

P1.12 AN OBSERVATIONAL STUDY ON ATMOSPHERIC CONDITIONS
FOR FORMATION OF CLOSED CONVECTION CELLS

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1. INTRODUCTION In the previous studies (6th,8th and 9th Conf. on Mesoscale Processes), we reported that closed convection cells could be viewed by the satellites at the south or south west part of synoptic high accompanied with the cold air outbreak if the atmosphere was enough covered by the inversion layer. We also reported that open or closed convection cells were mainly formed by depending on whether downdraft or updraft in the mesoscale field. That is, open cells were formed under downdraft area in the upstream of cold air outbreak, whereas closed cells may found under weak downdraft or updraft at the down stream of it. So that closed convection cells will be deformed by reducing to downdraft domain in the open cells in proportion to the atmosphere embedded them has been changed from downdraft to updraft. This time we will show the results of analysis such as synoptic situation and atmosphere conditions about similar sample to that of last one observed at the southern sea of Japan islands, which open and closed cells were clearly seen at the east and west part of synoptic high. We have

investigated about formation process for closed convection cells as mentioned above which observed at the western sea of California peninsular, south America and Africa continents by using GOES satellites, AVN meteorological analysis and the wind analysis data of CIMSS Tropical Cyclones. Those data showed to agree with our analysis which searched for the dependence between vertical air velocity and formation of open and closed cellular convection.

2. SYNAPTIC SITUATION Fig. 1 shows open and closed convection cells were visualized by GMS taken at 00 UTC 11 November 2002.

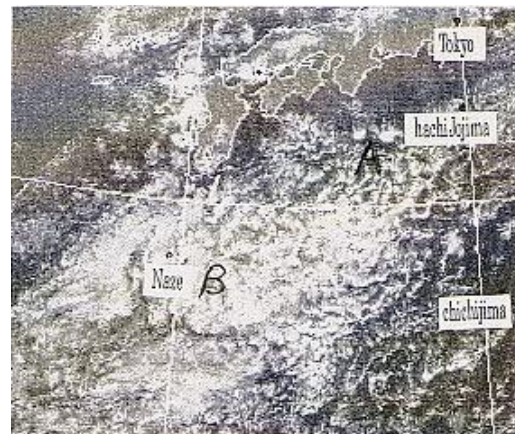


Fig. 1. GMS VIS at 00 UTC 11 NOV. '02

The marked A and B shown in Fig. 1 point at open and close cells viewed in the east and west parts of the high, located at the southern sea of Japan

islands.

We showed the surface analysis in Fig. 2 when open and closed cells were clearly seen by GMS.

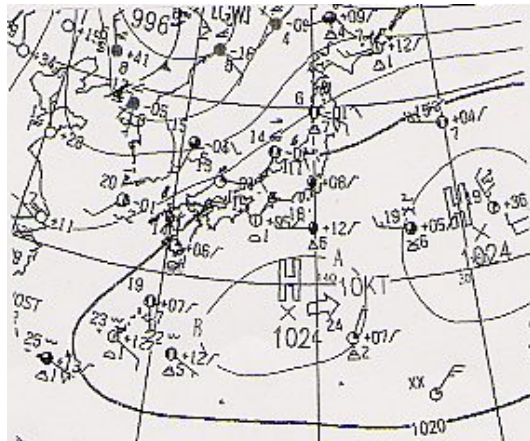


Fig. 2 Surface analysis, 00 UTC 11 Nov. '02, JMA

The marked A and B indicate the location of open and closed cells, respectively.

Fig. 3 shows P – Velocity (hPa/hr) at 700 hPa.



Fig. 3 P-Velocity (hPa/hr) at 700 hPa, 00Z 11 Nov. '02, JMA

The marked A and B show the position of open and closed cells, respectively. The area enclosed by solid line with vertical hatched lines shows updraft area and solid line is 0 value. Thick solid lines show 850 hPa isotherm. As shown in Fig. 3, open cells always form and alive

at the downdraft area in the upstream of cold air outbreak. Whereas closed cells can only find at weak downdraft or updraft area in the downstream of cold air outbreak. We next show the upper analysis at 850 hPa in Fig.4. The synoptic high was covered by weak cold air at the front of trough as shown in the figure.

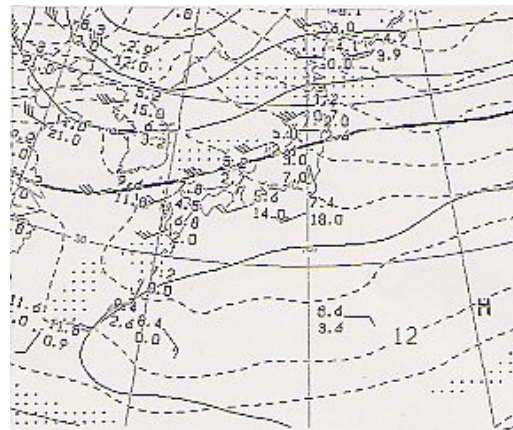


Fig. 4 Upper analysis at 850 hPa, 00 UTC 11 Nov. '02, JMA

VERTICAL STRUCTURE Fig. 5a and b show soundings plotted on Skew-T diagram, which observed at Chichijima (47971) and Naze (47909). Both are indicated on Fig. 1.

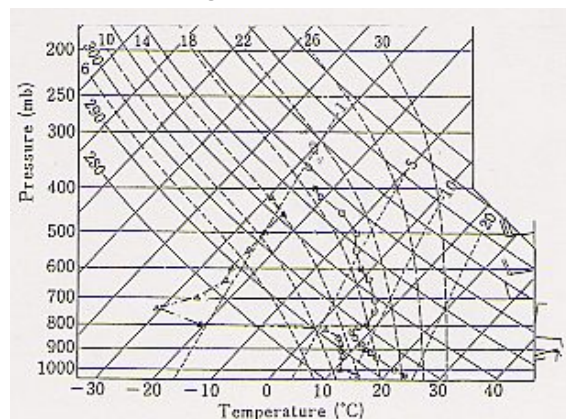


Fig. 5a Sounding at Chichijima, 00 UTC 11 Nov. '02

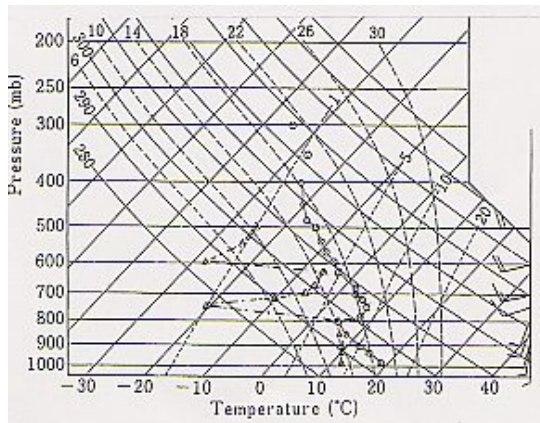


Fig. 5b Sounding at Naze , 00 UTC 11 Nov. '02

Solid curved line of sounding and same dashed line show air and dew point temperatures, respectively. Temperature soundings of both station show almost parallel to the dry adiabatic line in the convective layer except a little rise temperature gradient near the top layer and above of the layer shows typical stable layer. Therefore, we understand that the difference of temperature gradient between the upper part and lower part of convective layer are a little. It is difficult to tell which type should be formed there from temperature gradient. Also the difference between sea and air temperature is about 5°C. The sea surface temperature was about 25°C for the both station. The temperature difference between upstream and downstream is not much but also we can see open and closed cells.

4. SUMMARY As mentioned above, we have been studied on the formation process to the open closed convection cells with the main subject to the

relationship between vertical air velocity and formation for them around the sea of Japan islands but also western sea of California peninsular, south America and Africa continents. And we obtained same results to agree with our analysis. But this time, We do not show without above case due to the page limitation.

5. REFERENCES

Miura, Y., 2001: An observational study on atmospheric conditions for formation of closed convection cells. Ninth Conference on Mesoscale Processes, Ft. Lauderdale, Florida. P5.20