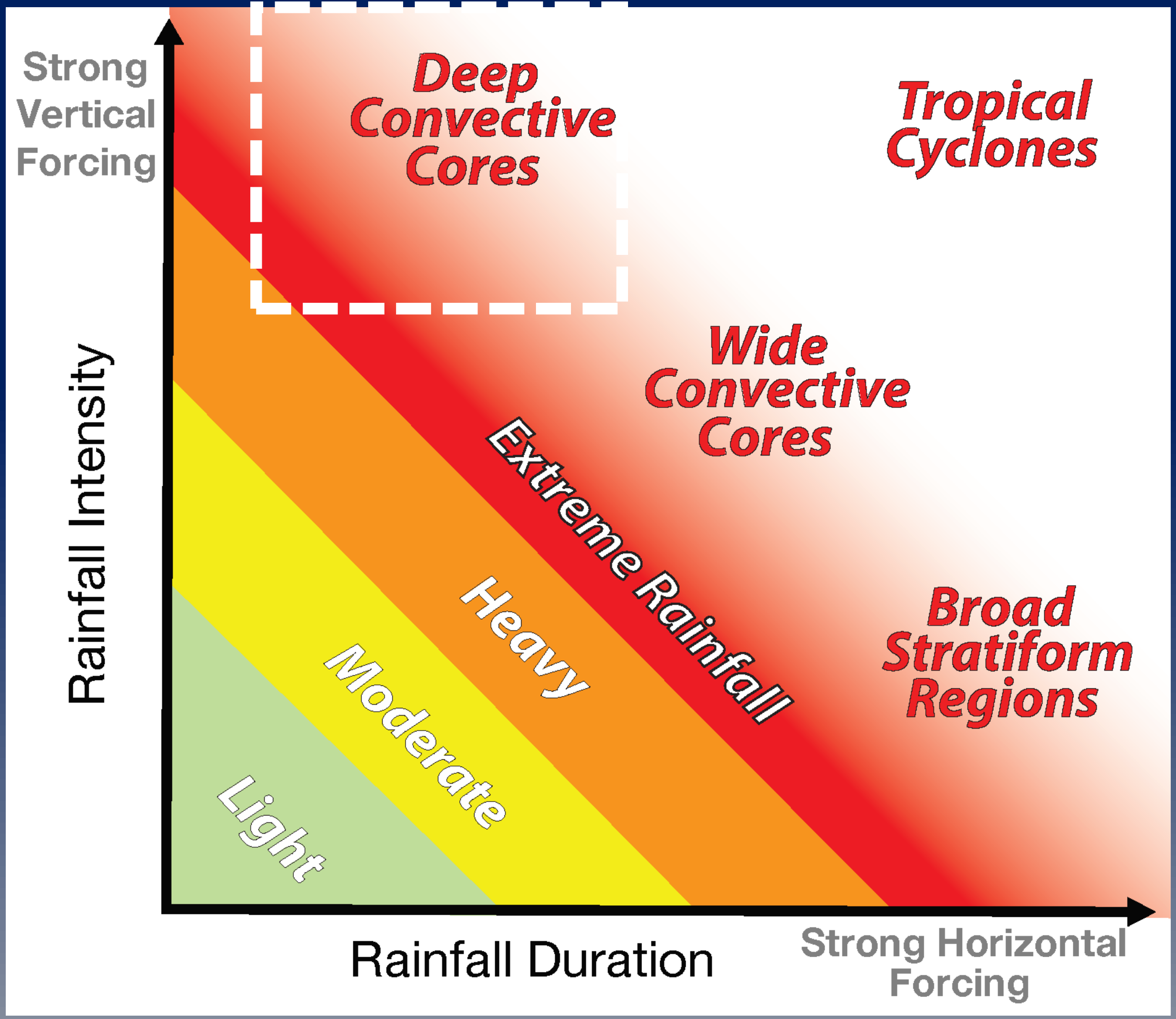


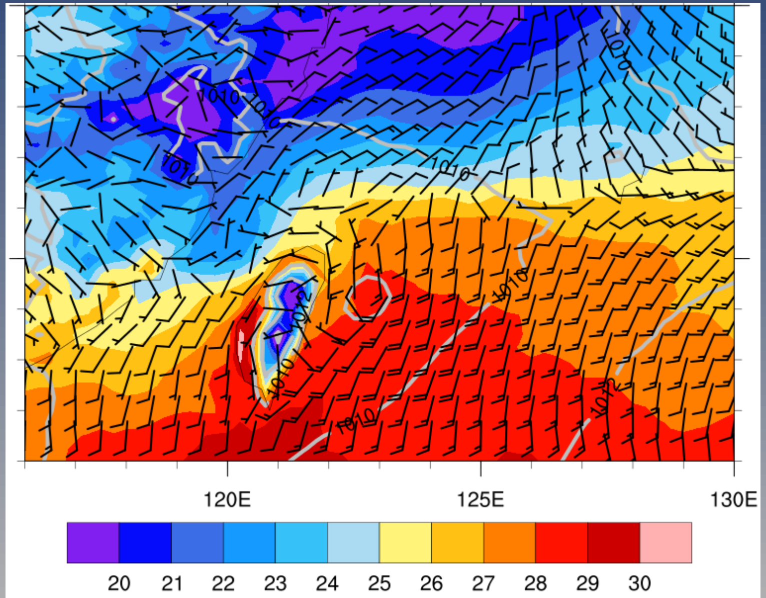
Figure from Michael Bell



- Intensity-duration framework
- Moisture-rich environment
- Key ingredients and processes

Orographic extreme rainfall in strongly-forced ATS

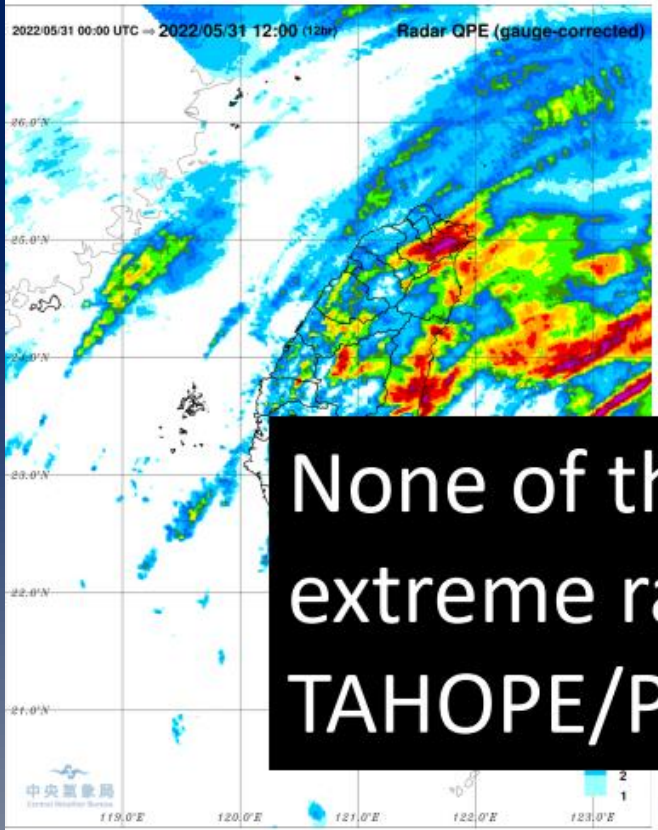
- Previous studies have focused on weakly-forced ATS.
- Different environments => mesoscale processes may vary (Houze 2014)
- Impacts of terrain are different under weak and strong synoptic environment (Rocque and Rasmussen 2022)
- Ingredients for orographic extreme rainfall in strongly-forced ATS

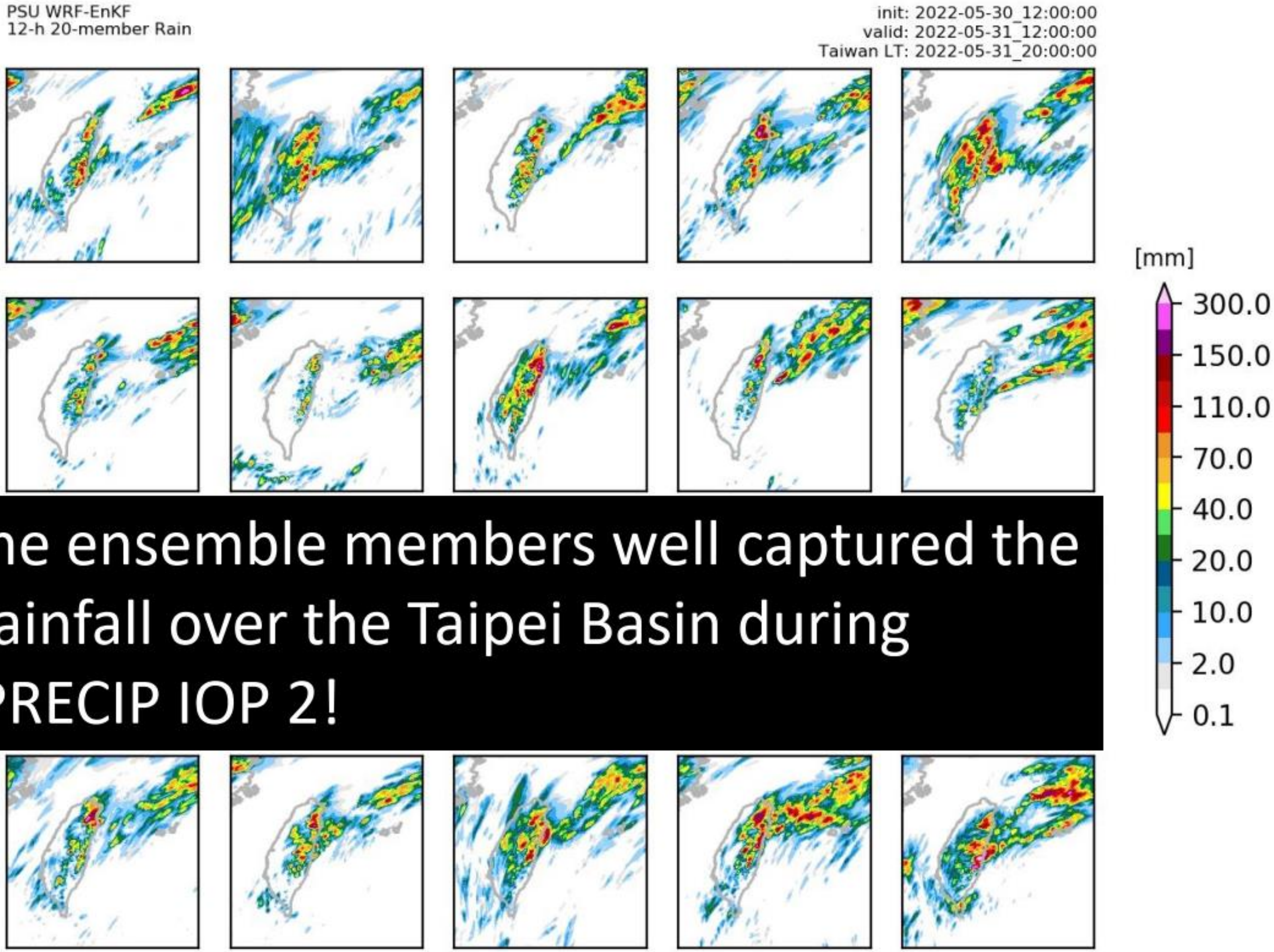


PRECIP IOP 2

Surface map at 08LST

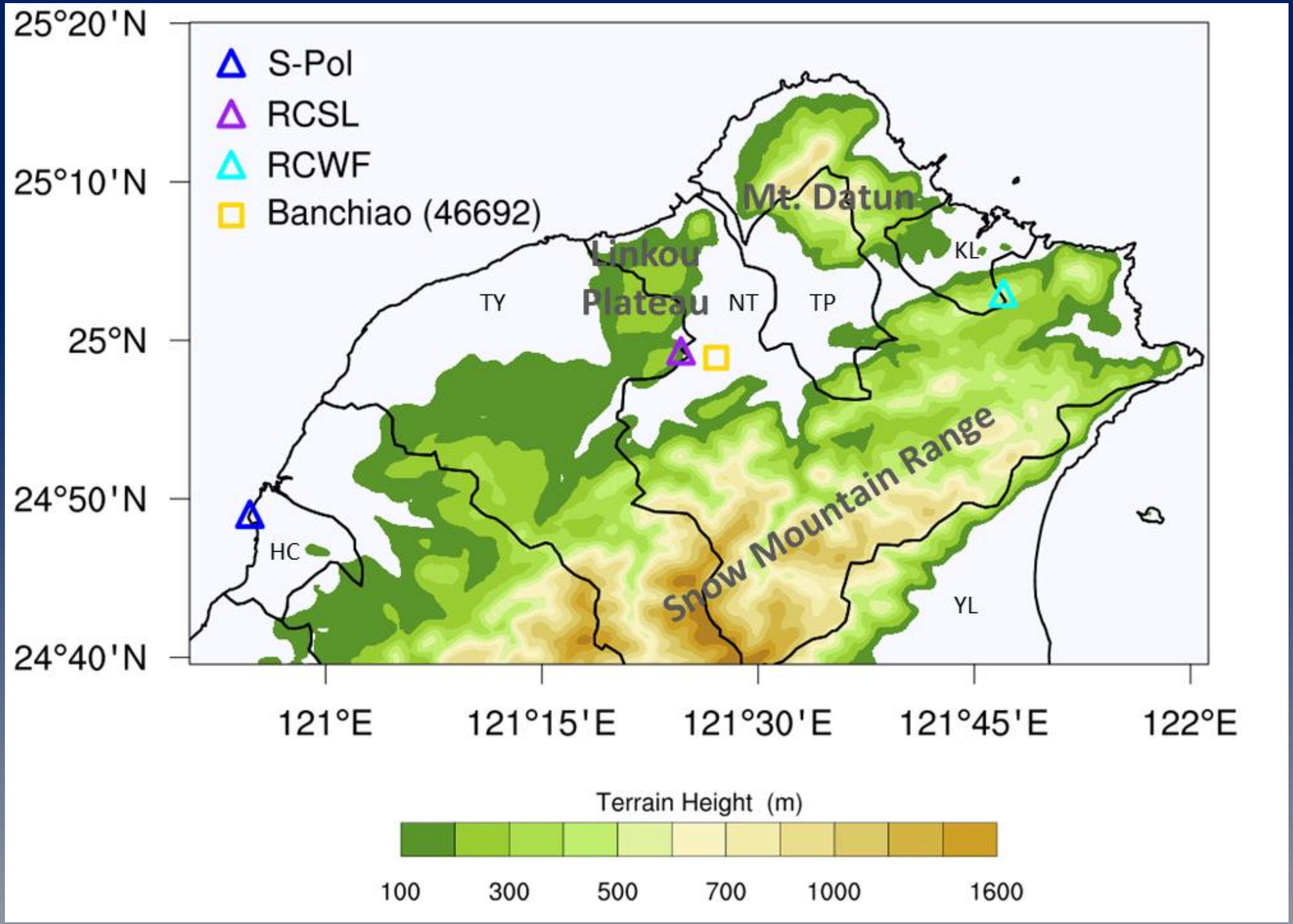
2022/05/31 08–20 LST



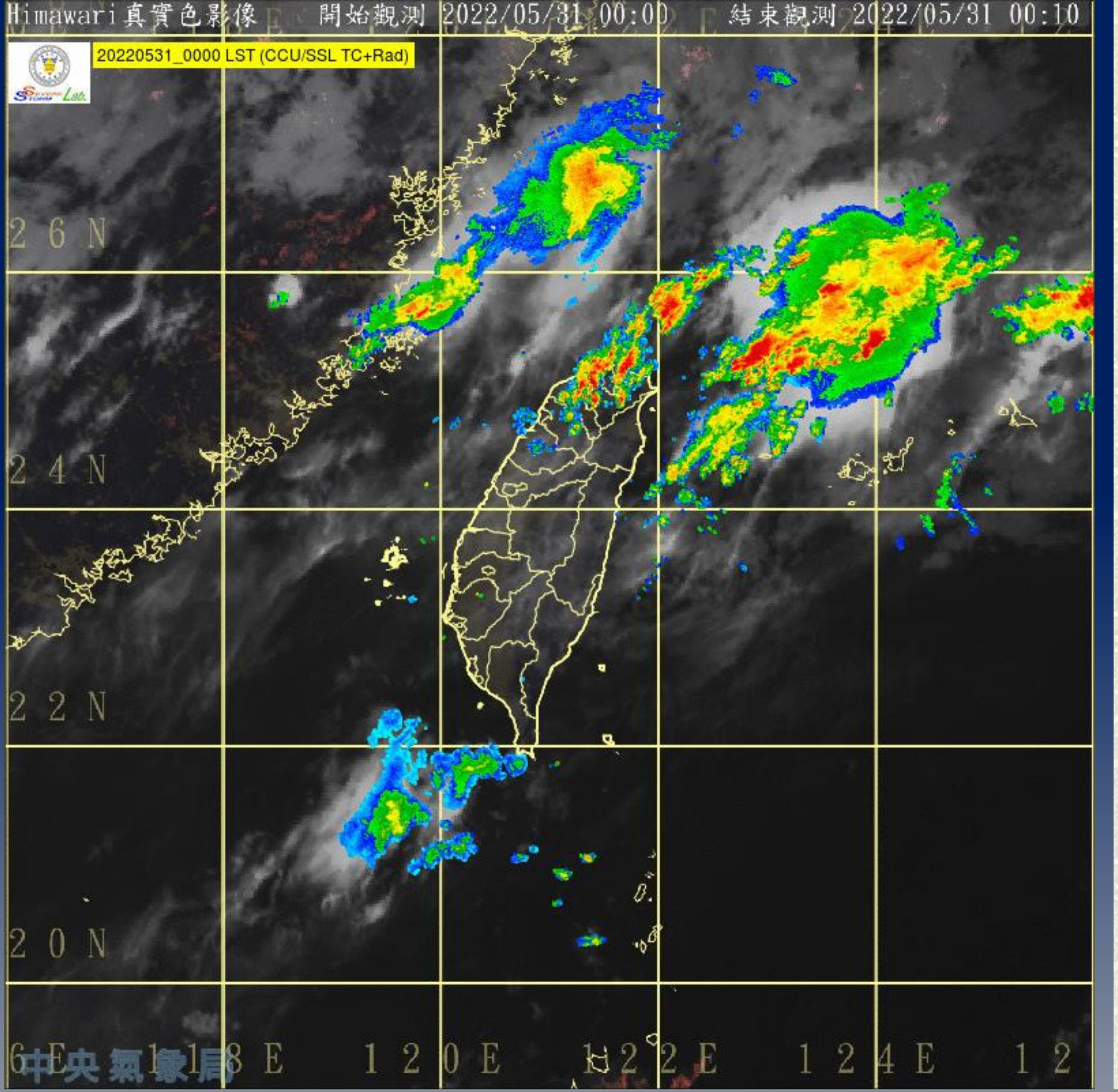


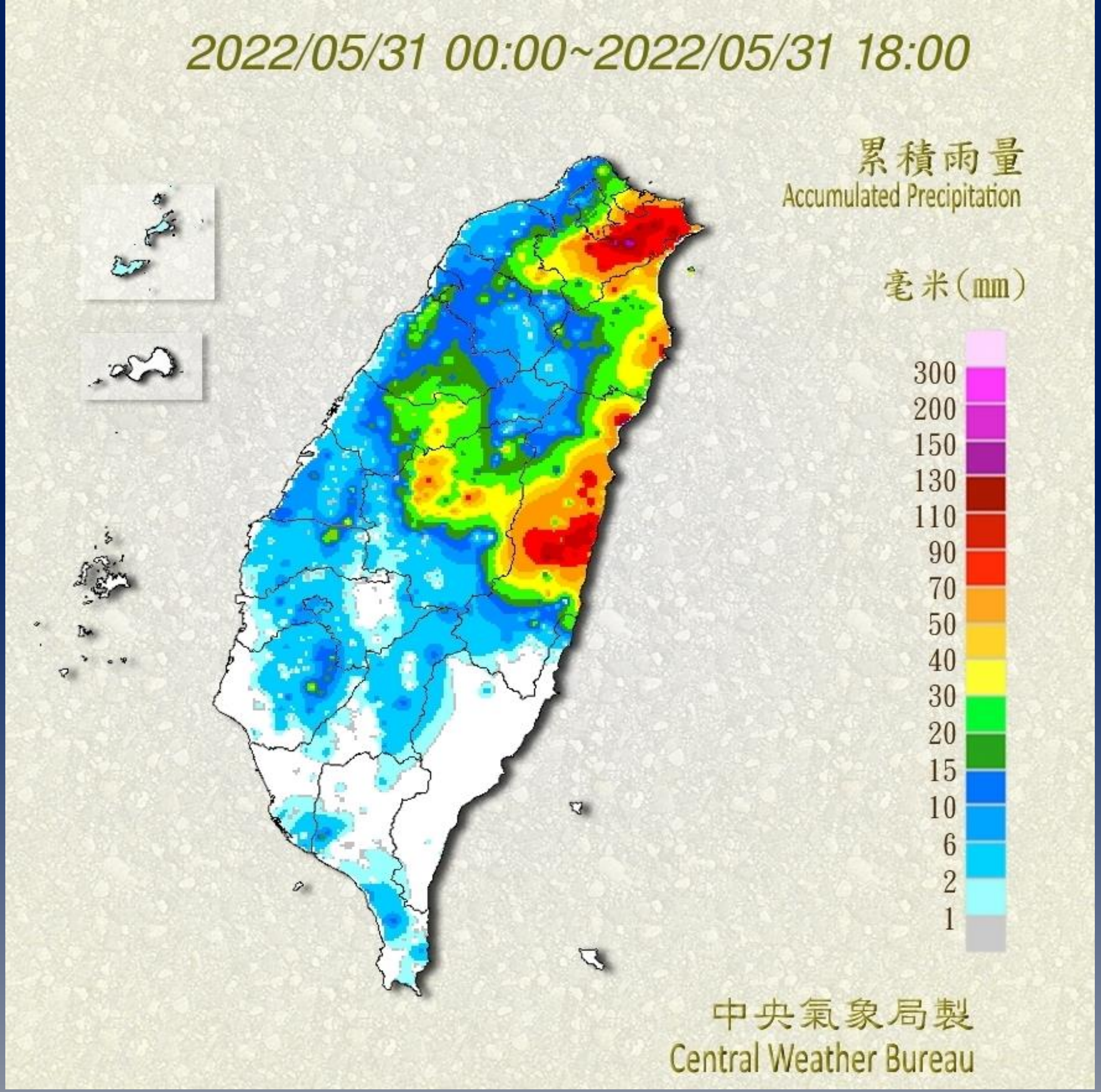
None of the ensemble members well captured the extreme rainfall over the Taipei Basin during TAHOPE/PRECIP IOP 2!

Microphysical and Kinematical Characteristics of Merged and Isolated Convective Cells over the Taipei Basin

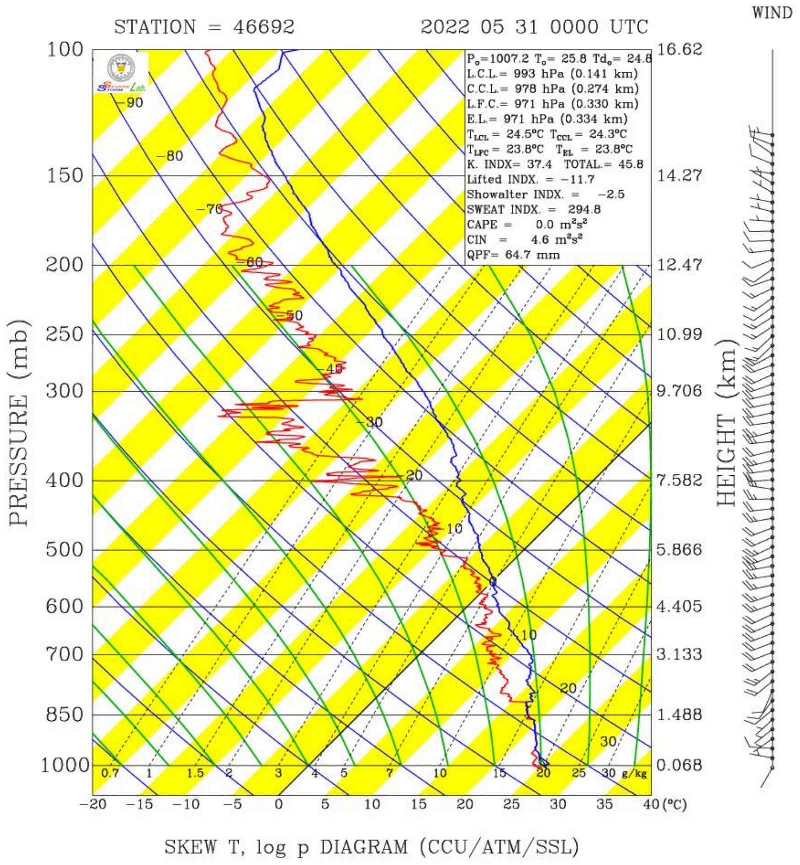


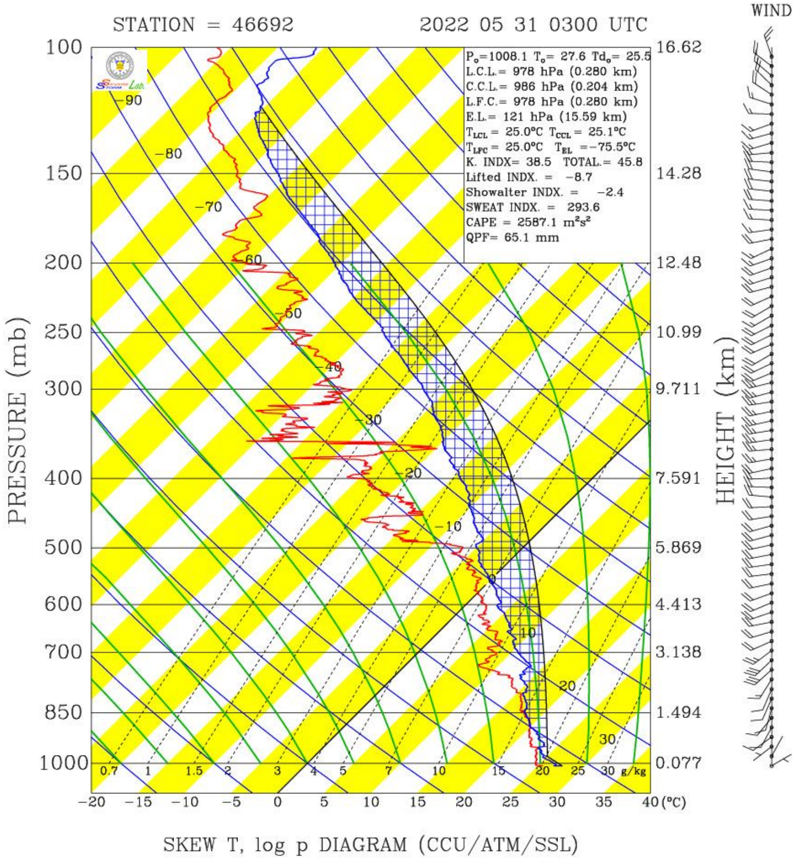
- Microphysics: S-Pol RHI (NCAR/EOL S-Pol Team 2023)
- Kinematics: SAMURAI-Terrain (Cha and Bell 2023)





TAHOPE/PRECIP IOP 2: (1) Weak rainfall occurred in the morning; (2) Strong ATS; (3) Deep convection near northeastern coast





5/31 Banchiao (46692)
0800 LST (0000 UTC):
Moist middle level (700-500 hPa)

Saturated layer at 940-820 hPa

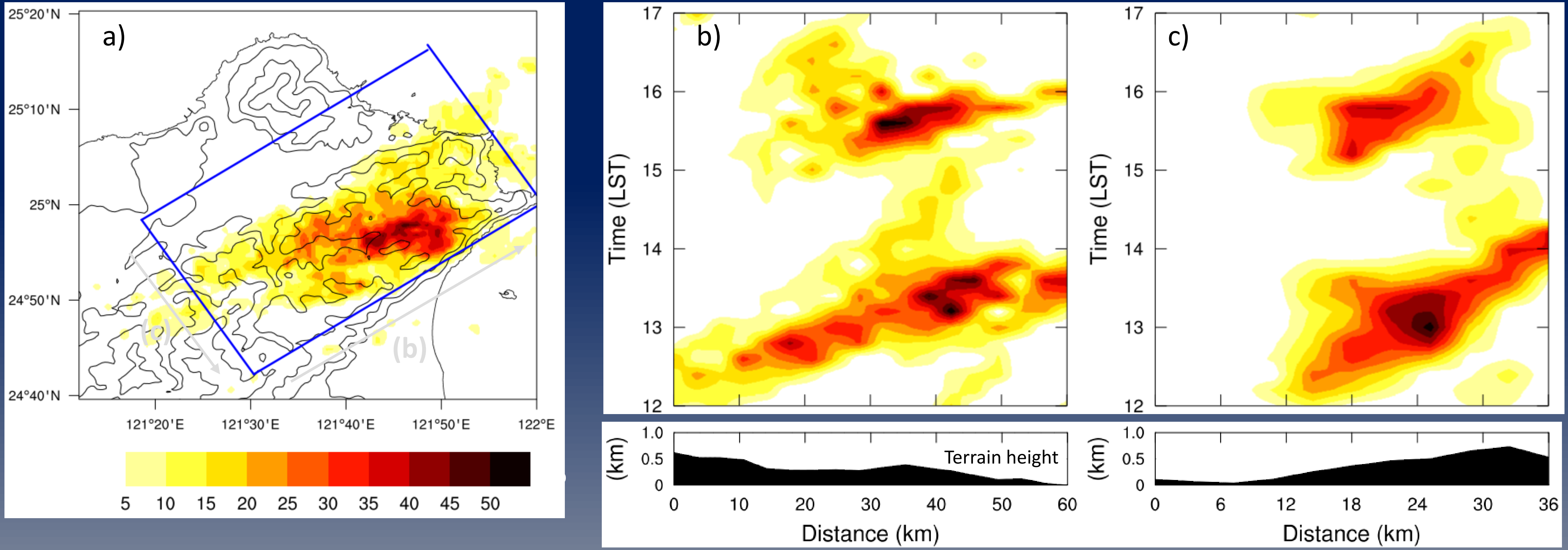
Weak southwesterly within PBL

Southwesterly between 800-500 hPa (20 ~ 25 kts)

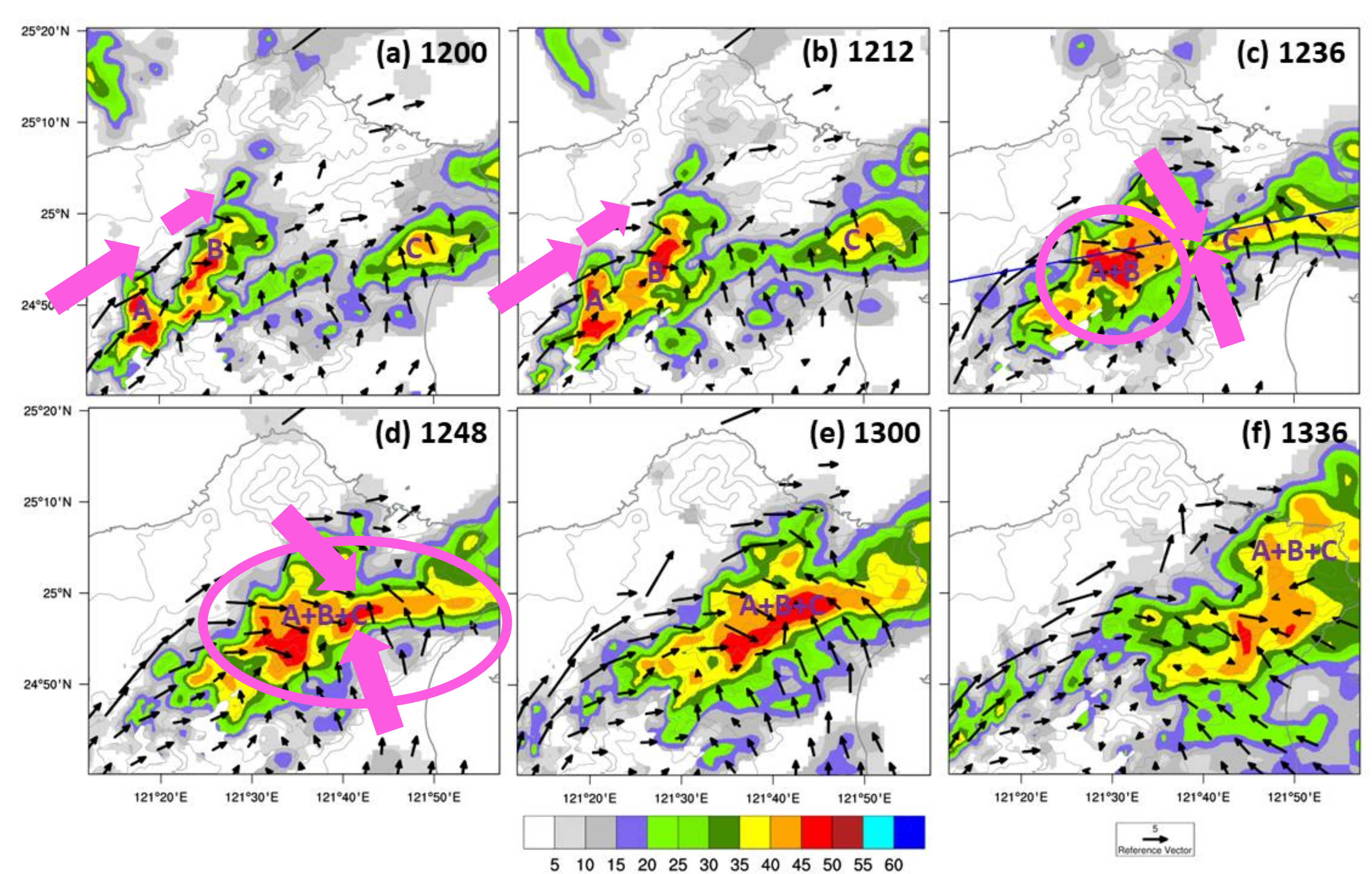
1100 LST (0300 UTC):
Northerly (sea breeze) below 950 hPa

CAPE increased to ~ 2600 J/kg

Spatial and temporal distribution of ZH>40dBZ at 3 km MSL



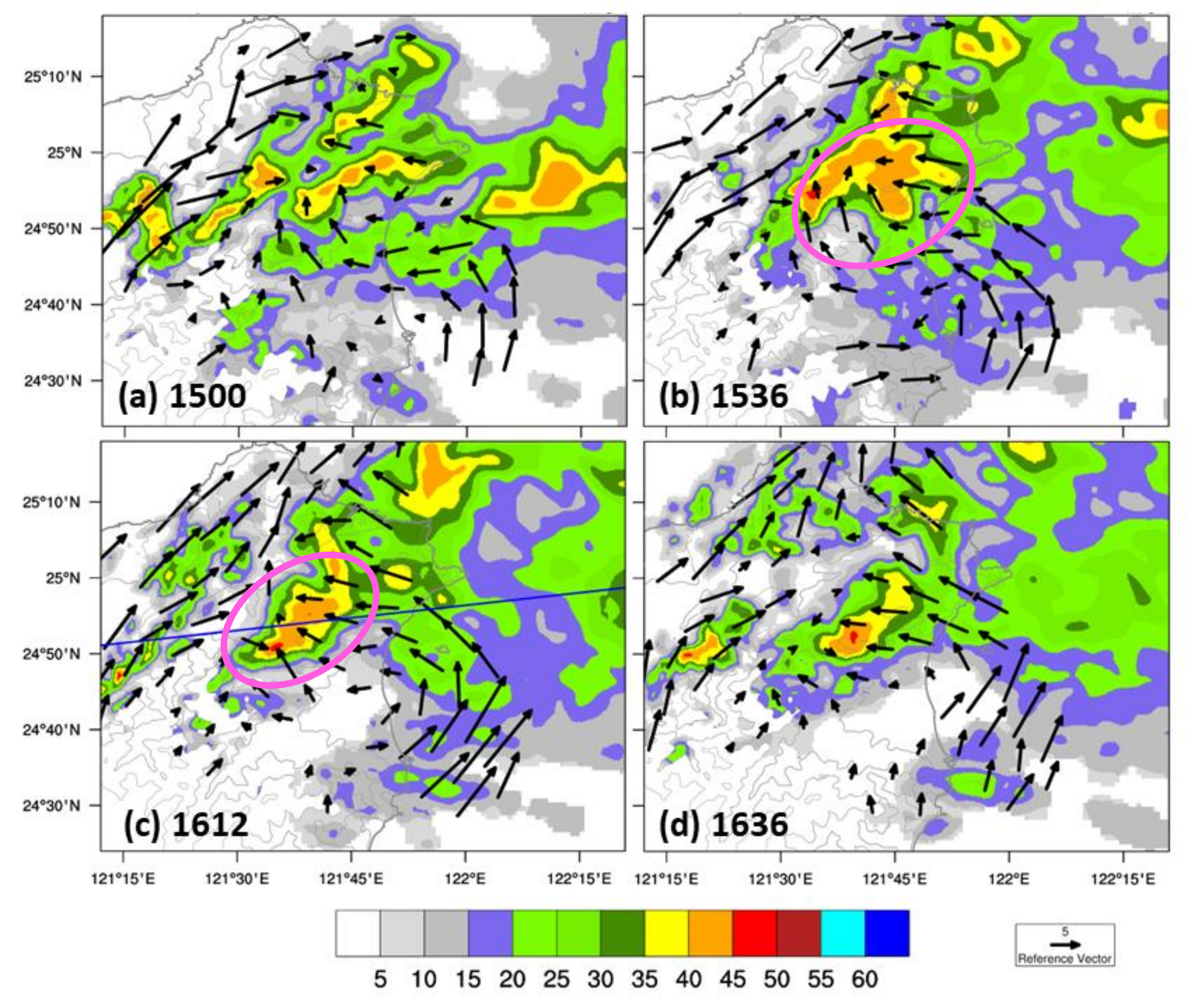
- Strong convection mainly occurred over the Snow Mountain Range (SMR)
- Episode 1: 1200-1400 LST; episode 2: 1500-1700 LST
- Convection was confined within the mountainous region, resulting in heavy rainfall over SMR.



Episode 1

S-Pol ZH & wind at z=1.5 km

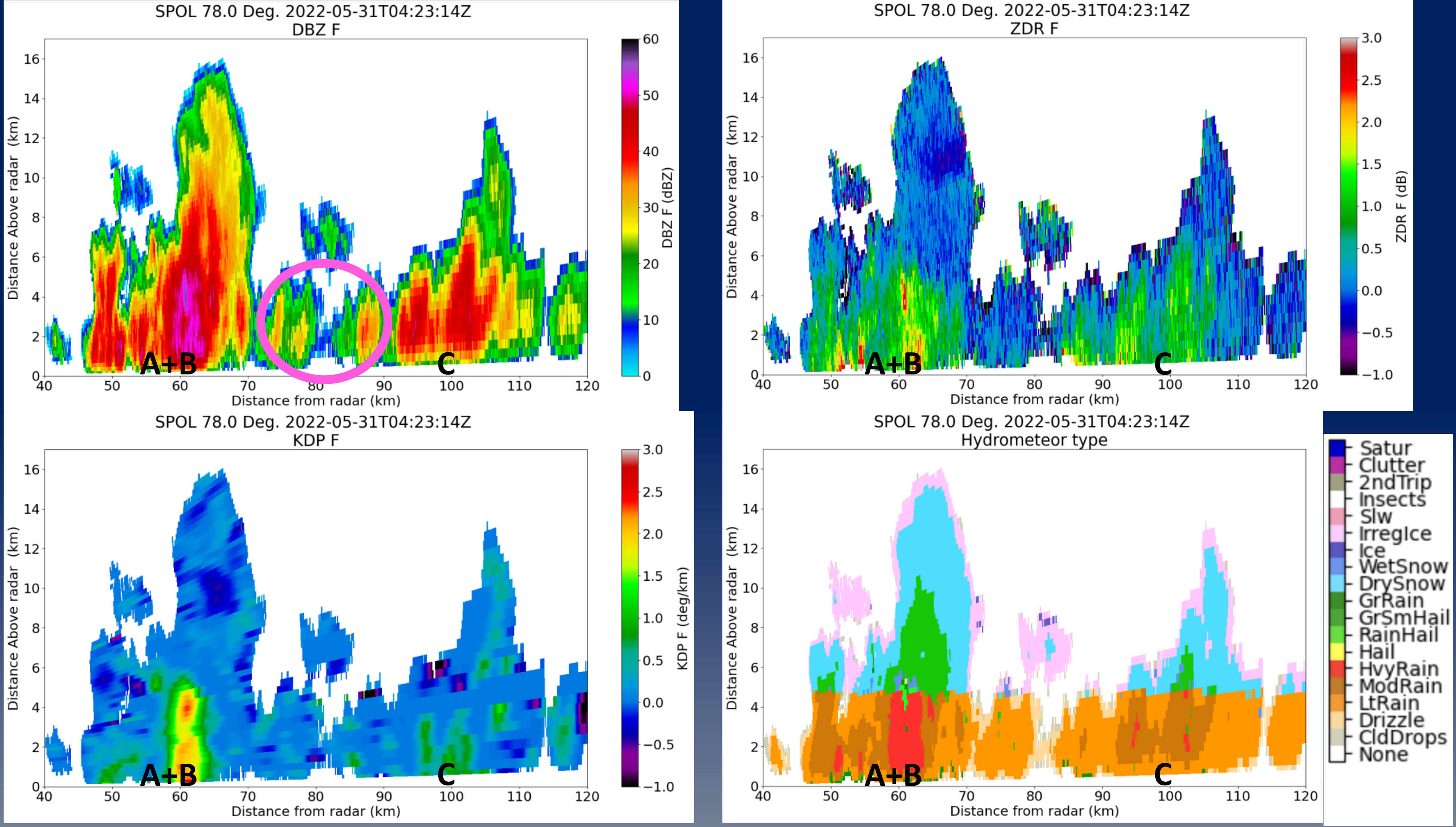
- Multiple cell merger (MCM)
- A and B merger: rear-end collision due to the different propagation speeds (Miao and Yang 2018)
- A+B and C merger: convergence produced by upslope winds
- Terrain played an essential role in the merger of A+B and C.



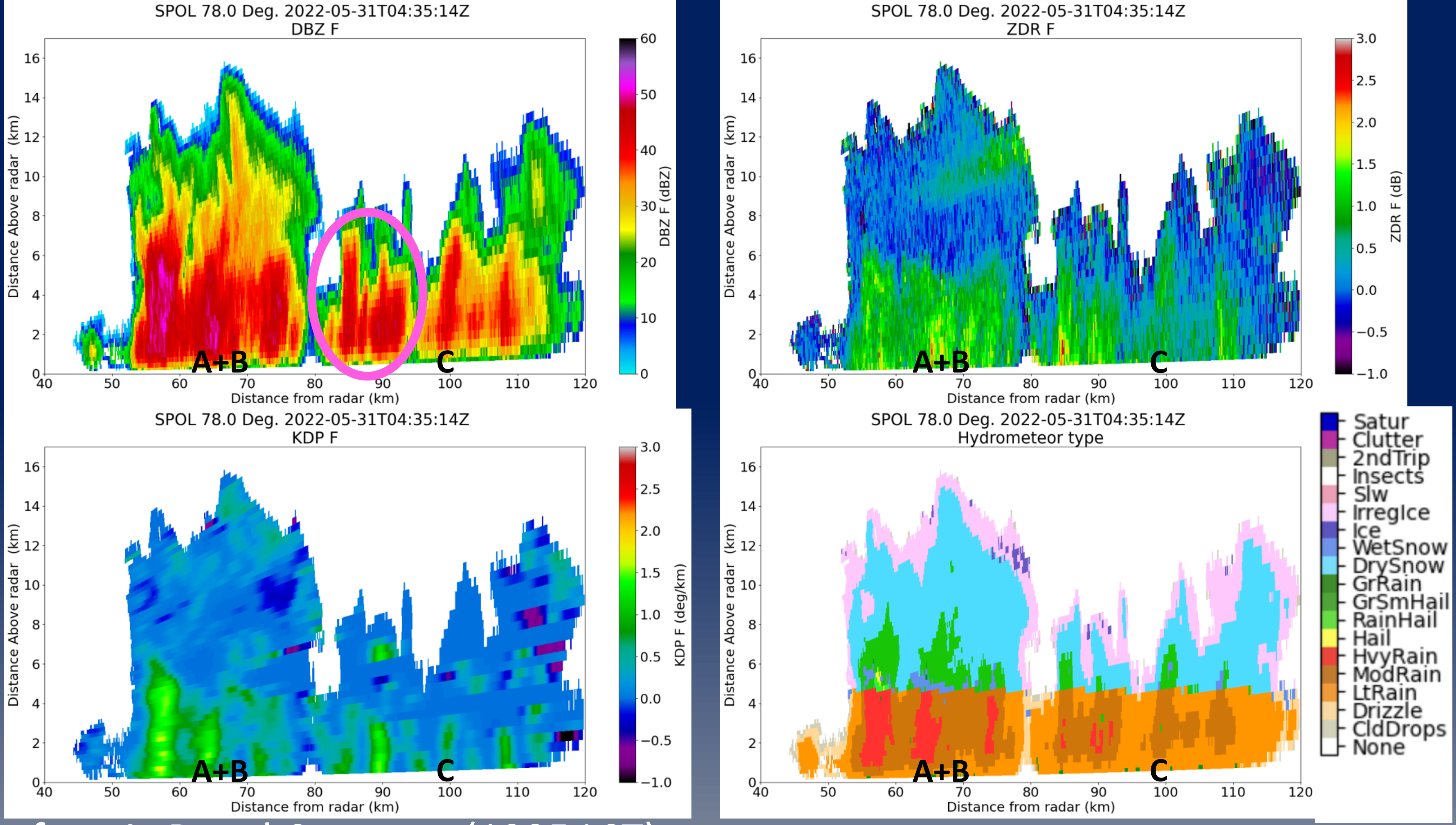
Episode 2

S-Pol ZH & wind at z=1.5 km

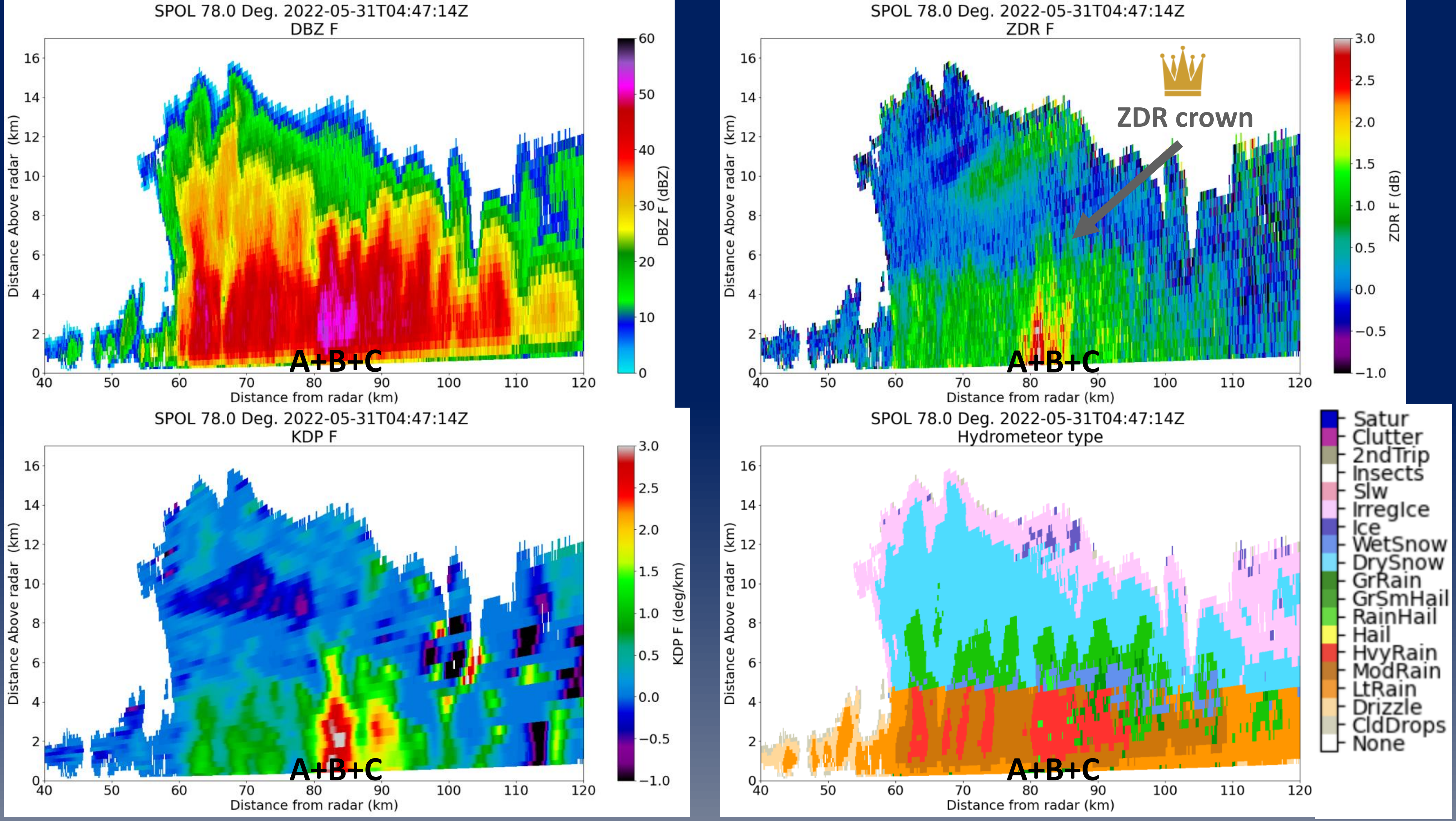
- Isolated convective cells
- Mesoscale vortex moved northward. Easterly winds north of the vortex penetrated into SMR.
- The convection over SMR was located at the front of the easterly winds.



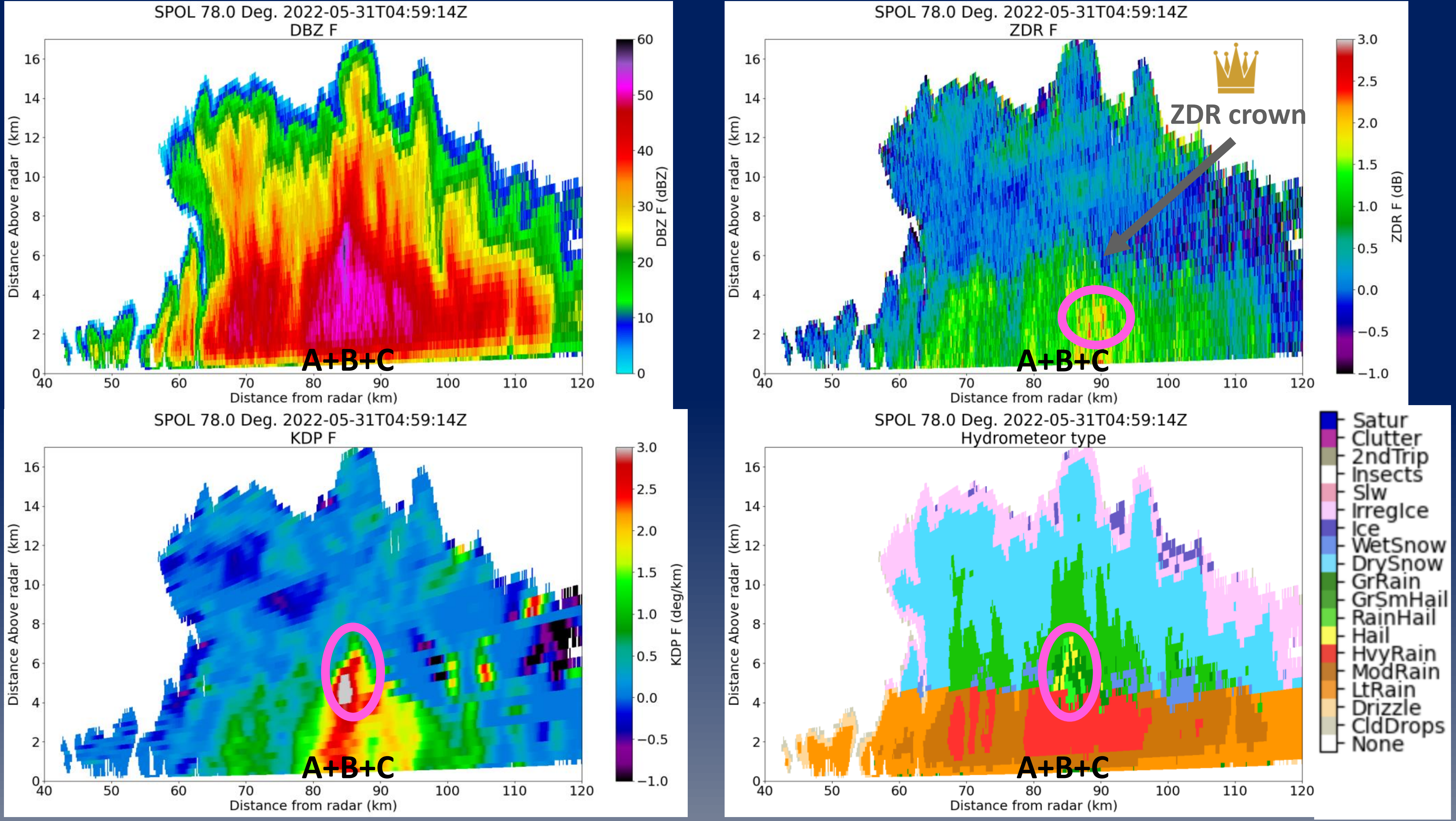
- Before A+B and C merger (1223 LST): echo-top ~14.5 km MSL; graupel at 5-10 km
- ZDR columns at x~60 km and 100 km => convective updrafts
- Shallow cumulus clouds (x=70-90 km): low-level convergence



- Before A+B and C merger (1235 LST):
- Shallow cumulus clouds extended above the 8km MSL.
- Low-level convergence produced by upslope winds.

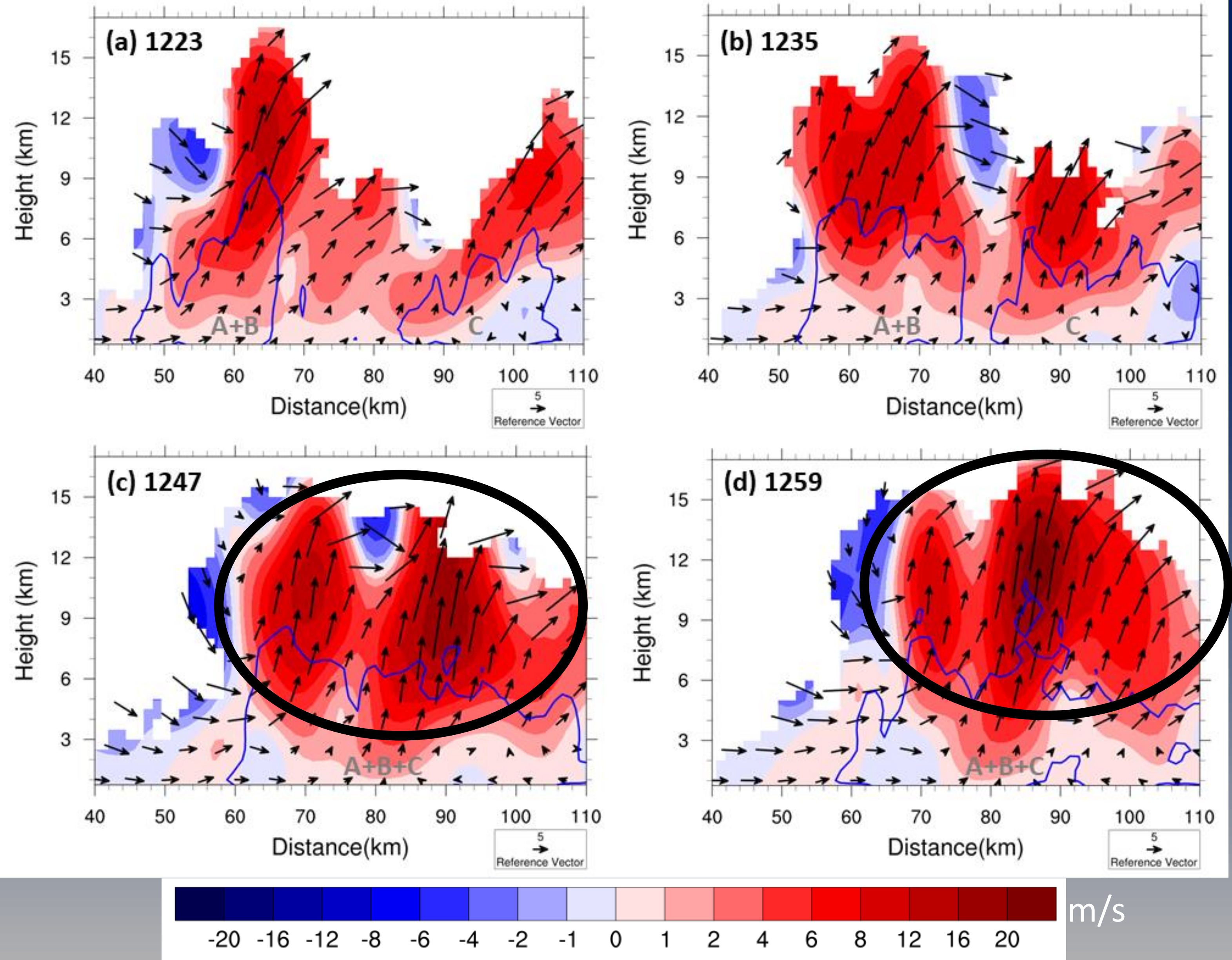


- After A+B and C merger (1247 LST):
- The enhanced ZDR region (>1dB) seems like a **crown** rather than a column!
- KDP column with a height of 7km; Max. (~ 3.5 °/km) was larger.



- After A+B and C merger (1259 LST): echo top exceeding 16 km; max. ZH ~ 60 dBZ
- Water-coated hailstones and large supercooled raindrops: high KDP
- rain/hail and graupel/rain, high ZDR (> 2 dB), shedding and melting of graupel

Kinematic structure during cell merger process



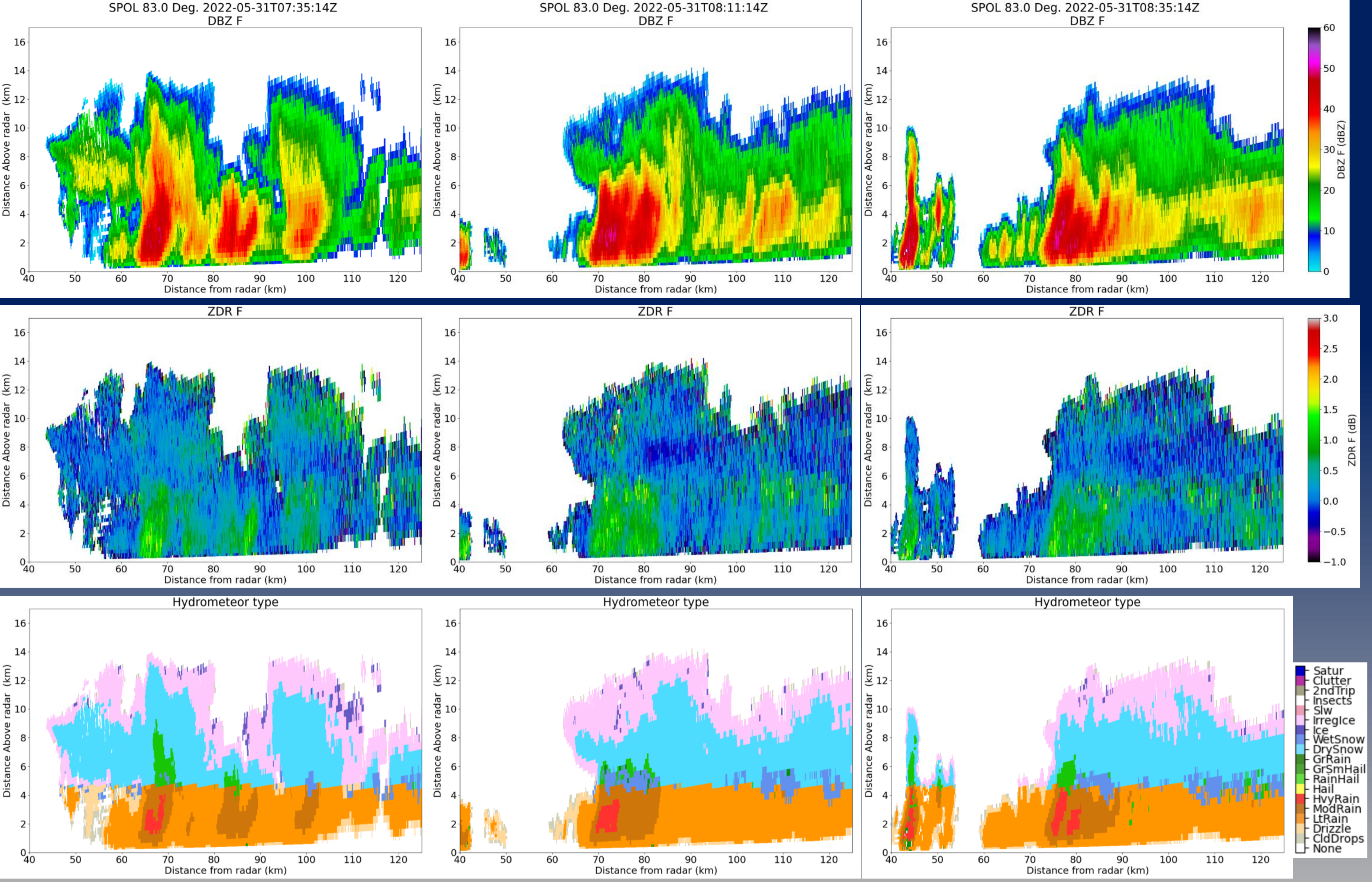
vertical velocity (colored)
35-dBZ-ZH (blue contour)

Before merger (1223-1235 LST):

- Retrieved updrafts ~ ZDR columns.
- Low-level convergence produced by upslope winds.
- Max. vertical velocity ~12 m/s.

After merger (1247-1259 LST):

- mid-to-upper-level updrafts (> 4 m/s) merged
- Max. vertical velocity > 20 m/s
- a large amount of graupel and hail



Episode 2

Isolated cells

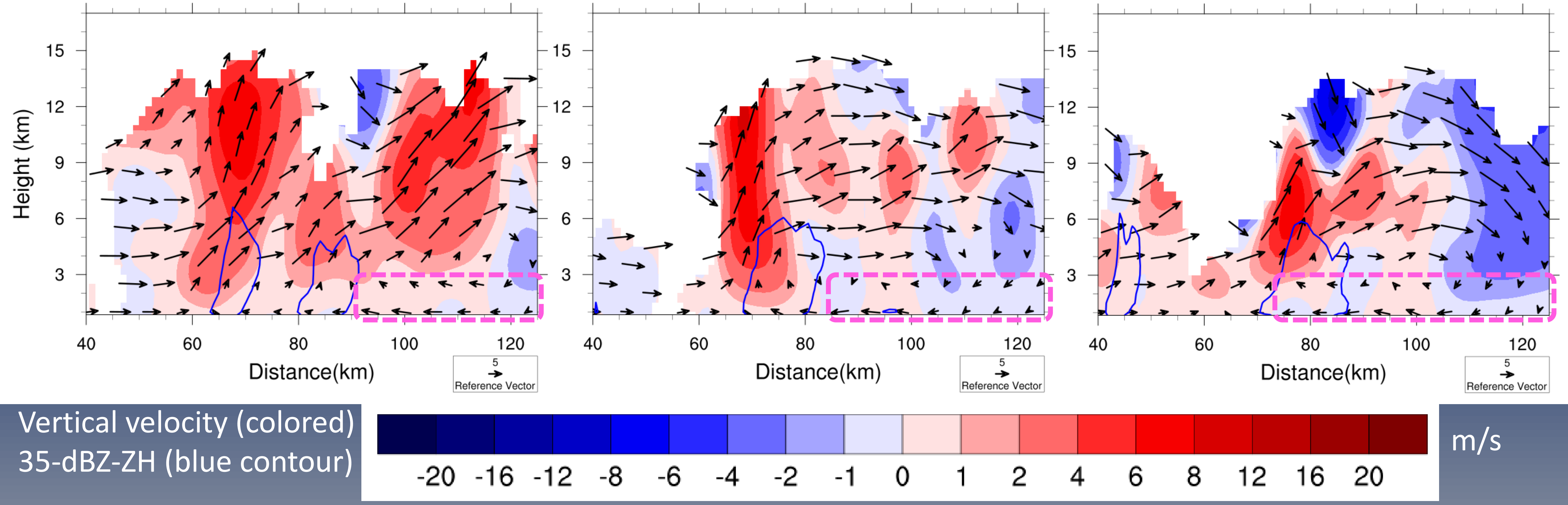
Echo-top ~ 12 km MSL

Barely well-defined ZDR column

Snow

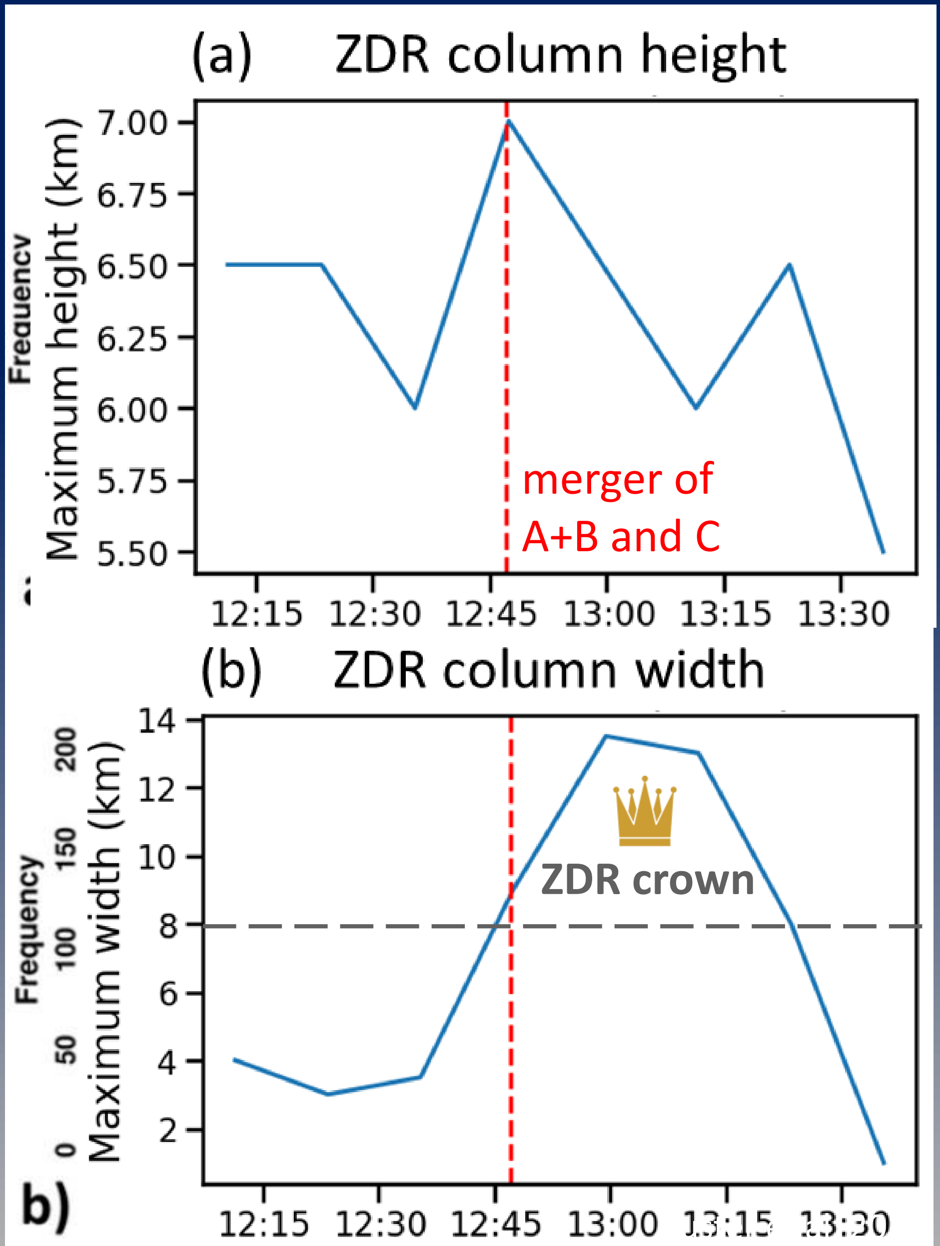
Decreased rainfall intensity

Kinematic structure during Episode 2



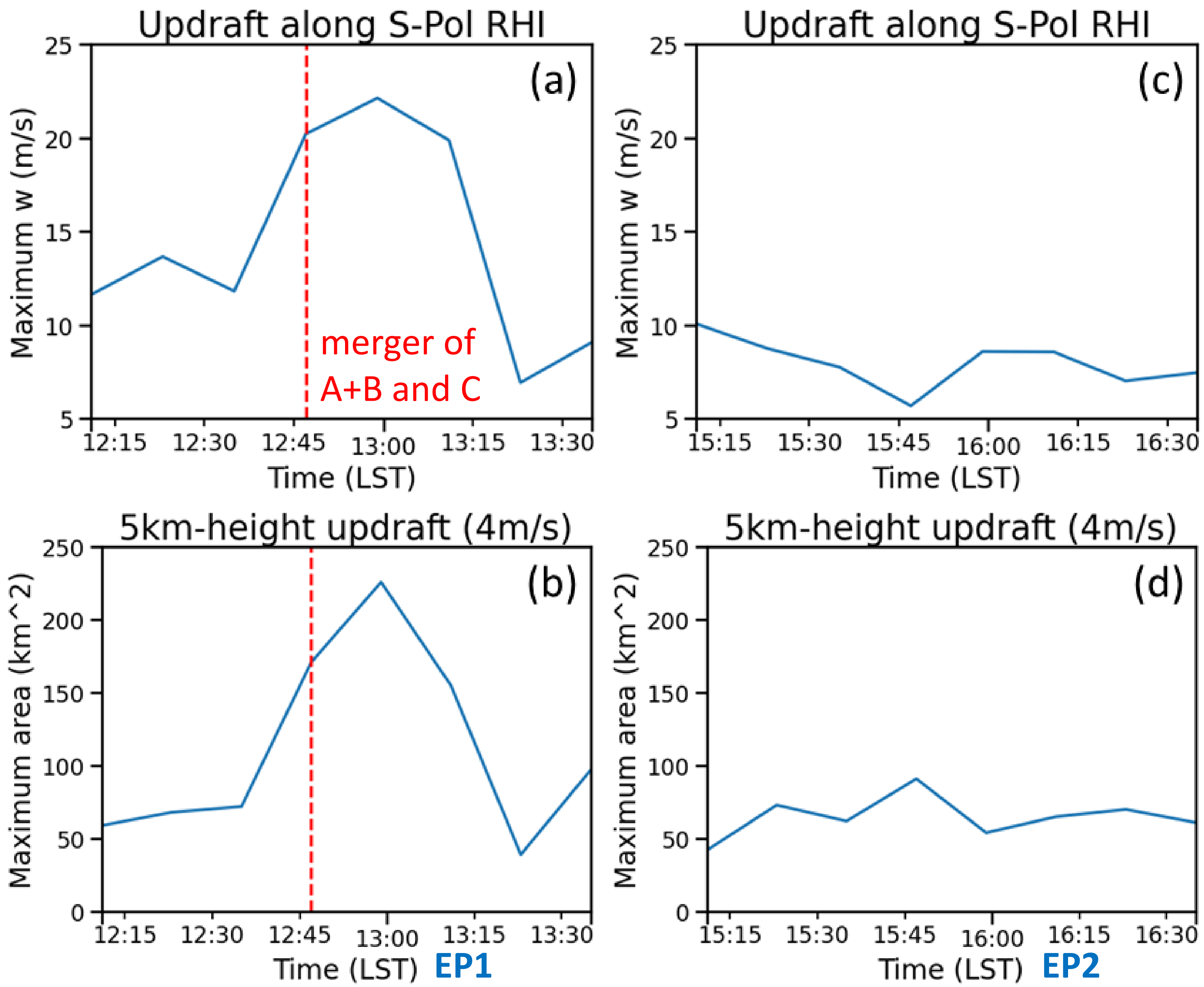
- No cell and updraft merger
- Disorganized and slantwise structure with a max. *w* of 8 m/s
- Easterly flow (< 2 km MSL) advanced westward to x~75 km

Evolution of ZDR column/crown during Episode 1



- Tracking ZDR column heights and areas (Snyder et al. 2015; Kuster et al. 2019; French and Kingfield 2021)
- Tracking ZDR columns (ZDR ≥ 1dB extending up to ≥ 5 km) using tobac software (Heikenfeld et al. 2019)
- Maximum height: 6 km -> 7 km (intensifying updrafts)
- Maximum width: 4 km -> 8 km -> 13 km (ZDR crown: 5-km-height width > 8 km)
- ~30 min; manifestation of updraft merger

Evolution of updrafts during Episode 1 & 2



Episode 1

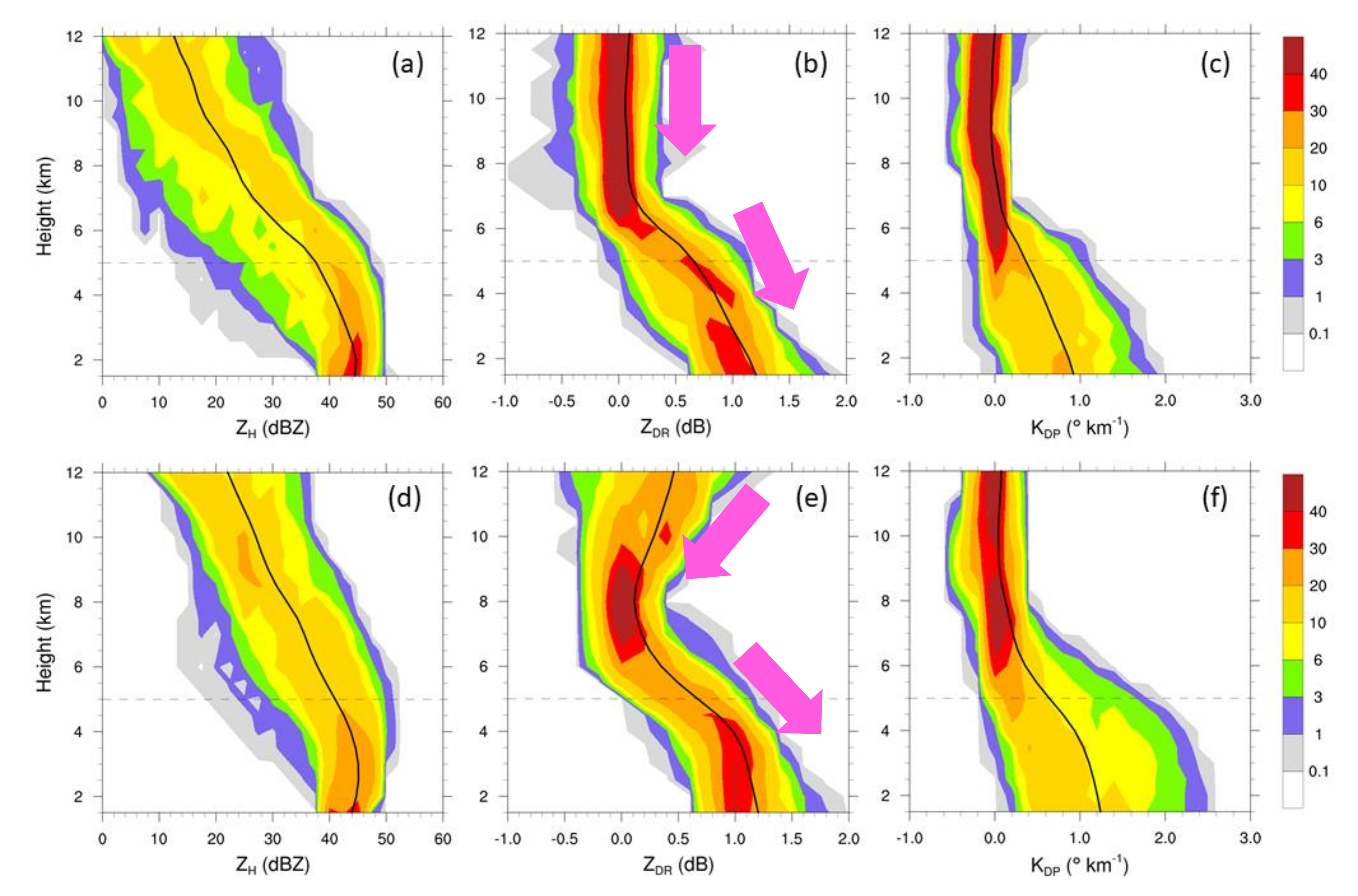
- Updraft velocity and area rose rapidly around the merging time.
- Updraft velocity and area increased with ZDR column width (ZDR crown)
- Less likely to be invaded by the dry air intrusion from environment (Miao and Yang 2022)

Episode 2

- No ZDR crown
- Weak updrafts

1224 LST

1300 LST



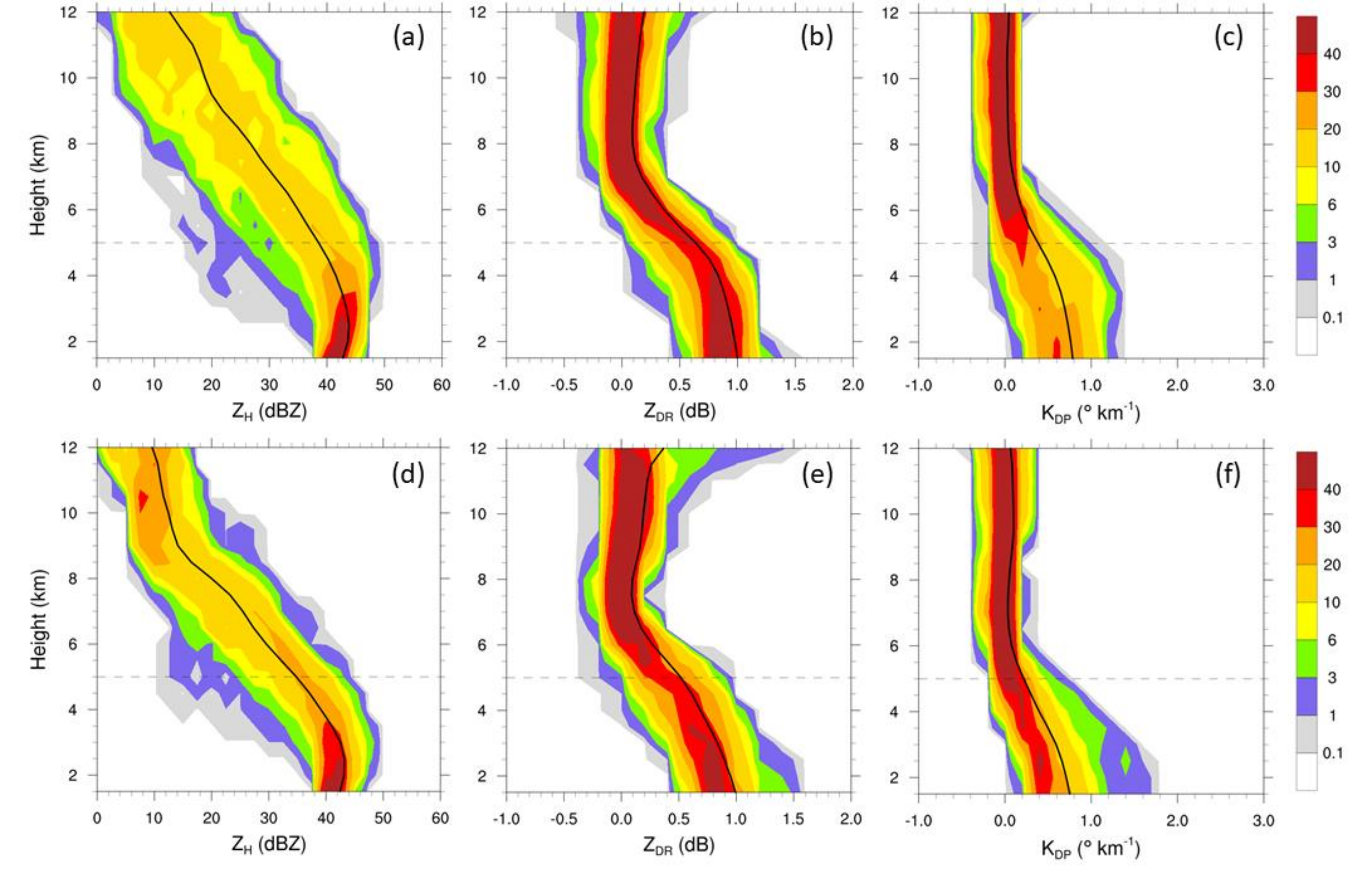
CFAD of reflectivity (Z_H), differential reflectivity (Z_{DR}) and specific differential phase (K_{DP})

Before -> after multiple cell merger (Episode 1)

- 1% 35-dBZ ZH: 7.5 -> 12 km
- 1% 1-dB ZDR: 5.5 -> 6.0 km => stronger updrafts
- Downward decrease of ZDR between 8 and 12 km => more active riming (Kumjian et al. 2022)
- Downward increase of ZDR near 0°C level was more pronounced

1524 LST

1612 LST



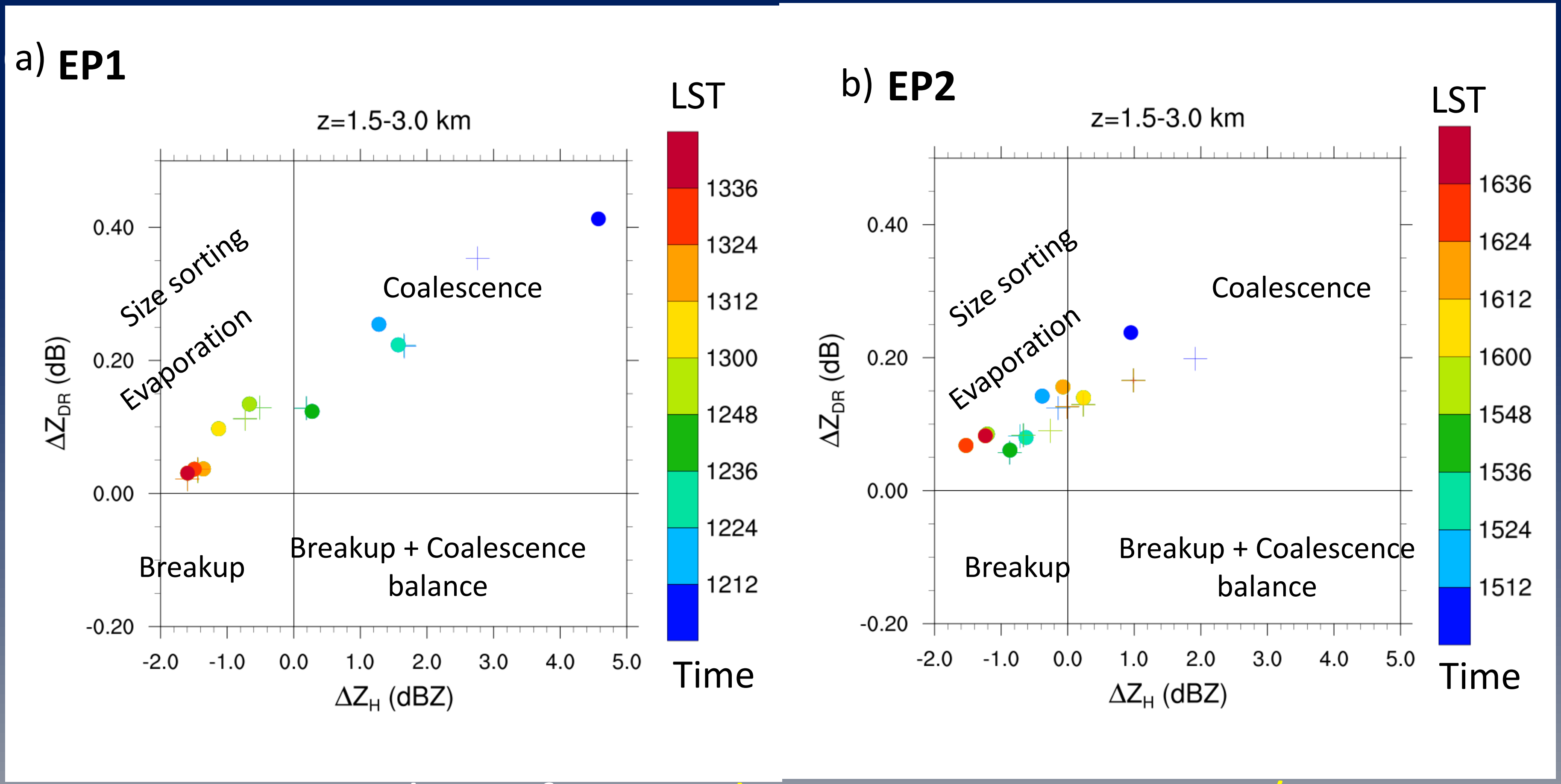
CFAD of reflectivity (Z_H), differential reflectivity (Z_{DR}) and specific differential phase (K_{DP})

Isolated convection (Episode 2)

- 1% 35-dBZ ZH: 9 -> 7km
- 1% 1-dB ZDR: 5 km or lower => much weaker updrafts
- At 8-12 km, the major distribution (> 20%) of ZDR ~ 0 dB => no active riming
- Smaller raindrops and lower rainwater content

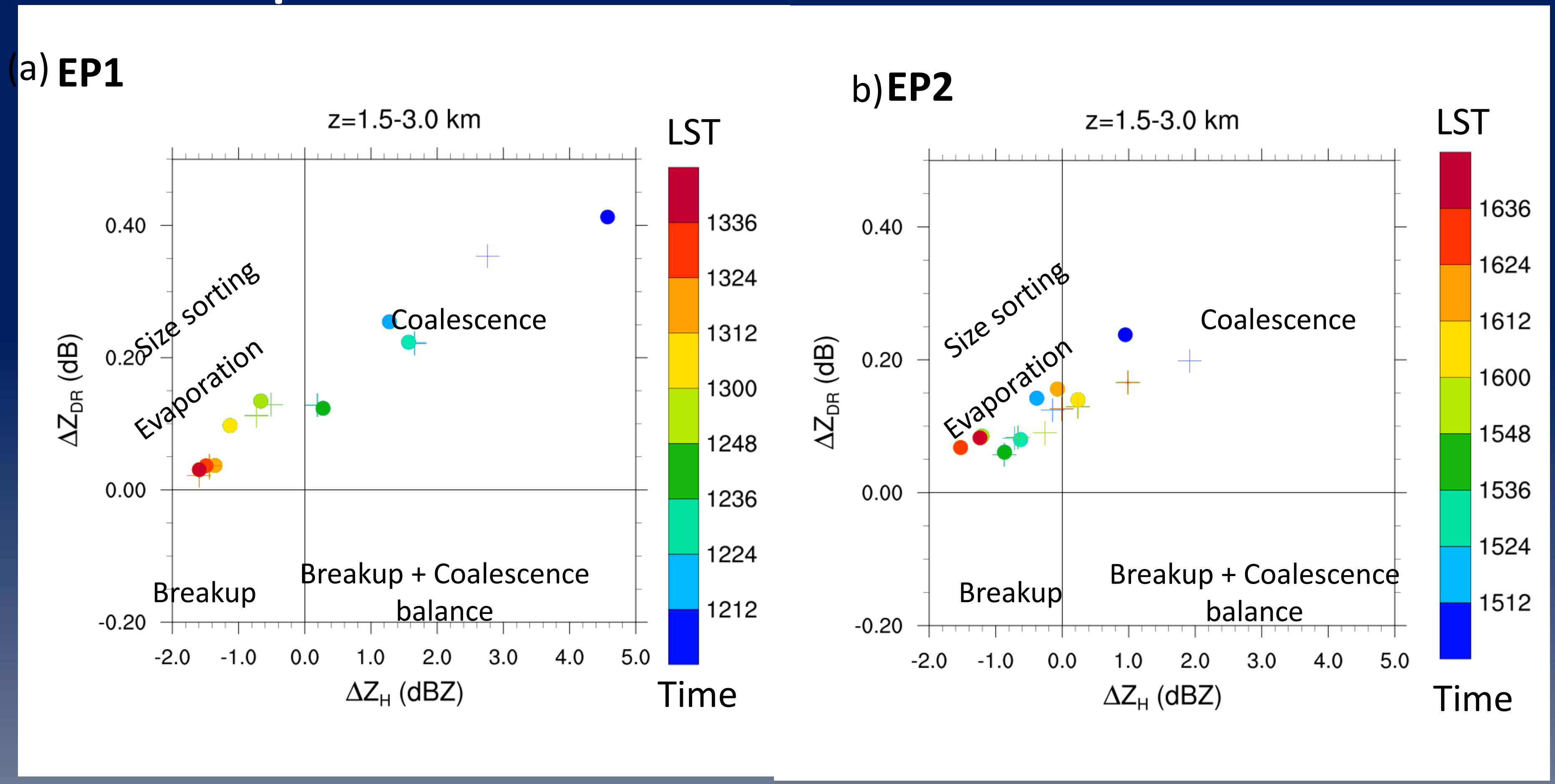
"Microphysical fingerprint" for warm-rain processes

Phase diagram of ZH and ZDR changes (Kumjian et al. 2022) from the 1.5-km pure rain layer over the strong convection (>40 dBZ) during episode 1 and 2



- EP1: Distinct pathway from coalescence to evaporation/size sorting
- EP2: Most of the samples are located in the evaporation/size sorting

Compared with oceanic convection cases

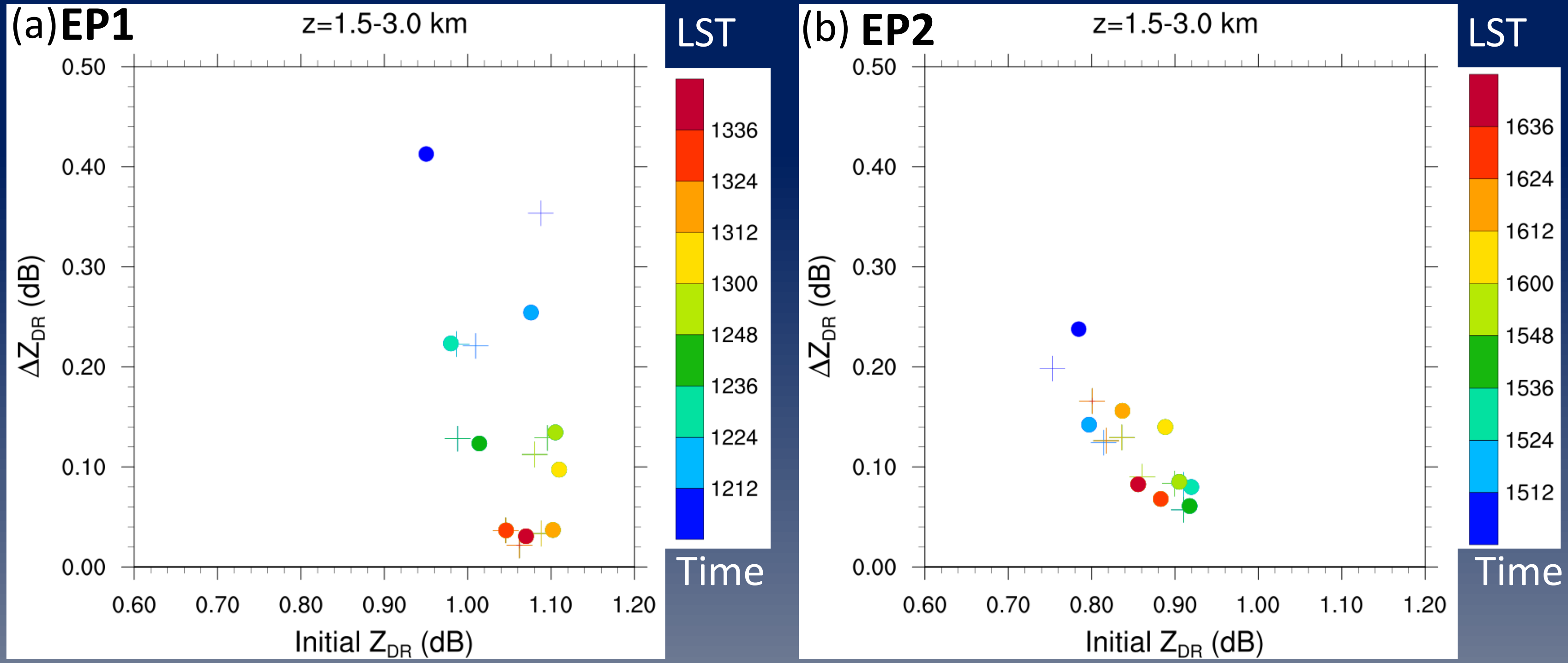


- DYNAMO: convection => coalescence and evaporation (Kumjian and Prat 2014)

  stratiform => breakup, coalescence and evaporation
- PRECIP IOP 2: consistent with their results on oceanic convection in DYNAMO

Convective organization may impact evolution of DSD

Phase diagram of initial ZDR and ΔZDR from the 1.5-km pure rain layer over the strong convection (>40 dBZ) during episode 1 and 2



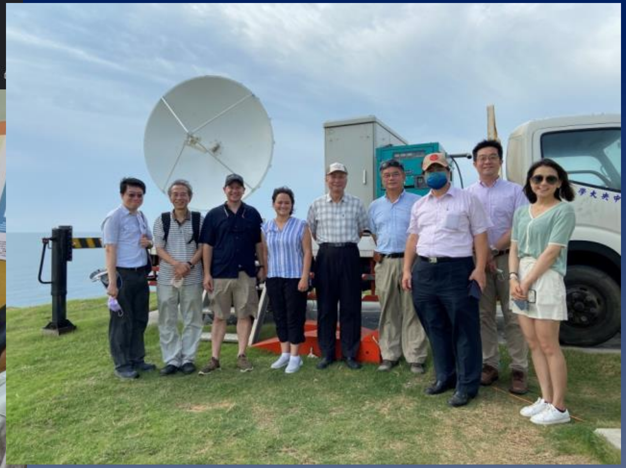
- Initially smaller droplets result in larger ZDR increase during EP1 & 2
- Impact of convective organization on evolution of drop size distribution

2022年TAHOPE/PRECIP 實驗期間









2023年TAHOPE研討會

Conclusions:

- Multiple convective cell mergers favored by terrain-induced circulation led to intense updrafts and extreme rainfall over Taipei Basin.
- A unique radar signature, "ZDR crown," was associated with the peak phase of the storm, indicating broadening and intensifying updrafts.
- Radar observations like the "ZDR crown" could be crucial for predicting severe weather over complex terrain.

Thank you !!!

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