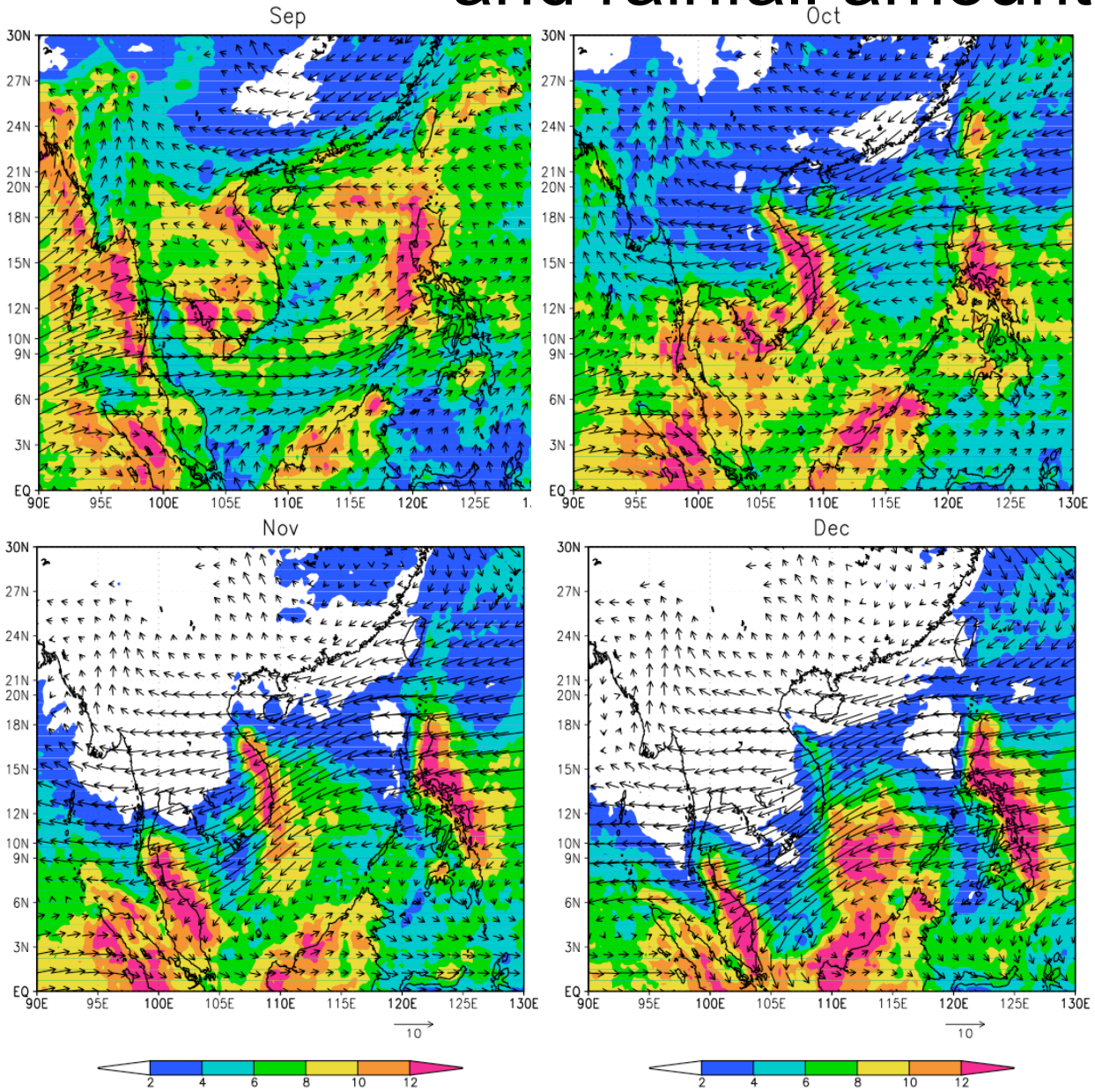
Time-space characteristics of heavy rainfall event in central Vietnam from mid-October to mid-November 2007

Hironari KANAMORI (Tokyo Metropolitan Univ.)
Hideyuki Kamimera (JAMSTEC, Japan)
Yasushi Agata (JAMSTEC)
Jun Matsumoto (TMU/JAMSTEC)

Introduction and Motivation

- The extreme heavy rainfall event occurred over central Vietnam (around Da Nang region) from mid-October to mid-November 2007 (the 2007 flood).
- In particular, the heavy rainfall in November 10-13 caused server flood in this area.
- In general, strong northeasterly “Cold Surge” wind contributes to heavy rainfall event in boreal fall to winter in central Vietnam.
- According to Yokoi and Matsumoto (2008), it has been revealed that one of the main reasons for heavy rainfall occurrence in central Vietnam is co-existence of cold surge in the South China Sea and tropical disturbances near South Vietnam.
- This study investigates characteristics of temporal and spatial variations of the 2007 flood.

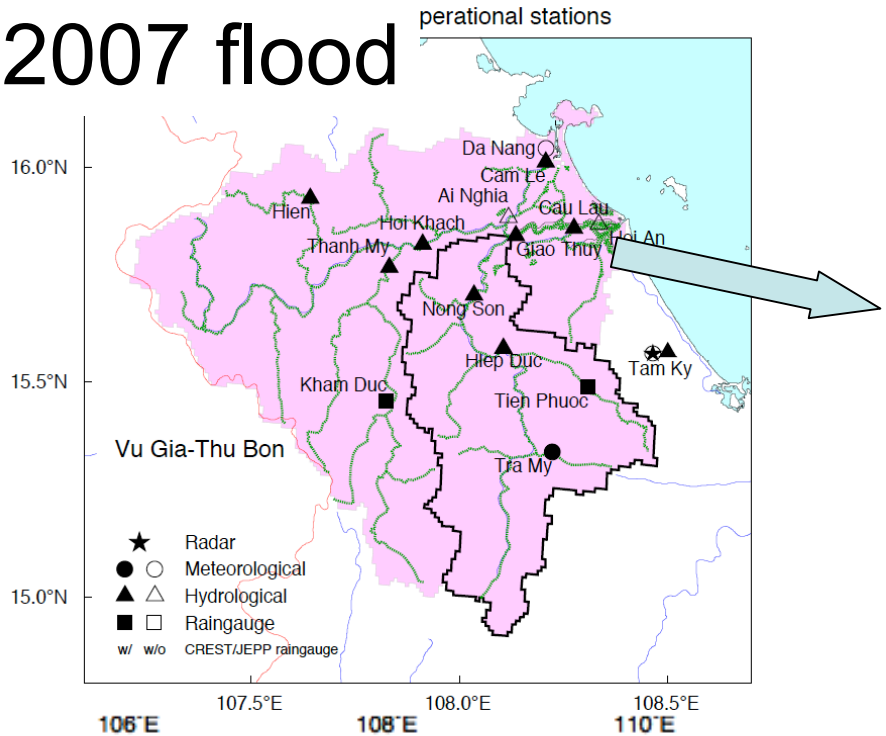
Climatological Low-level circulations and rainfall amount



U & V at 850 hPa
（JRA25, 1979–2007）

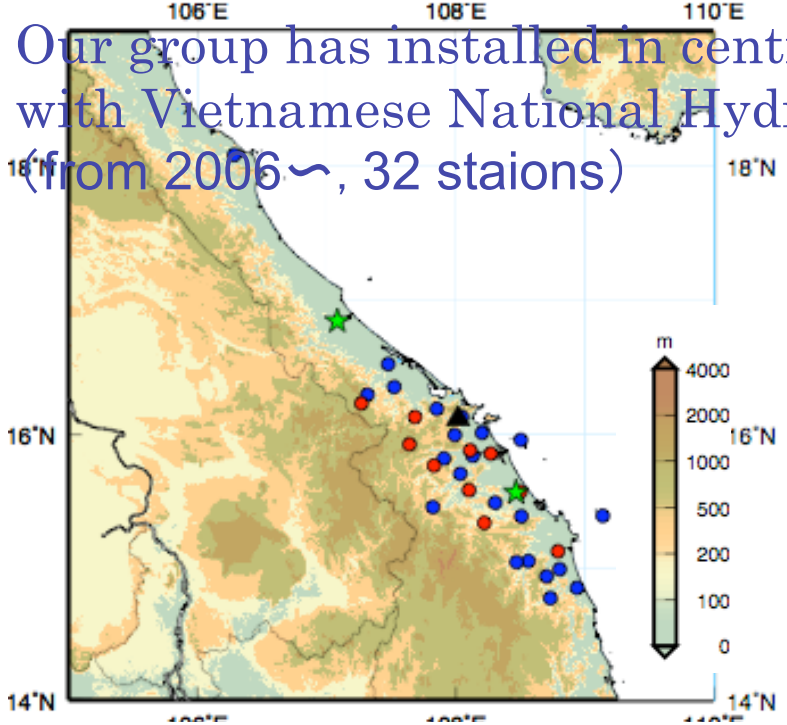
TRMM3B42（1998–2007）

The 2007 flood



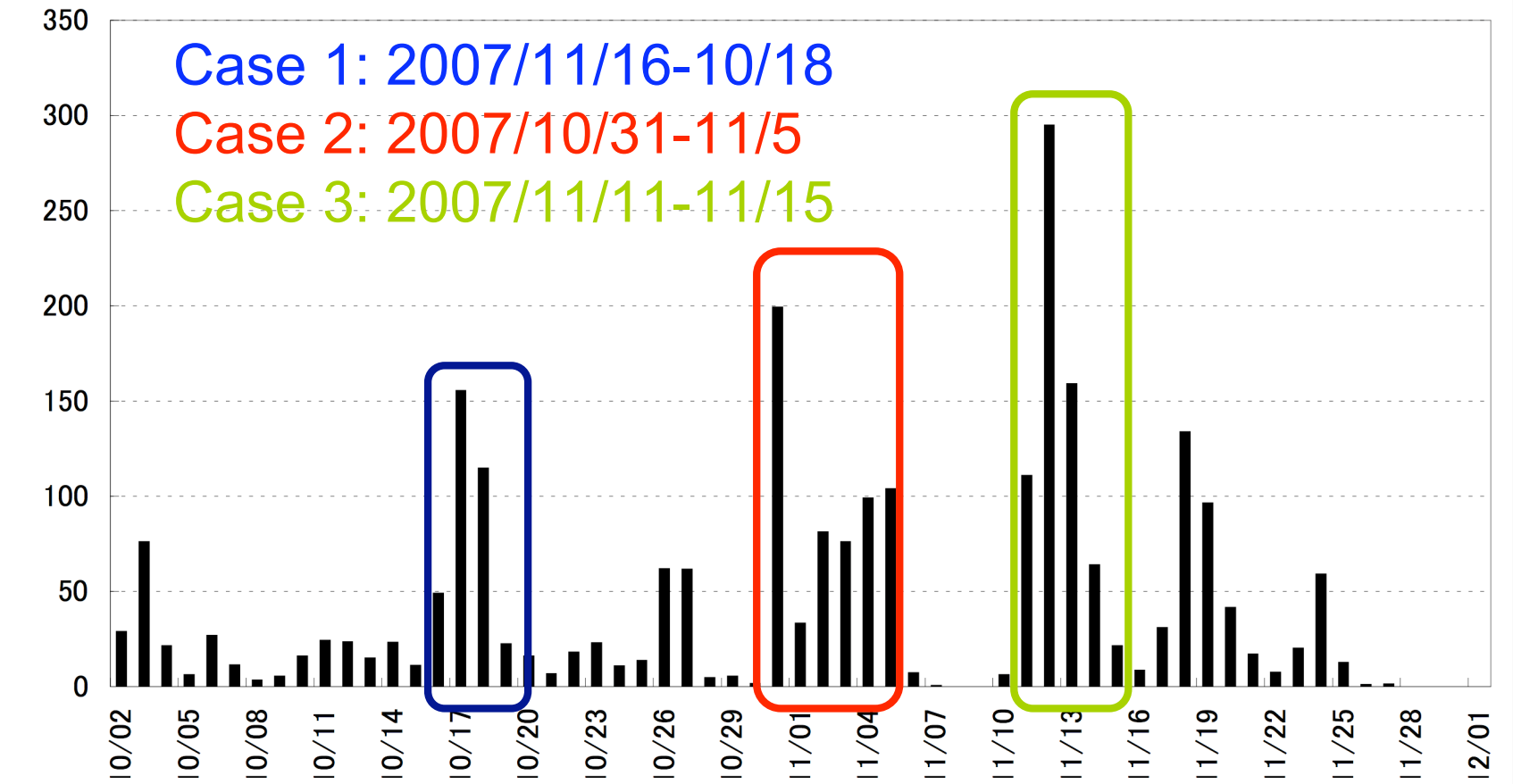
Hoi Anh City in Nov. 2007
(http://jp.reuters.com/)

Our group has installed in central Vietnam region in collaboration with Vietnamese National Hydro-Meteorological Service (VNHM).
(from 2006～, 32 staions)



Real-time rainfall data transmission from 10 stations to AMO in Ha Noi using MAHA-6 with ADSL line

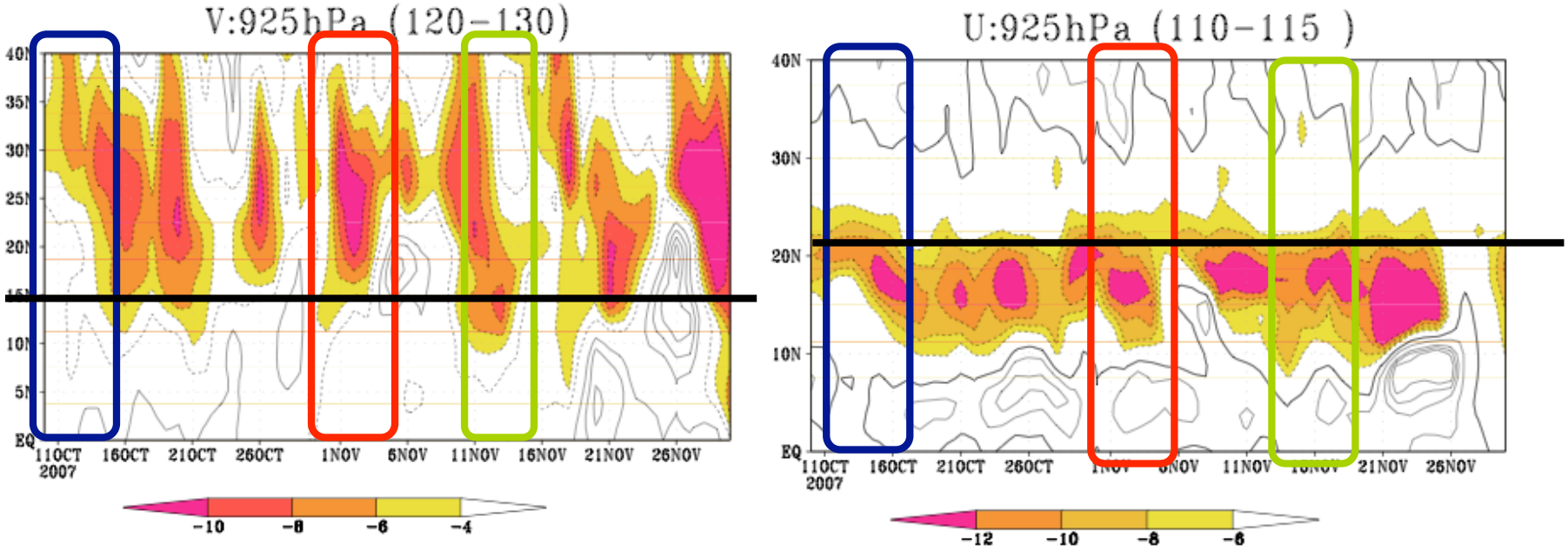
Time series of mean rainfall during Oct.-Nov. 2007. (averaged rain gauge at 11 stations.)



•The 2007 flood has three heavy rainfall events.

•Tra My station located in the interior mountain region recorded the maximum daily amount of 593.5 mm/day and the maximum hourly amount about 80 mm/hr.

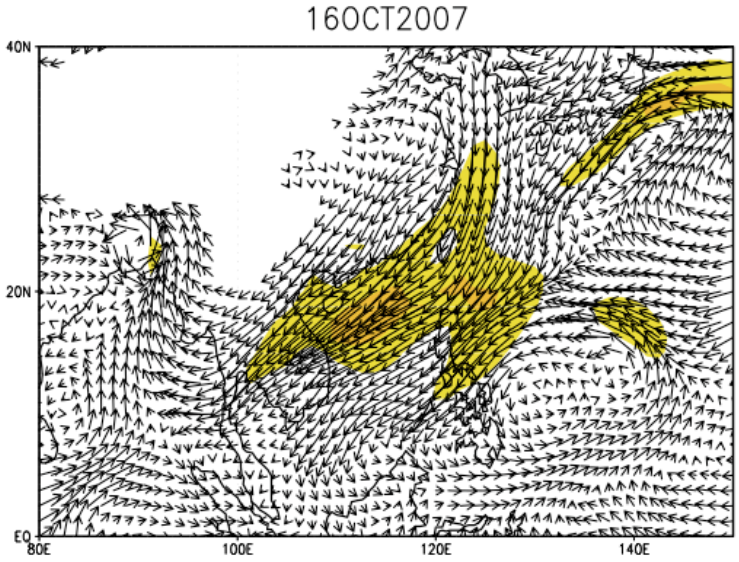
Latitude-Time section of U & V comportments at 925hPa

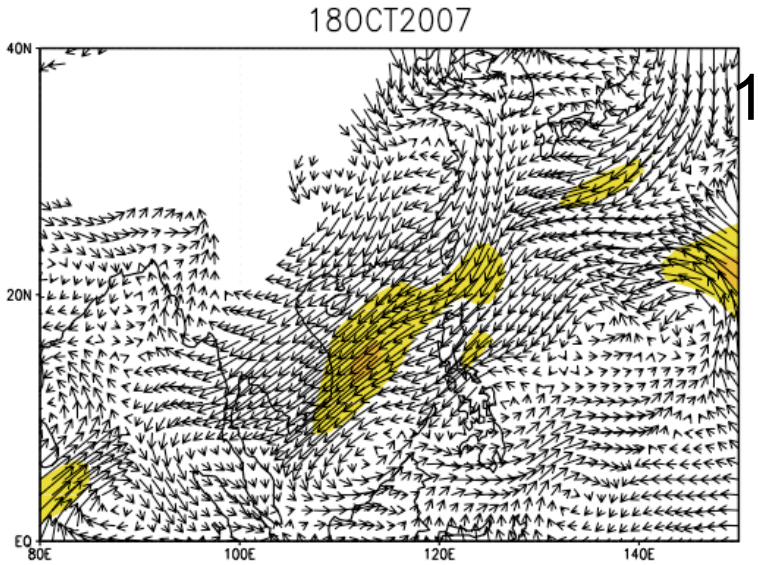


In all cases, the strong northeasterly wind existed over the South China Sea which was originated near 40–N.

Low-level(925hPa) circulations and its speed During 16Oct.-18Oct. (Case 1)

10/16





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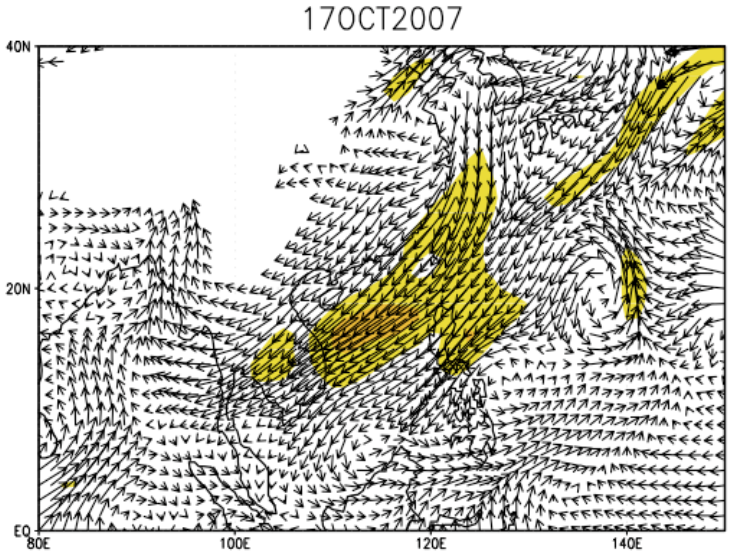


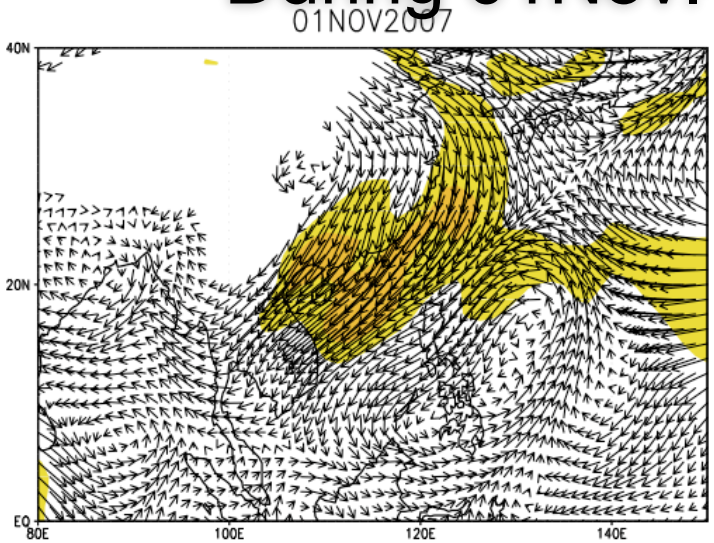
[m/s]

U & V at 925 hPa (JRA25, 1.25x1.25)

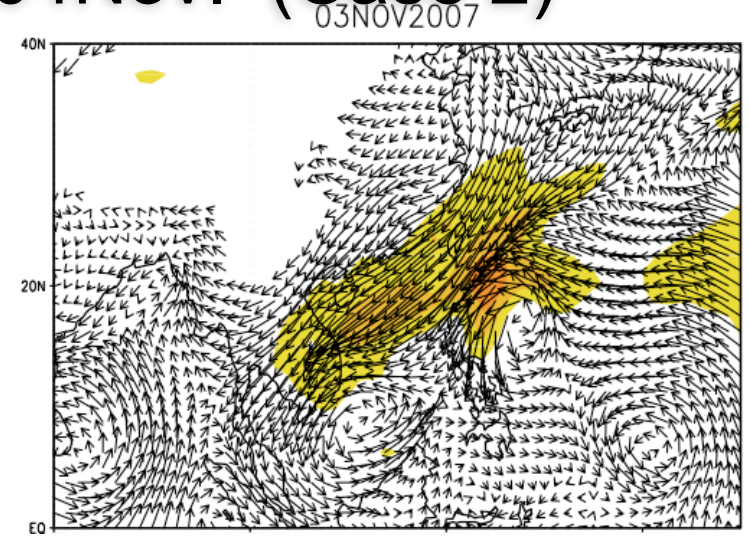
The strong northeasterly exists along the coast line.

Low-level(925hPa) circulations and its speed During 01Nov.-04Nov. (Case 2)

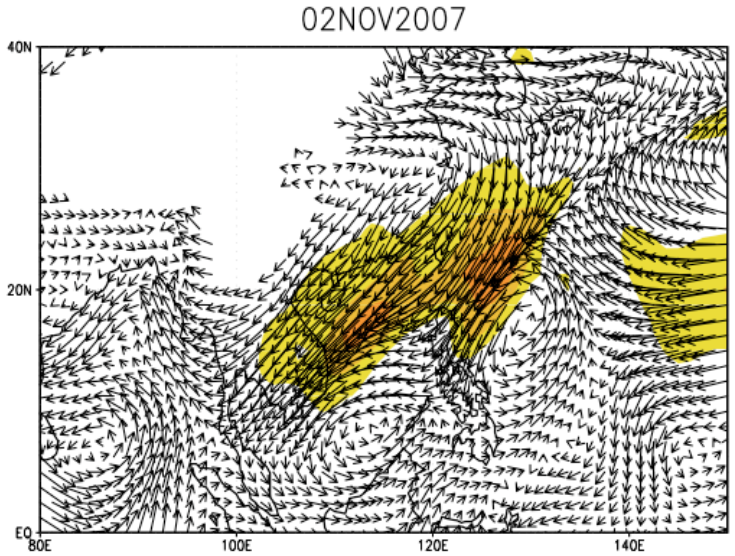
11/01



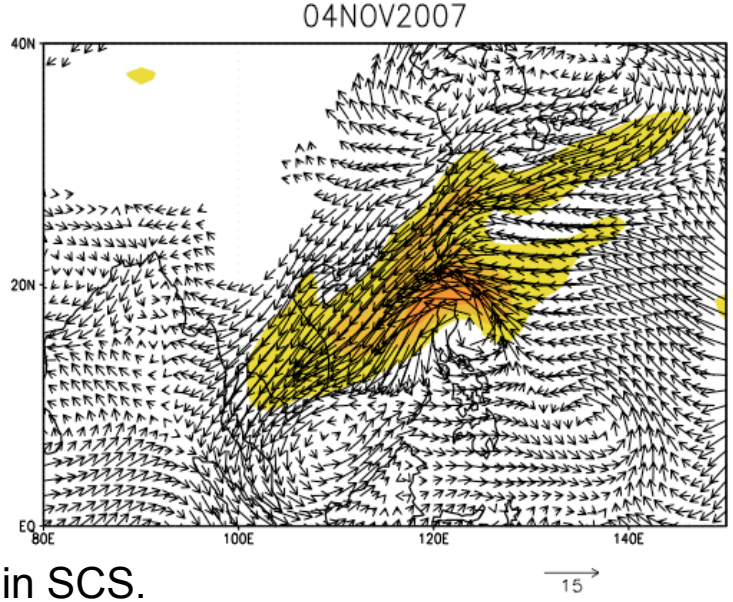
11/03



11/02



11/04



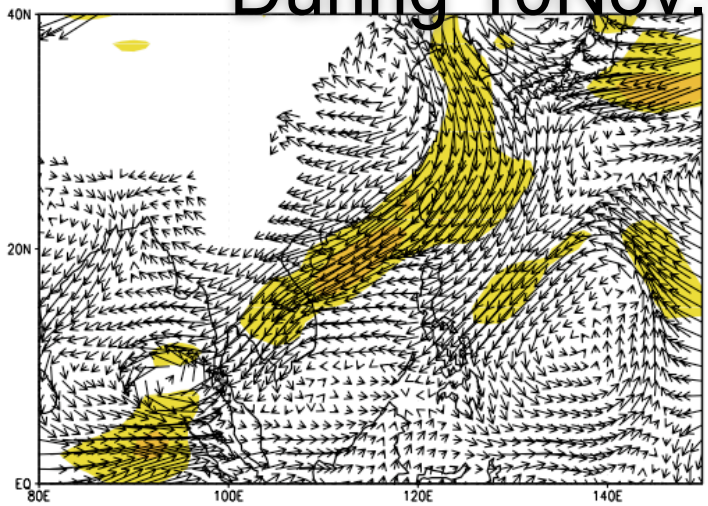
11/02：Tropical Disturbance occurred in SCS.

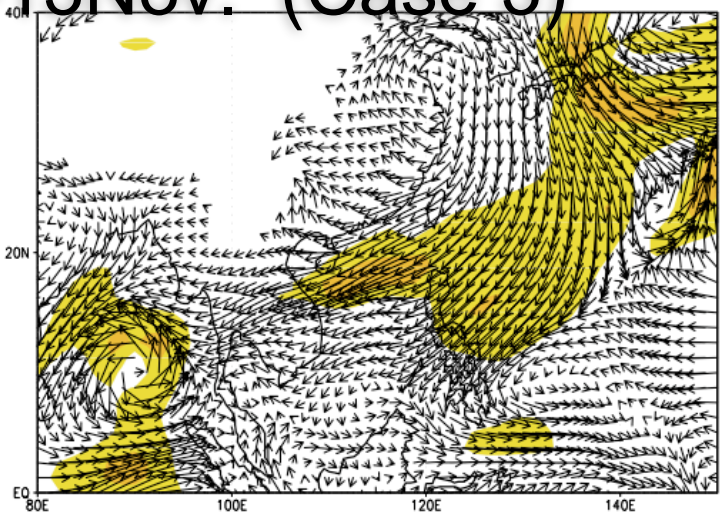
11/04: The typhoon was generated near the Philippines.

The northeasterly wind was enhanced by southeasterly wind from Tropical disturbance

Low-level(925hPa) circulations and its speed During 10Nov.-13Nov. (Case 3)

11/10





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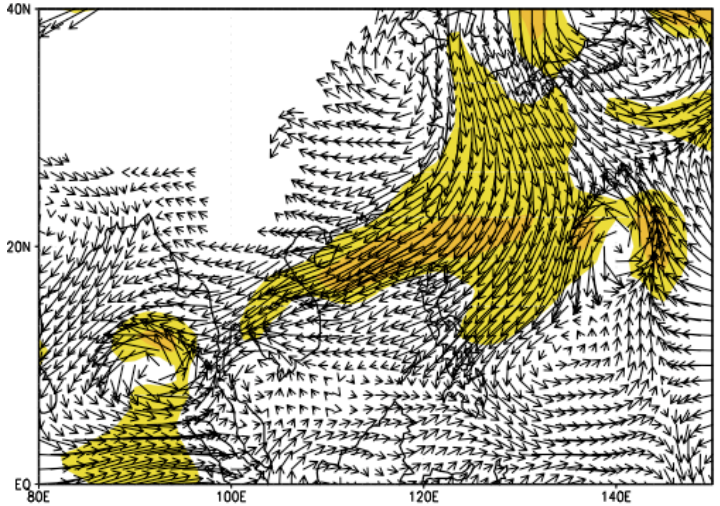
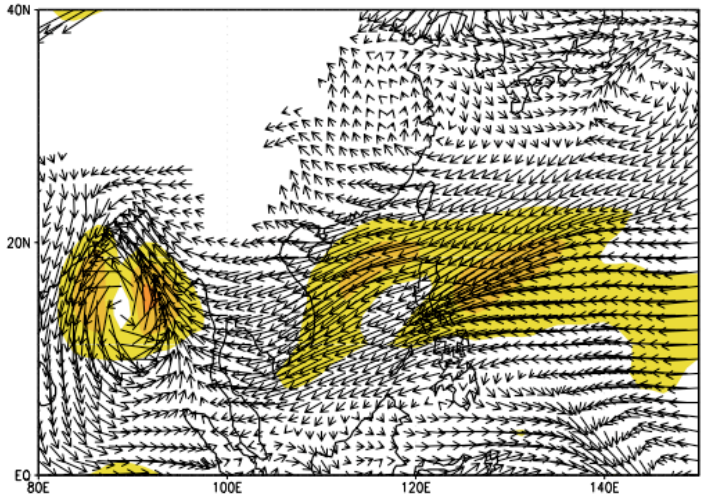
11/11



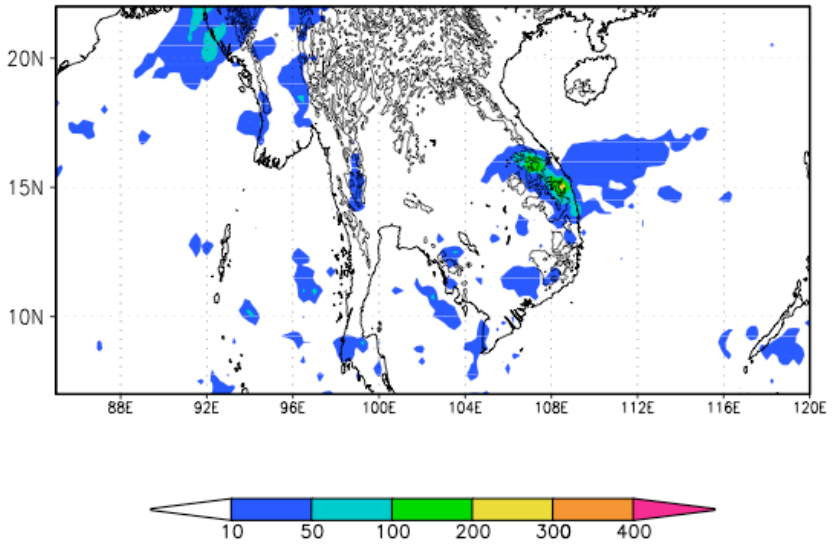


11/13

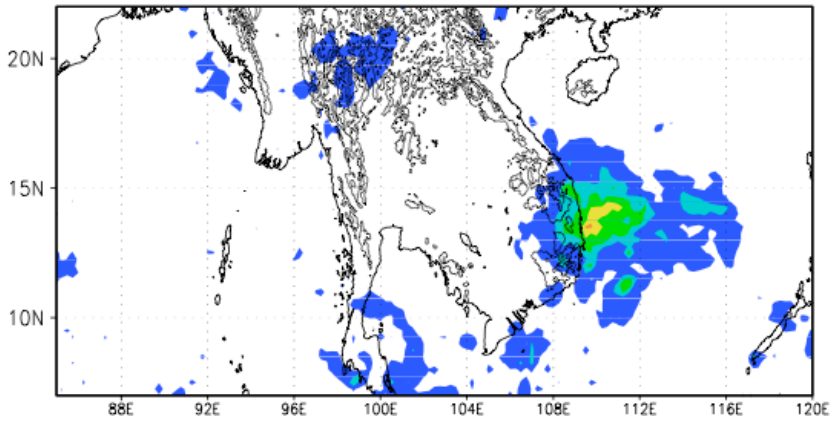
- Cyclone Sidr was developed in the southern Bay of Bengal and moved northward during this case.
- The strong easterly wind blowing into this cyclone occurred over the SCS.

Spatial distribution of rainfall （TRMM 3B42: Case 1, 2)

Case 1

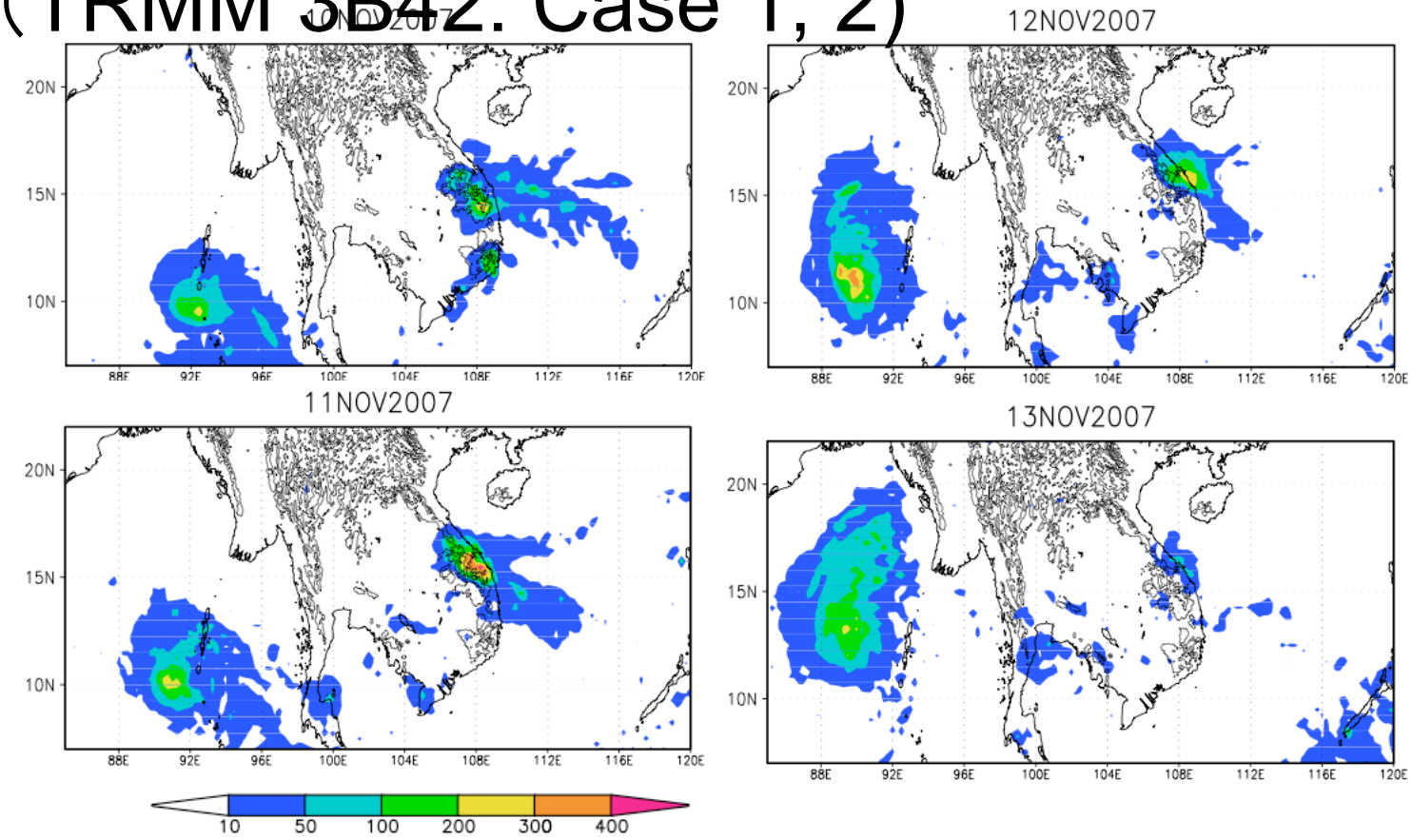


Case 2



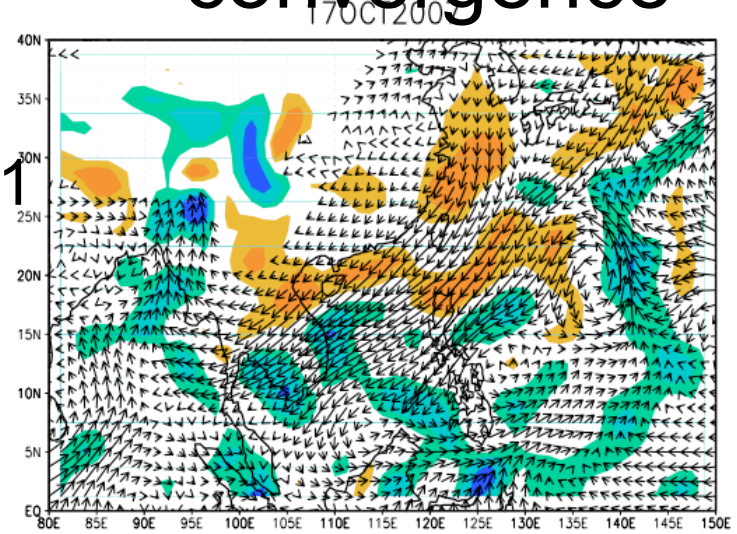
Heavy rainfall concentrated east of interior mountain reagion

Spatial distribution of rainfall (TRMM 3B42: Case 1, 2)

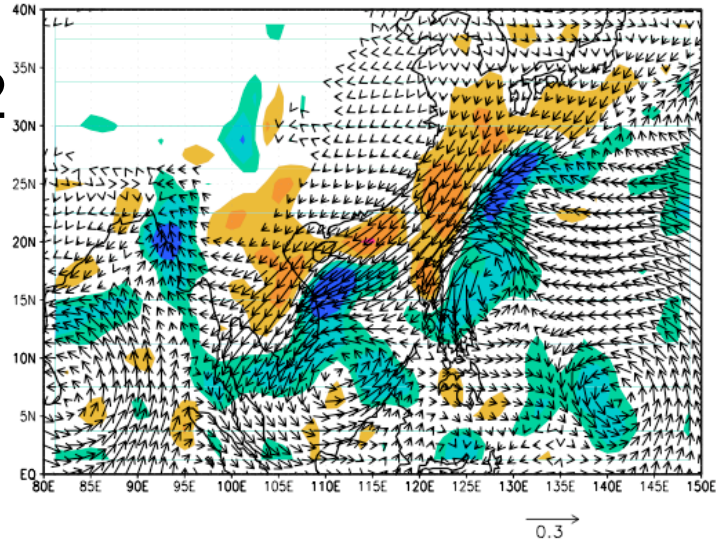


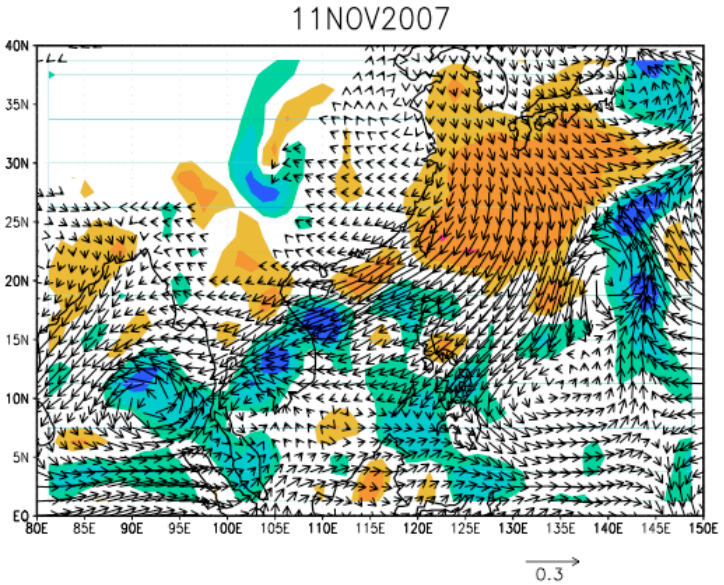
Moisture flux and moisture convergence

Case1



Case 2





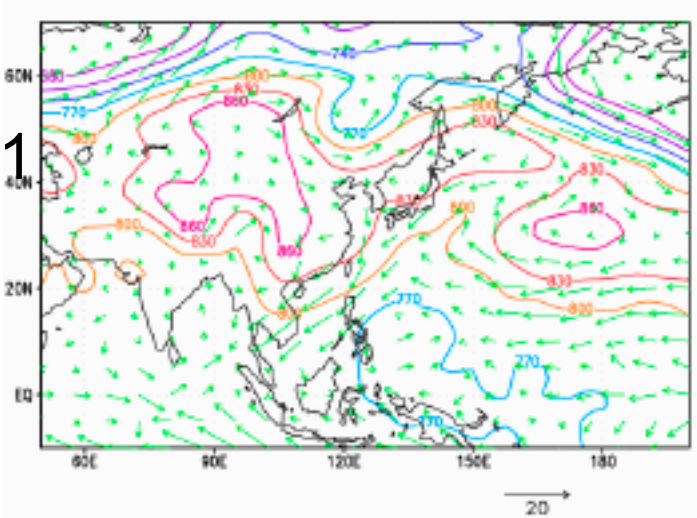
Case 3

qu &qv at 925 hPa (kg/kg x m/s)

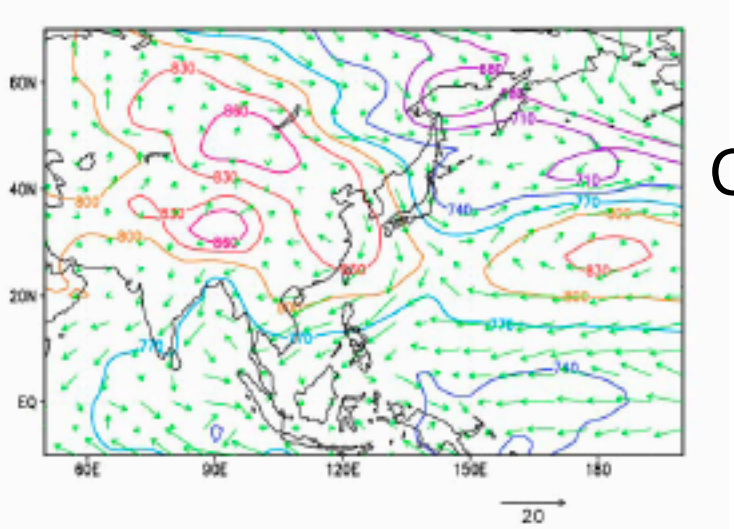
div. qu&qv at 925 hPa (x 10^{-7})

Geopotential height (925hPa) and circulations

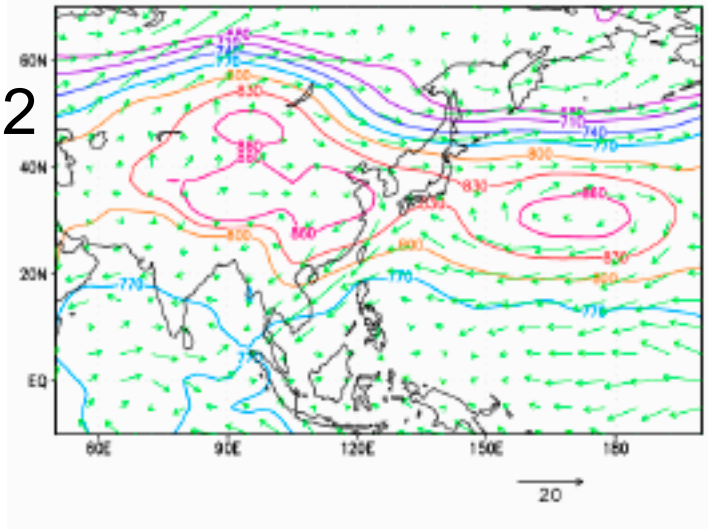
Case 1



Case3



Case 2



Conclusion

- The 2007 flood had three events
- In case 3, The strong easterly wind blowing into this cyclone occurred over the South China Sea, and the strong moisture convergence line was formed on the South China Sea.
- This indicates a remote influence of the intense cyclone in the Bay of Bengal, which has not been pointed out in the former studies.
- Climatological analysis on the heavy rainfalls in central Vietnam, as well as minute analysis on the causal mechanism, is further to be investigated.

199年に発生した豪雨の事例

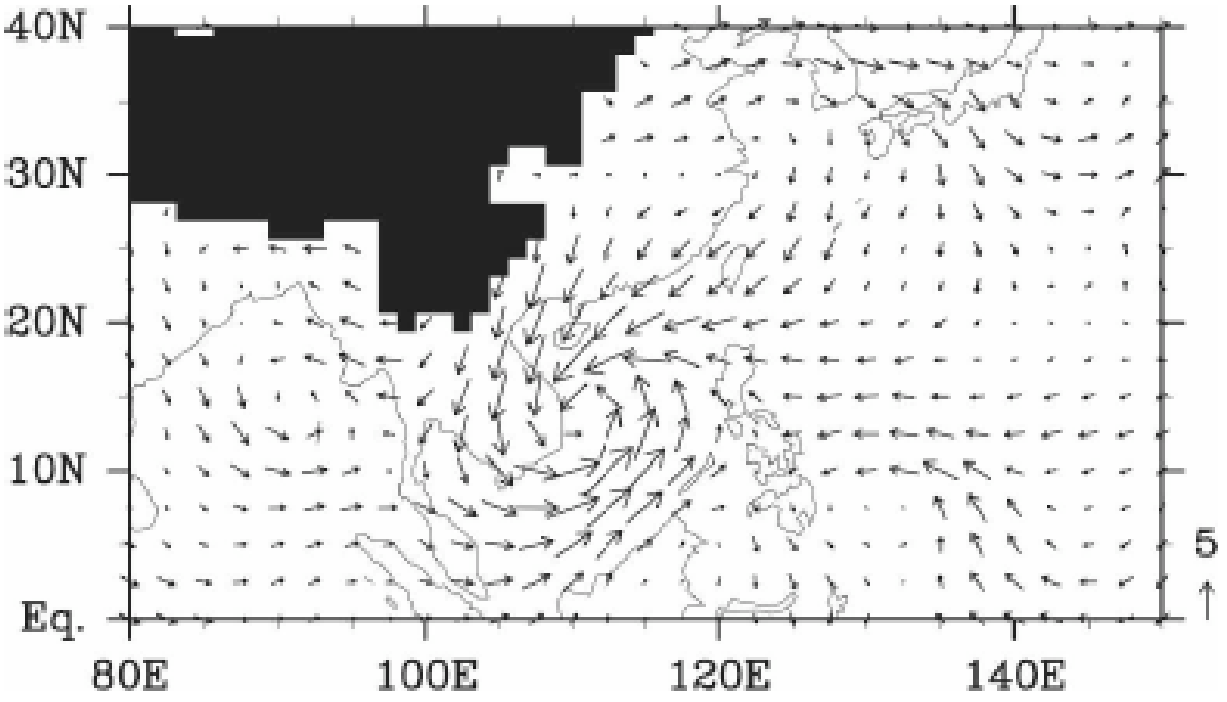


FIG. 13. Composite horizontal wind anomaly of CS-SW at the 925-hPa level. Reference vector corresponds to value of 5 m s^{-1}. The blacked-out areas are the same as in Fig. 5.

(Yokoi and Matsumoto, 2008)

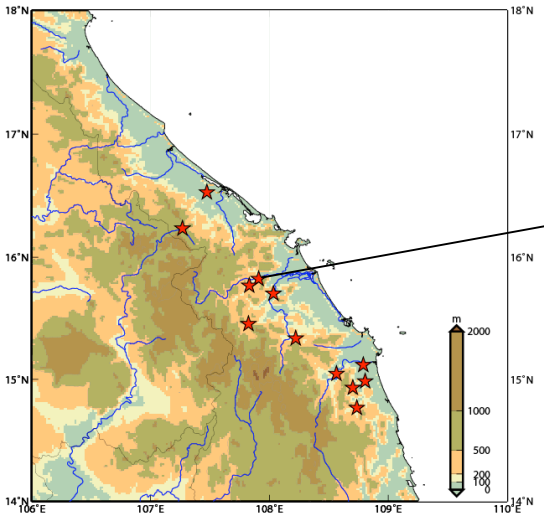
◆コールドサージと熱帯起源の季節内変動の相互作用により、もたらされている。

はじめに

- 北半球、秋～冬季にかけての北東モンスーンによって、ベトナムの雨季がもたらされている。
- 高緯度から吹き込む、下層北東風（Cold Surge)がベトナム中部で発生する豪雨に大きな働きを
- 2007/10下旬から2007/11中旬にかけて、ベトナム中部では洪水が発生し、大きな被害をもたらした。

この豪雨イベントについて、周辺大気循環場の特徴を示す

この期間における降水の日周期変化の一例



Hoi Khach 地点

10/01

11/30