

**NHESS-2015-261**

**Responses to Anonymous Referee#2**

**Date: 25 January 2016**

**Referee#2 recommendation:**

This paper seems to be very useful for researchers who are working for extreme rainfall. This paper shows a different aspect of the synoptic and mesoscale environment in which an extreme rainfall event was developed in Korea, compared to the previous studies. The event is very unique and thus the study might be a good reference for future study on very heavy rainfalls. Therefore, this paper is recommended for its publication with corrections as suggested in the major comments.

**Authors Response**

We thanks to the Anonymous Referee#2 for his/her valuable comments, which will give to the authors the opportunity to improve the manuscript before its resubmission to NHESS. The manuscript will be revised according to the recommendations provided by the reviewer.

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**Major comments**

- 1) This paper discusses physical processes related to an extreme rainfall-producing MCS. However, for its publication, it needs some revisions as the followings; (1) change of the title of the paper: I suggest the following title: “ Characteristics of a Mesoscale Convective System Produced Extreme Rainfall over Southeastern Korea: 7 July 2009”

**Response**

Thank you for this suggestion. We fully agree your opinion. The title was revised as ‘Characteristics of a Mesoscale Convective System Produced Extreme Rainfall over Southeastern Korea: 7 July 2009’.

- 2) 3. Synoptic and thermodynamic environment (i) The horizontal length of Changma front should be mentioned. (ii) The convection over southwestern Korea redeveloped vigorously, and had expended in size area north of the front. Describe the evidence of redevelopment

of the convection over southwestern Korea in detail. (iii) At this time, the organized MCS was moving across the southern Korean Peninsula. The moving speed of the system should be given.

### Response

Thank you for this suggestion. We revised and modified the following sentences.

- (i) The Changma front west of 127°E was oriented roughly east–west with a length of roughly 2000 km and extended into eastern China along about 35°N (Fig. 3a). (page 7, line 31-48)
- (ii) The convection over southwestern Korea developed vigorously with  $T_B \leq 220$  K, and had expanded in its size to north of the front. (page 8, line 138-139)
- (iii) Thank you for this suggestion. However, following suggestion about moving speed which had been included in section 4.2 *Propagation of the quasi-stationary MCS*. Shortly, the convective system moved from 240° at  $4 \text{ m s}^{-1}$ .

- 3) 4. Structure and evolution of the quasi stationary MCS. (i) page 13: The following sentence is not relevant and should be deleted: “The characteristics of the areal-mean .....some variability is neglected”. (ii) This is consistent with the results from previous studies ( add references).

### Response

Thanks for your suggestion. The sentence was modified as referee#2 suggestion.

- (i) The sentence was deleted.
- (ii) This is consistent with the results from previous studies (Corfidi et al. 1996; Corfidi 2003). (page 14, line 290-291)

- 4) 5. Discussion (i) The title “ discussion” should be changed as the following “ Analysis results and discussions. (ii) In addition, some grammatical errors such as,” To understand why convective initiation could occur continuously upstream (southwest flank) of system, we will examined how preexisting mesoscale features influence the system“. The manuscript needs to be edited for grammar and syntax to improve the article to be more readable. (iii) The magnitude of vertical wind shear should be given for Fig. 12. (iv)

Concerning Figs. 13, a and b, detailed explanation should be given on how the figures were obtained.

## **Response**

We agree with all minor suggestion and all of them were revised accordingly as below.

- (i) The title ‘discussion’ change to ‘analysis results and discussions’
- (ii) To understand why convective initiation could occur continuously upstream (southwest flank) of system, we will examine how preexisting mesoscale features influence the system, and how the convective system itself can change in the system-scale structure and longevity. (page 15, line 306-309)
- (iii) However, this event occurred with line-parallel vertical shear ( $3.2 \times 10^{-3} \text{ s}^{-1}$ ) in the lower troposphere (Fig. 12). (page 16, line 325-326)
- (iv) The surface observational data was interpolated from the measured points within neighborhoods, which was analyzed larger spatial areas near MCSs. (page 7, line 121-123)