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Natural Hazards and Earth System Sciences
Discussions



# *Interactive comment on* "Dominant processes of extreme rainfall-producing mesoscale convective system over southeastern Korea: 7 July 2009 case" *by* J.-H. Jeong et al.

**Anonymous Referee #1**

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The subject, contents and the following conclusion are not coincident. It's very difficult to find what the scientific new findings could be revealed by this study. The heavy precipitation event is very interesting as it has the historical rainfall record in the region. However, authors need to re-consider the logical structure and the corresponding analyses methodology.

1) The main reason would be the difficulty to understand the subject of this paper: no coincident among the title, described purposes in abstract, and described purpose in introduction. - Title: dominant processes of extreme rainfall - Abstract: to better understand 1) synoptic/meso-scale environment, and 2) behaviour of MCS - Introduction:

1) mechanism of rainfall, and 2) effect of synoptic/meso-scale environment on MCS - Section 1.2 (Organization of paper): 1) synoptic/thermodynamic environment, and 2) evolution and structure of MCS Authors didn't describe the importance to study on these subjects, and didn't show any results regarding these subjects in deed.

For instance,

- In terms of the "to better understand synoptic/meso-scale environment"; first, author have to explain what is previously revealed synoptic/meso-scale environment favoured for the target MCS development by previous studies (e.g. known, and unknown factors), as there are many previous studies already done on this subject. Based on the careful review of previous studies, then, author can raise the clear subjects of this paper, then, finally author can explain the new finding regarding the subject.

- In terms of the "mechanism of rainfall"; which mechanism author have in mind? For rainfall associated with MCS, e.g. the initiation, development, maintain, etc. could be the one. Please carefully mention it.

- In terms of the "effect of synoptic/meso-scale environment on MCS"; author needs to be very careful regarding the "effect" term. As this terms used in subject, readers will expect the quantitative or qualitative effects (of synoptic/meso-scale environments) on MCS (of its initiation, development, maintain) in the result. However, author didn't show any of these related results.

- In terms of the "evolution and structure of MCS"; It seems that author explain this term by description in section 4.1 with figures 9 and 10. For instance, author used important terms e.g. squall line, deep convection, leading-line trailing-stratiform, convective cell, cell initiation, cell merge in this section, however, it's hard to find where these terms are depicted on the figures. What is the definition of squall line, deep convection, convective cell, cell initiation and merge? And how those terms are seen in the figure? Depending on the definition, what we can find could be different. Author have to kindly explain so that readers can learn the interesting features seen in the analyses.



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- How the TS could be explained without showing stratiform region (reflectivity less than 30 dBZ)? The trailing stratiform region is characterised by large horizontal area, notch-like concavity at rear edge, secondary dBZ maximum, separated from convective cloud and etc. And the convective region has arc-shape, rapid movement, solid appearance, strong dBZ gradient at leading edge, elongated cell and etc. Please kindly describe these TS characteristics.

2) Another reason would be the mixed description of analyses results of the present study and results of previous studies. In sections of 3 and 4 which is the "result" sections, author have to describe carefully the analyses results, explaining kindly the analyses methods in section 2, so that readers can follow. For instance, descriptions of analyses methods for Figures 11 and 12 ("area average" analyses) are missing. As the interesting region is in baroclinic environment, the analyses results are dramatically changed, depending on the designed analyses area, especially for wind and temperature parameters.

3) It's difficult to find any of new finding in the described contents in summary and conclusion. The described important factors e.g. frontal slope, trough, upper-level jet, LLJ, and upstream initiation of MCS on rainfall in the section of summary and conclusions are already very well-known factors in meteorological field. In conclusion section, author should focus the new finding and the worth of the results.

- author mentioned the important roles of cold pool and downdraft in inducing long-lasting MCS, however the corresponding results are not clearly shown in results section; this term should be carefully described showing the proper evidences, e.g. the vertical wind cross-section along the low-level wind direction, horizontal vertical wind distribution and its temporal evolution. The cold pool was briefly explain using Figure 13. However, these following terms are necessary to be described kindly: 1) how the offshore wind could be captured by surface observation data? 2) what is data error? 3) how the "outflow boundary" was identified? 4) what is the cold pool boundary? 5) normally the inland temperature is lower than those temperatures observed on coastal



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region or offshore. Keeping this on min, how author explain the generated cold pool?

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