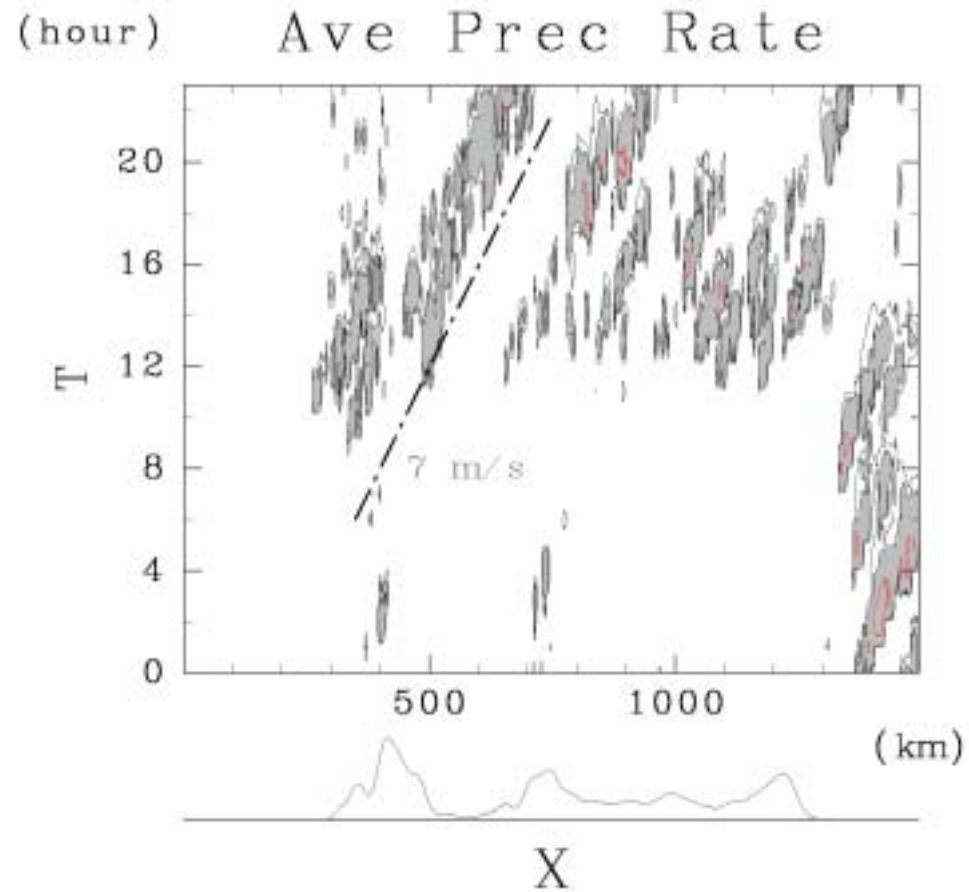
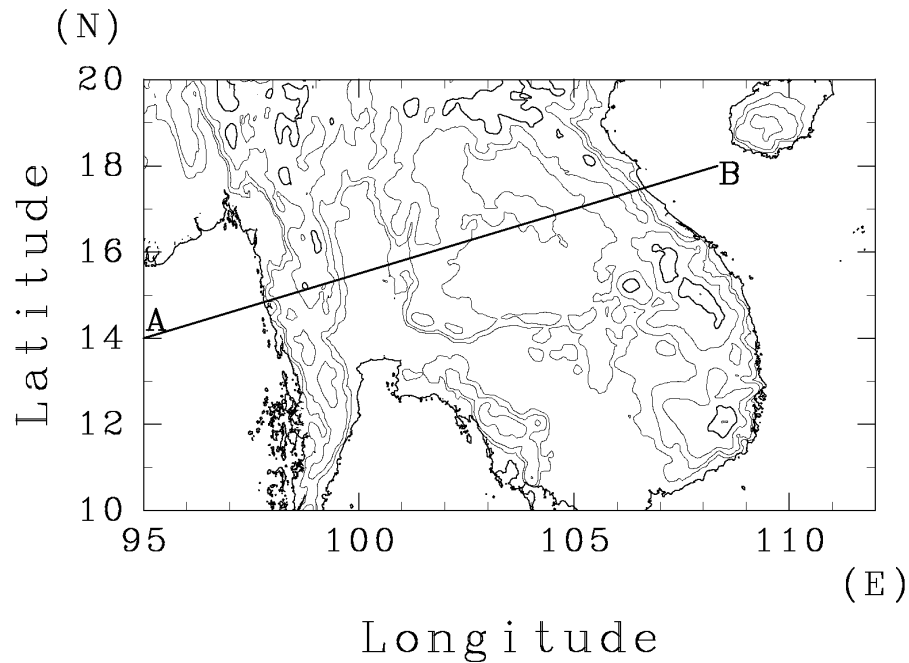


Diurnal Variation of Precipitation over Northern Thailand –Radar Observation–

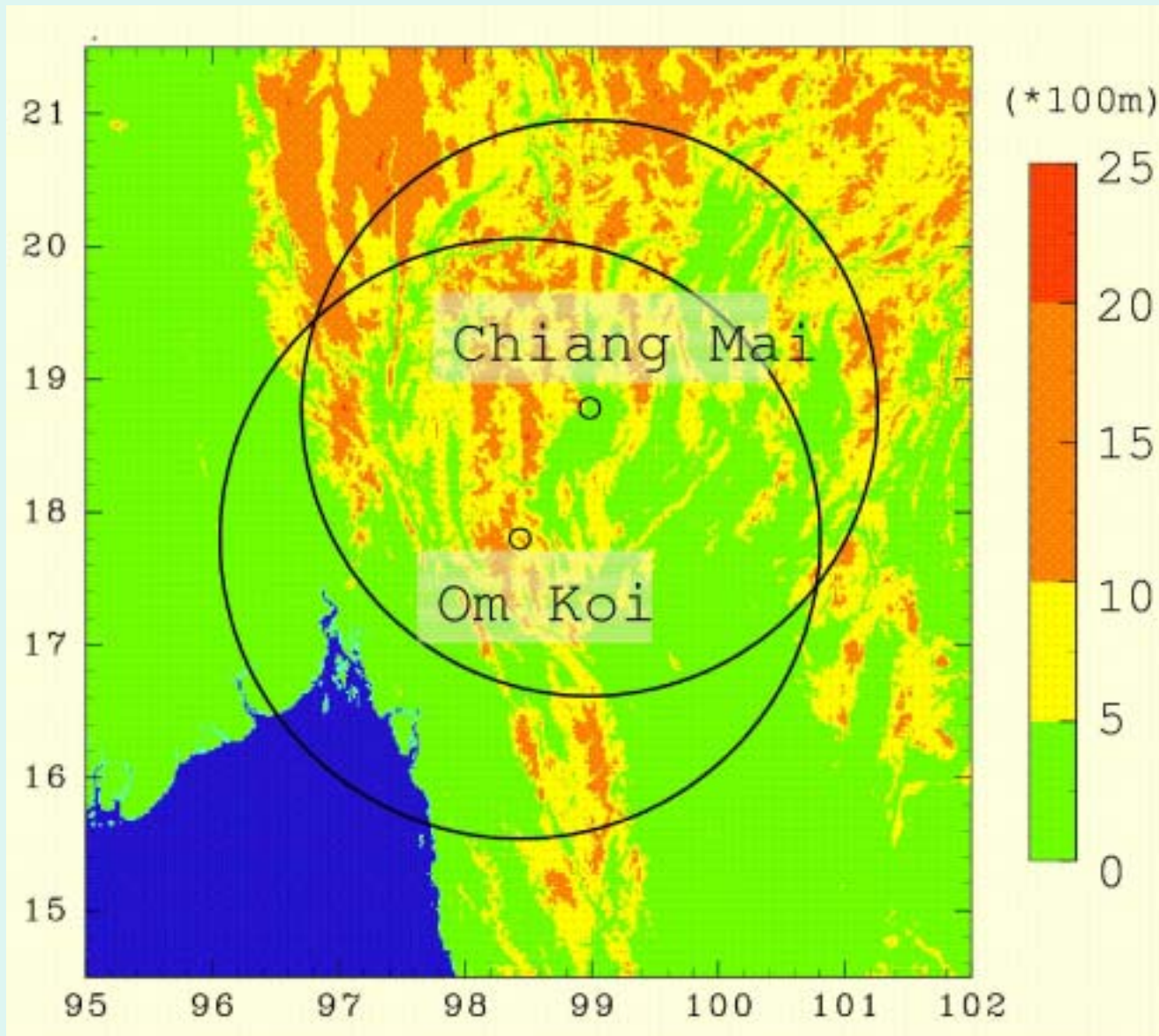
T. Satomura, K. Okumura(Kyoto University)
T. Oki (RIHN), Warawut Khantiyanan (BRRAA)
and TMD Chiang Mai Radar staffs

98 5 31

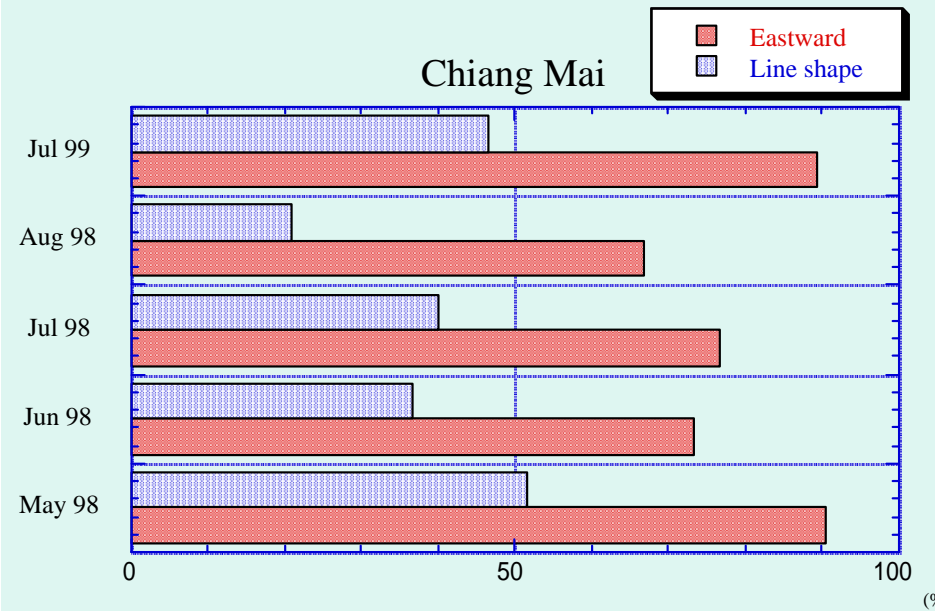
Working Hypothesis



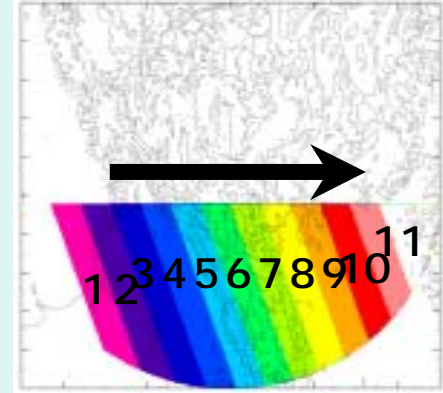
Radar Sites



Averaged Variation



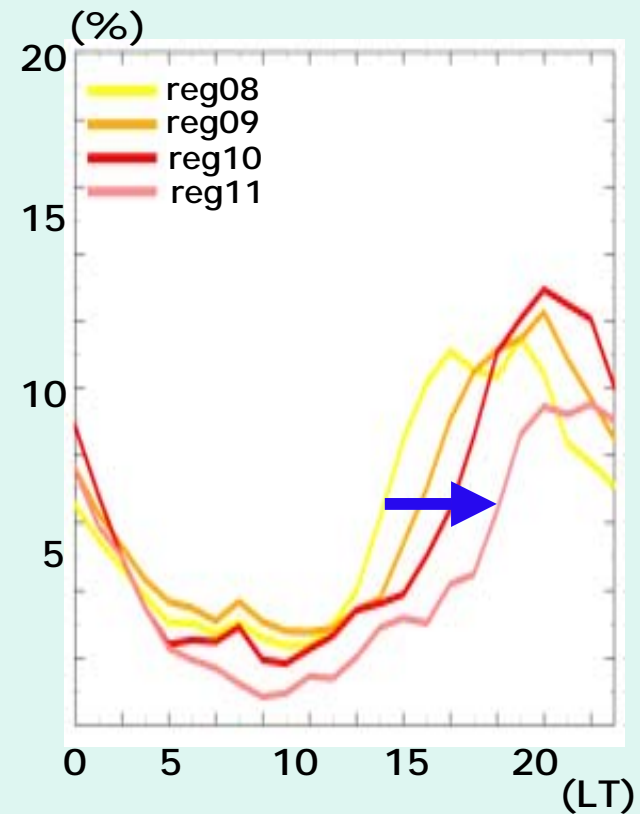
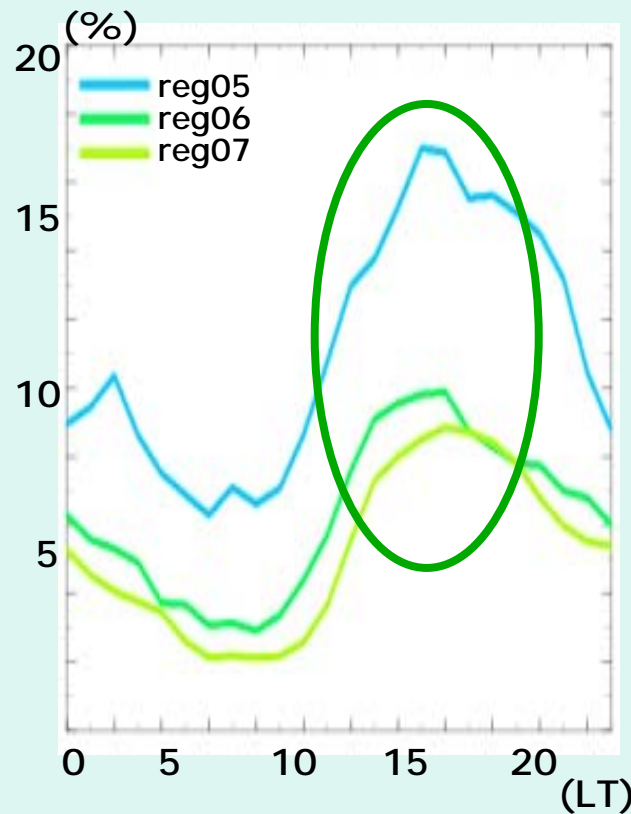
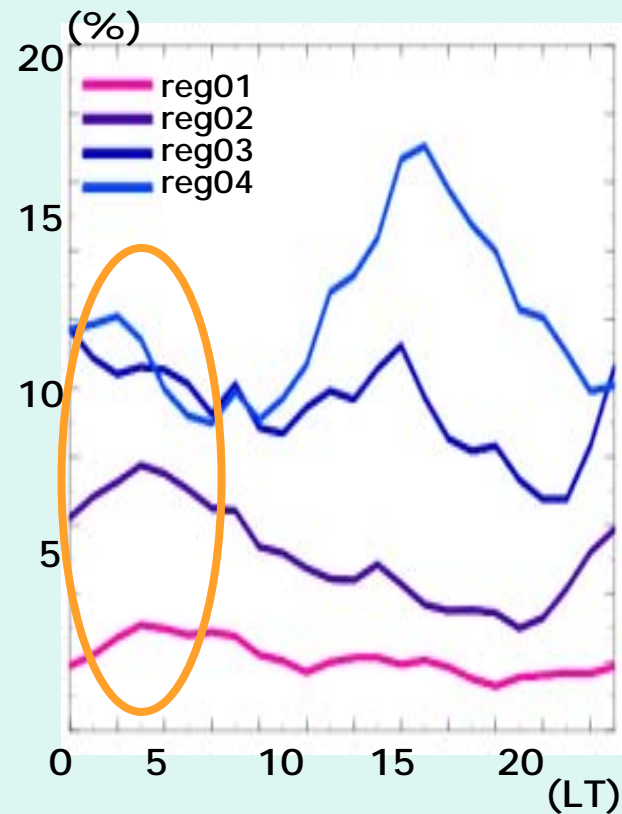
Echo area (over 10 DBZ) in each stripe; MAY to JUL 1999



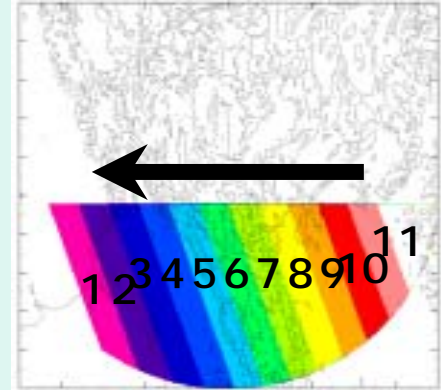
Windward side
(western area)

Mountainous
region

Lee side
(eastern area)



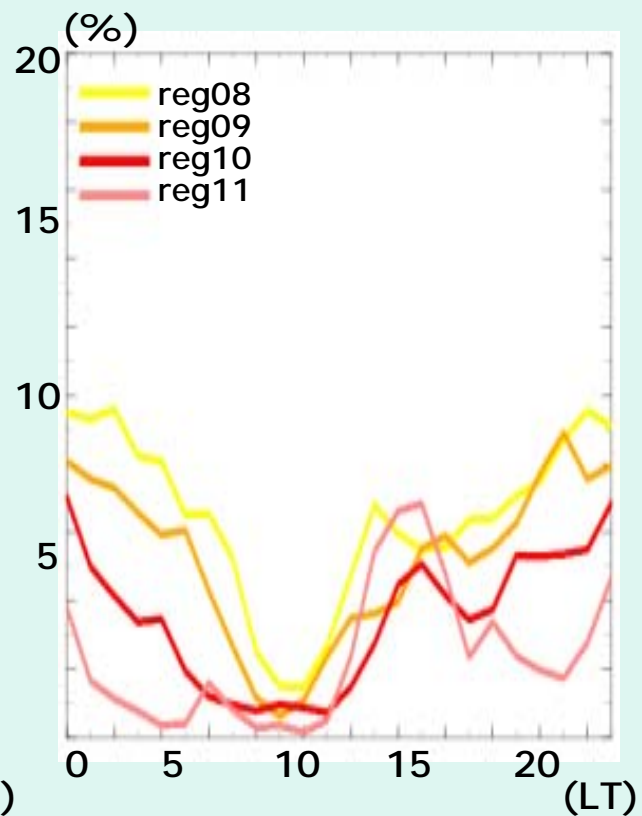
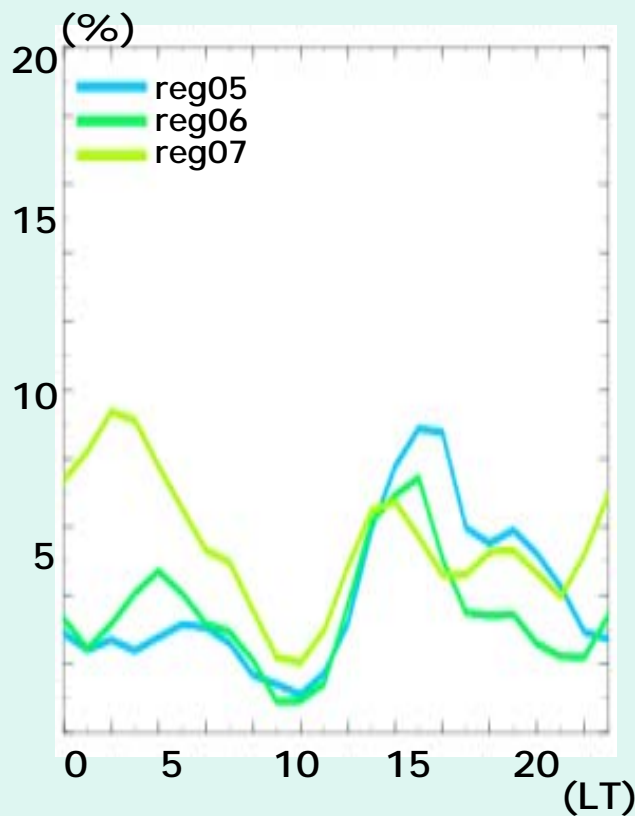
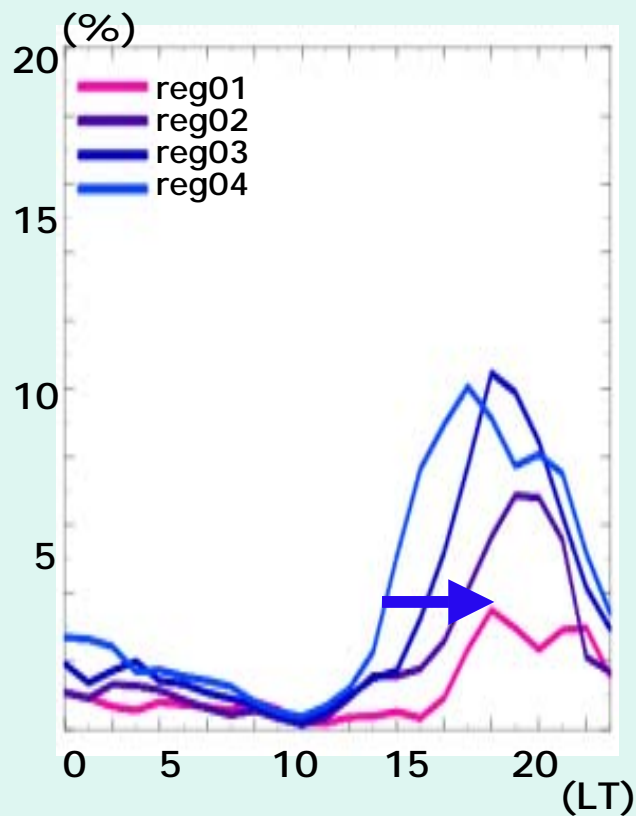
Echo area (over 10 DBZ) in each stripe; October 1999



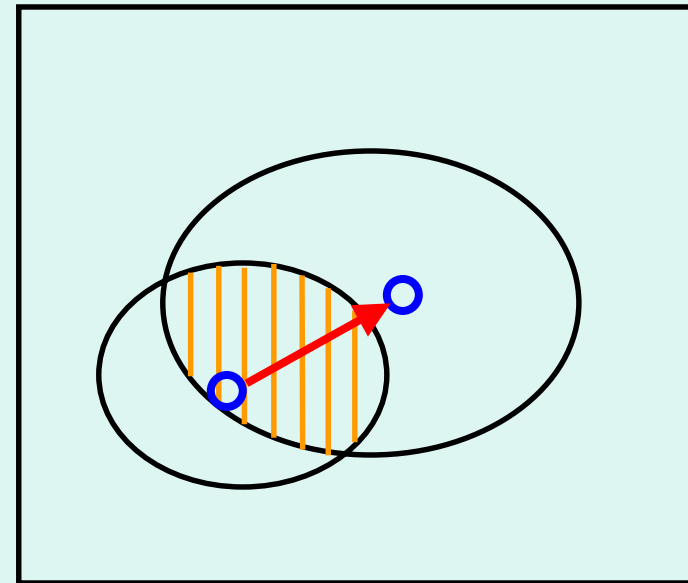
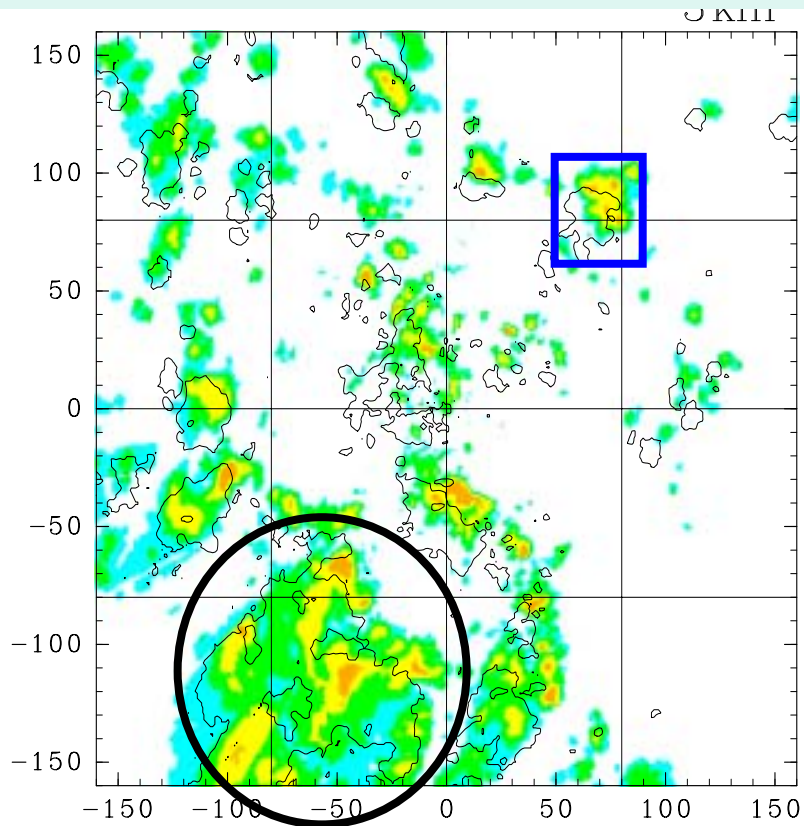
Lee side
(western area)

Mountainous
region

Windward side
(eastern area)

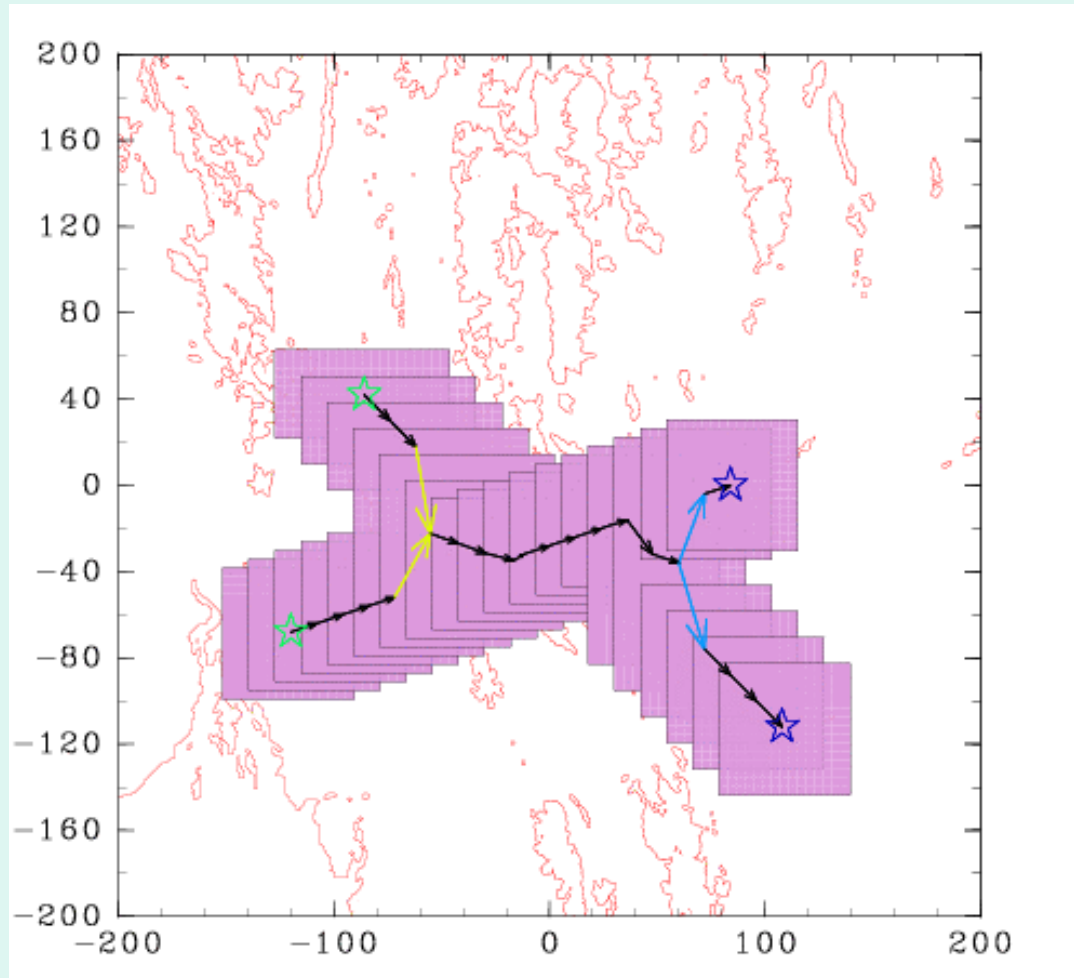


Tracking process of radar echoes

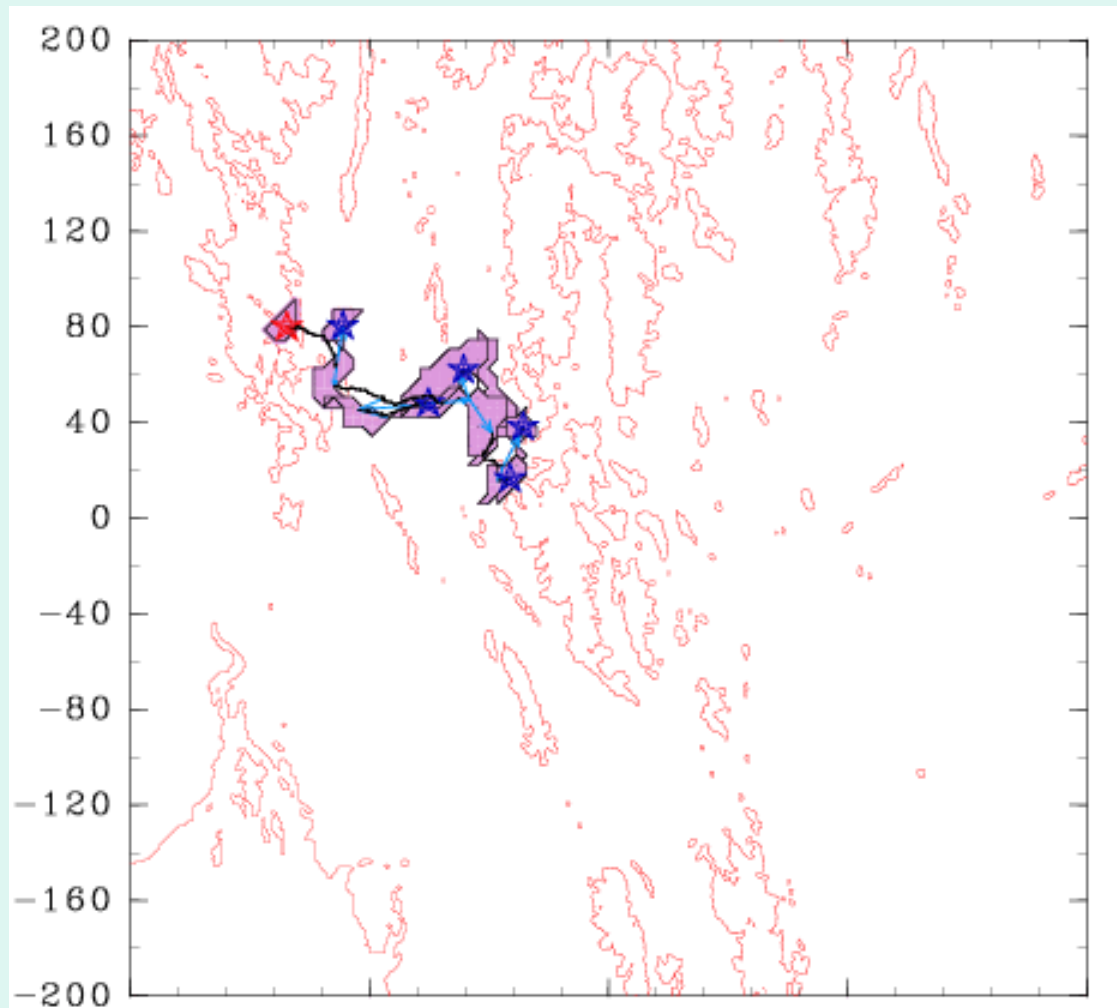


If overlap of two echoes exceeds 50% of the smaller one, the movement of the center of gravity of each echo is defined as the movement of the echo.

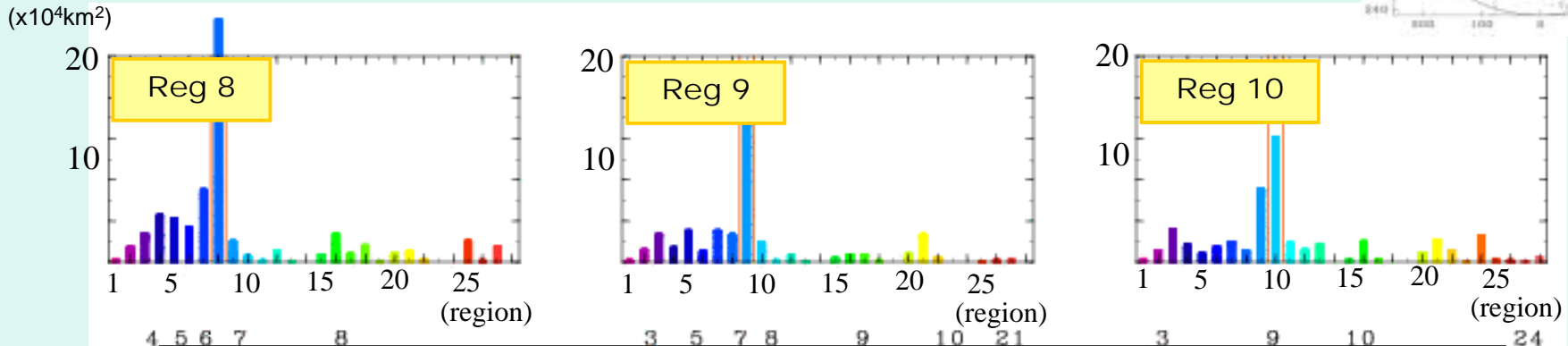
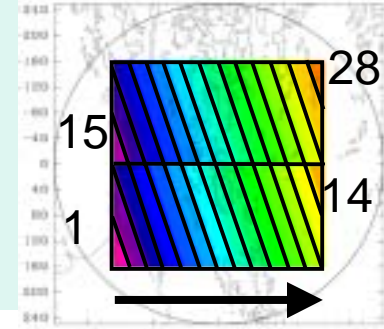
Test of the tracking algorithm



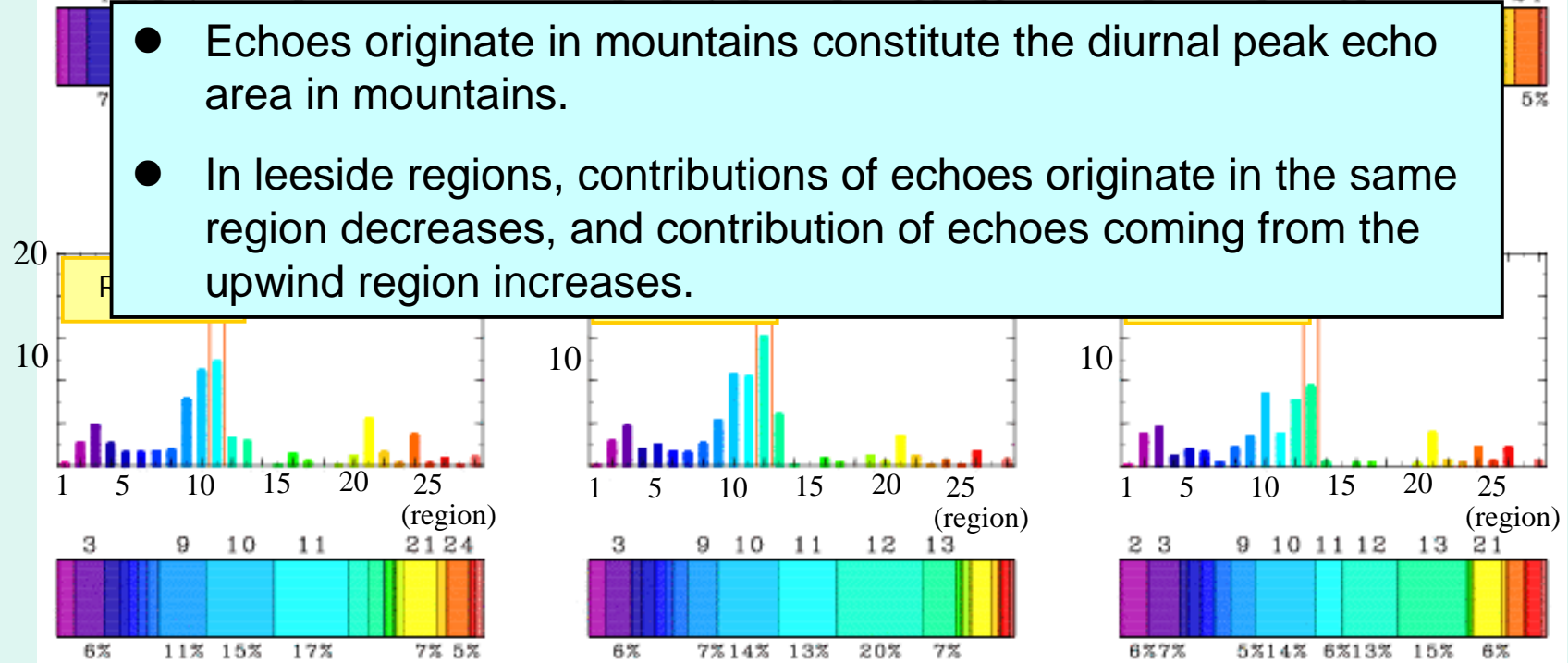
An example of the echo tracking



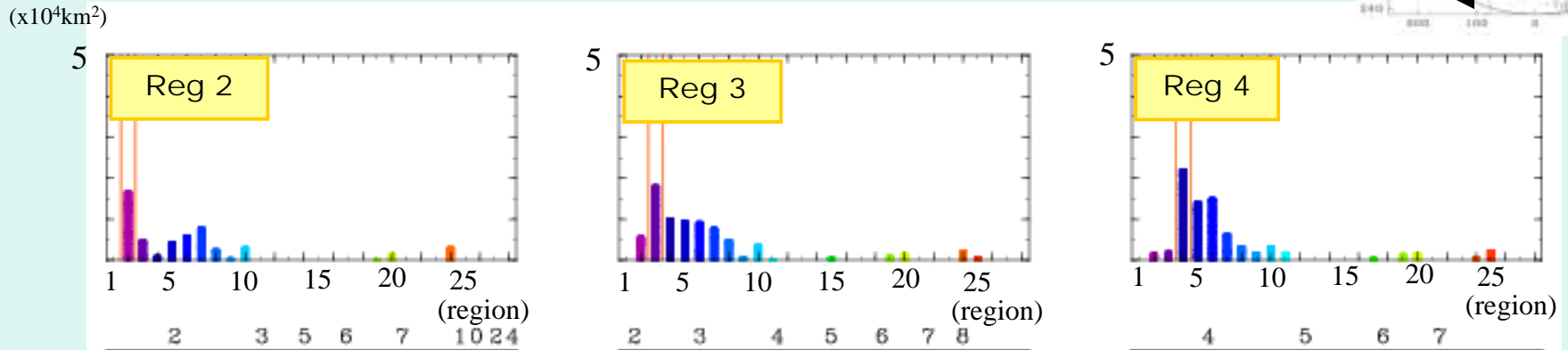
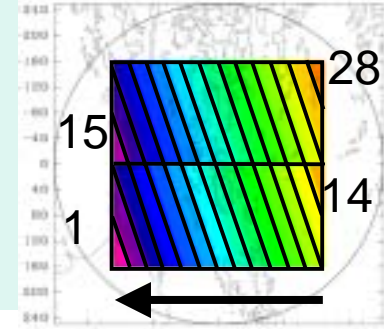
Contribution of each region to echo area of the specified region (May – Jul, '98 – '00)



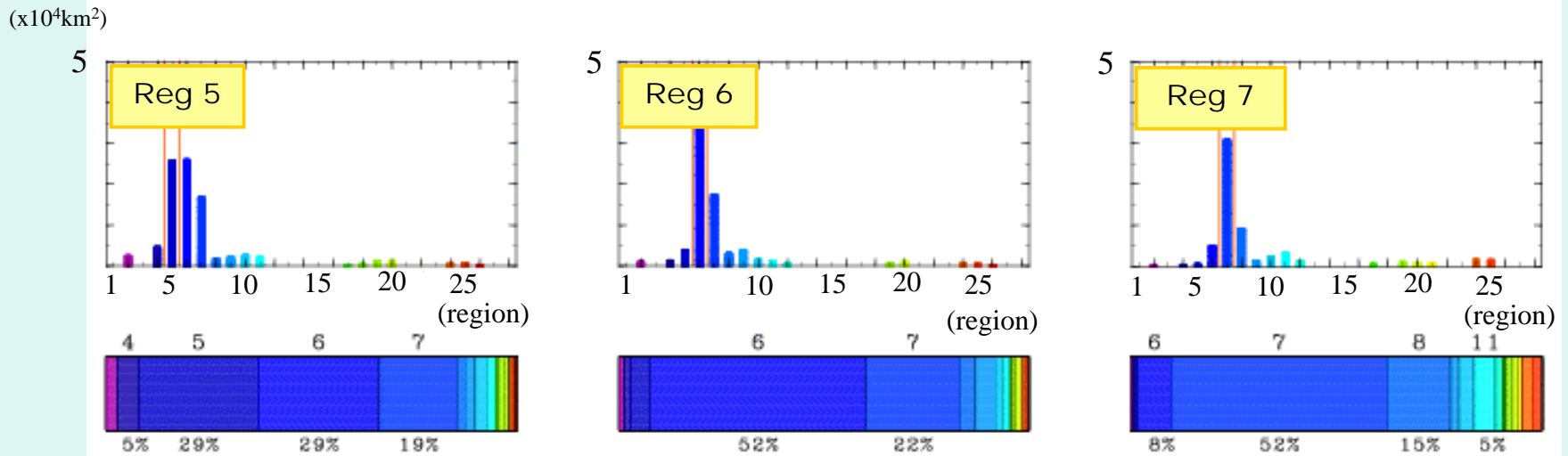
- Echoes originate in mountains constitute the diurnal peak echo area in mountains.
- In leeside regions, contributions of echoes originate in the same region decreases, and contribution of echoes coming from the upwind region increases.



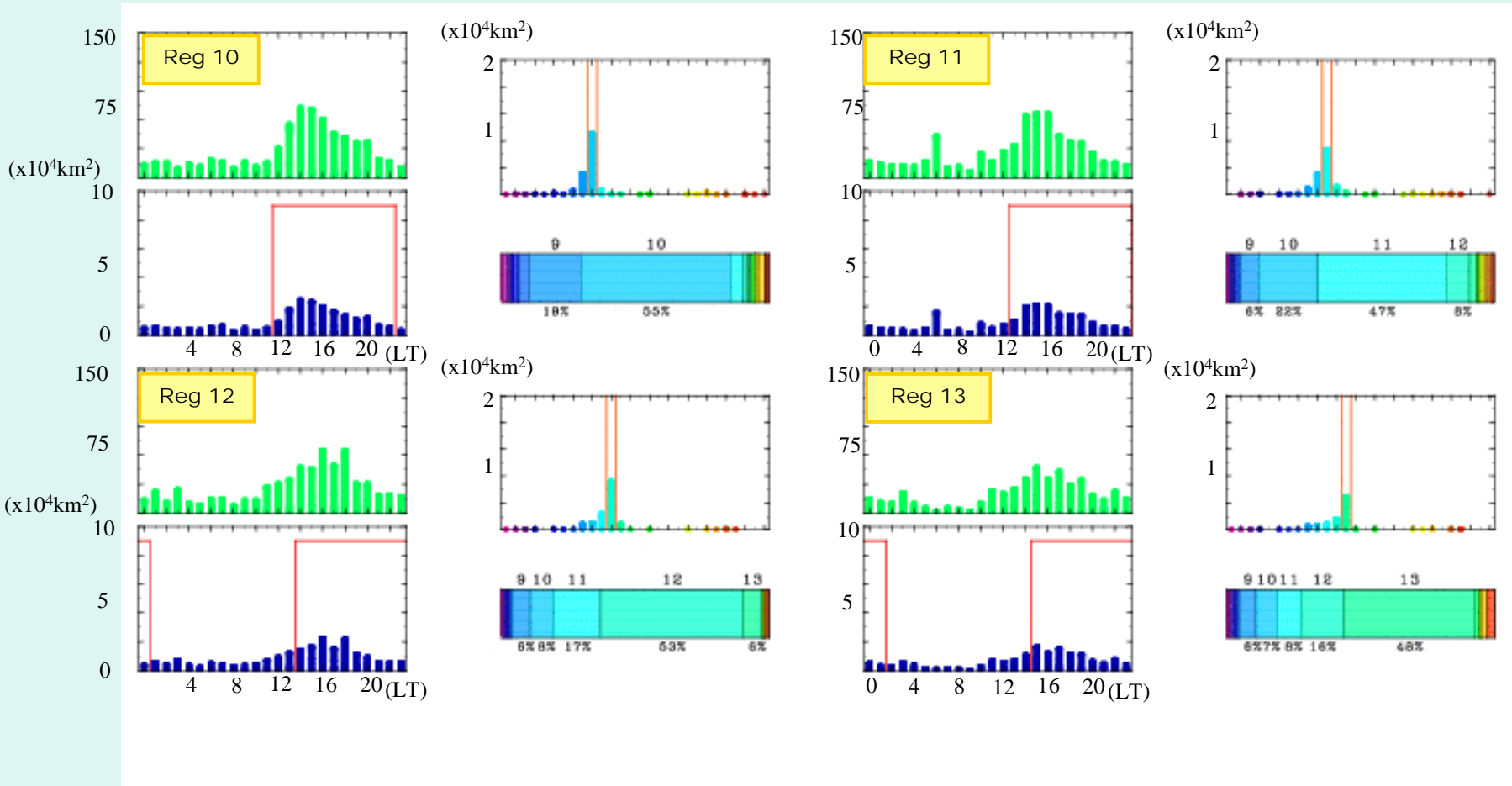
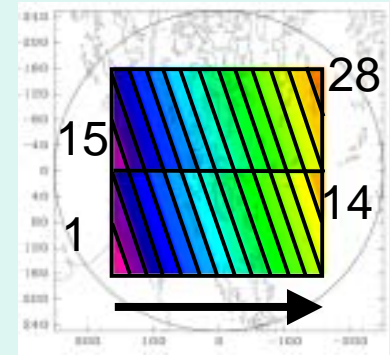
Contribution of each region to echo area of the specified region(Oct, '98 – '00)



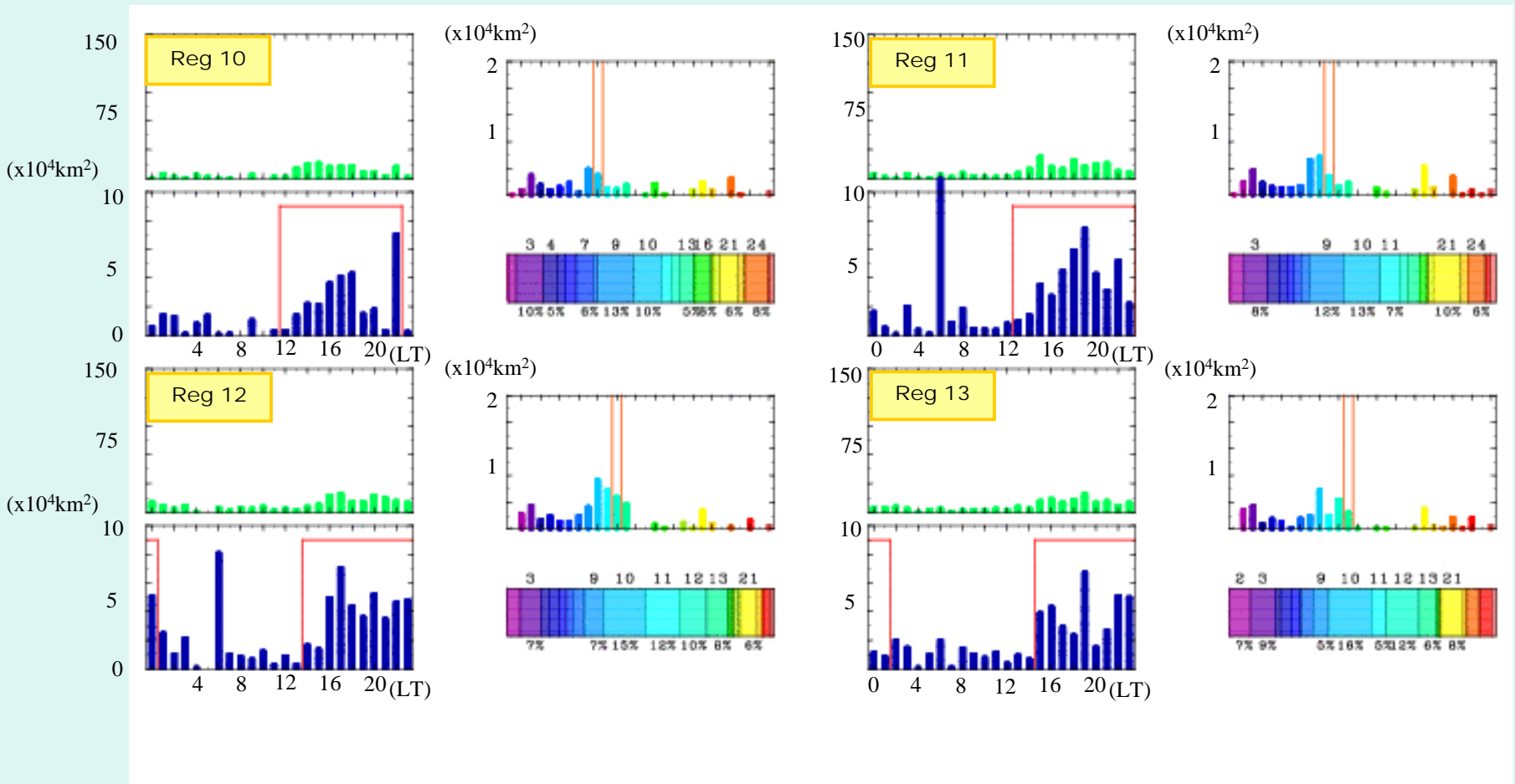
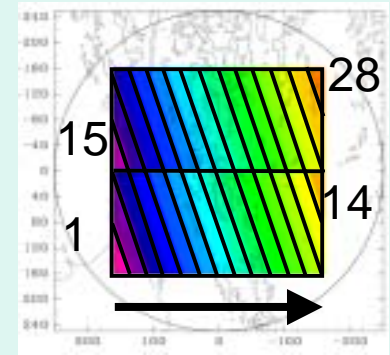
● The contributing region in October is symmetric to those in May-July, when the major wind direction is reversed



Contribution of smaller echoes (< 800km² 28x28km) (May – Jul, '98 – '00)

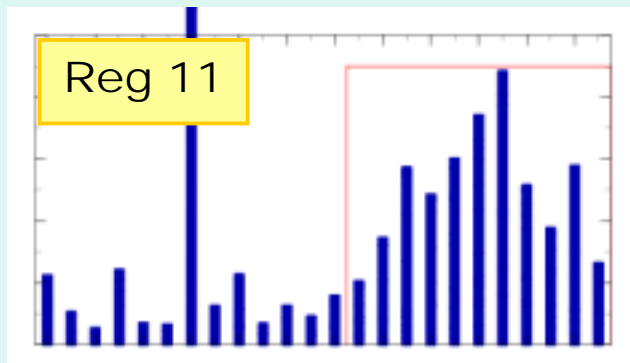


Contribution of larger echoes ($> 800\text{km}^2$ 28x28km) (May – Jul, '98 – '00)



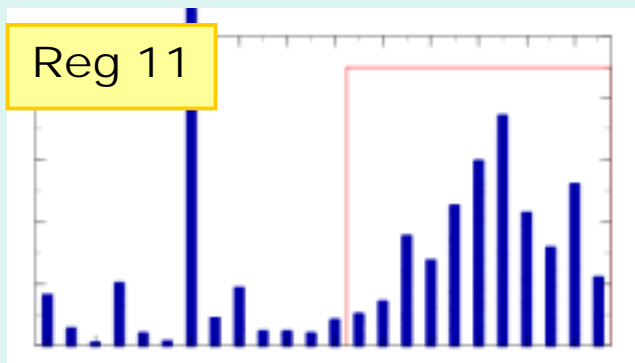
Diurnal variation of radar echoes ~ diurnal variation of precipitation

Total diurnal variation

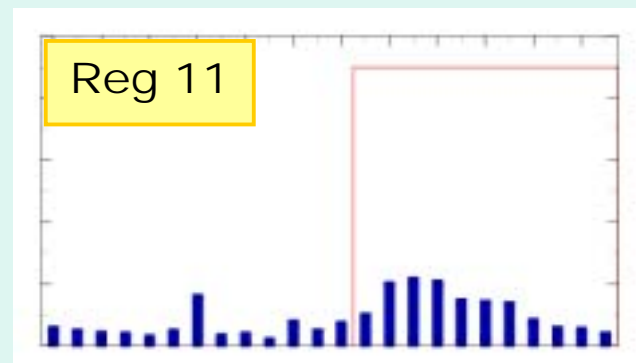


Total variation has similar characteristics to the larger echo variation.

Contribution of larger echoes



Contribution of smaller echoes



||

+

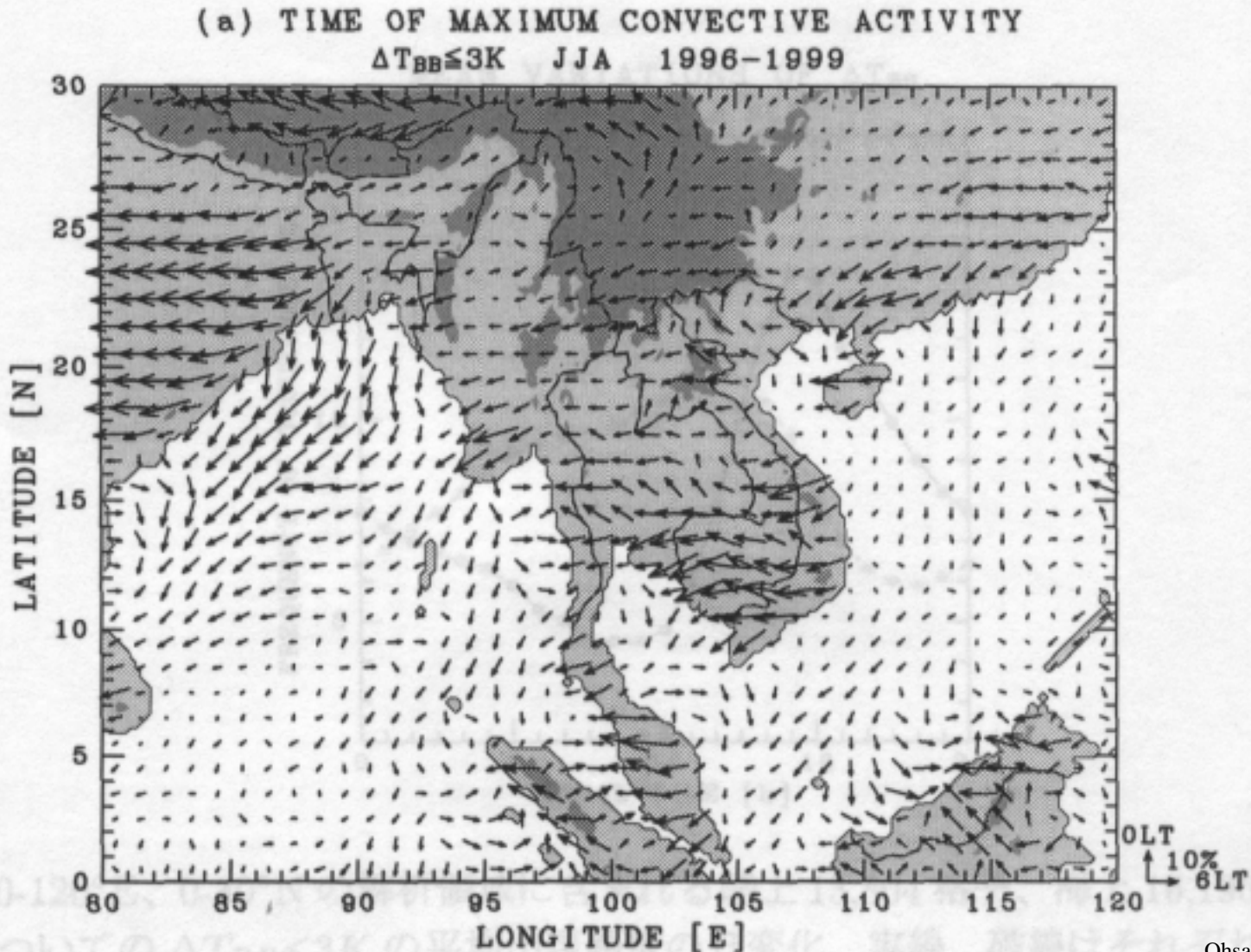
Moving from monsoon windward region.

Phase of diurnal variation depends on the distance from mountains.

Small convective clouds born above the each area.

Phase doesn't differ much between areas.

And
each region has each diurnal variation



Thus we started 3D simulations

- Triply nested
(54km, 18km, 3km)
- Nonhydrostatic MM5

Though phase of diurnal variation of precipitation is 2-3 hours behind from the observation, results are very promising.