Interactive comment on "Indexes establishment and capability evaluation of space-air-ground remote sensing cooperation in geo-hazard emergency response" *by* Yahong Liu and Jin Zhang

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We appreciate the time and effort you took to critically evaluate our manuscript and provide constructive suggestions for its improvement. Below, we will respond to all comments by explaining how we will address these issues in the revised version of the manuscript.

General commentsïijŽ First of all, the English must be deeply revised. There are many sentences are not clear, that hamper the understating of the work. Moreover, there are

too repetition in the manuscript (e.g. remote sensing cooperative, or space-air-ground remote sensing sensor). The language revision is extremely important, otherwise, the massage carried on is lost. I found many difficulties on reading the manuscript. An example, first sentence really misleading: "Geohazard emergency response is a disaster prevention and reduction action that multi-factorial, time-critical, task-intensive and socially significant" ...emergency response cannot be prevention and reduction action. A second important point is that the paper misses, since the beginning, indication on who is doing what for obtaining which results. This should be clear, immediately. The abstract does not allow to understand clearly whish are the objectives of the work, and does not present any figure of results Last general and important comment: the manuscript has to be re-organised, is is not well presented. In many parts, the content of the section does not report appropriate information (see further comments), a reader can have difficulties on understanding the logic of the work. Reply 1ïijŽThe main purpose of this manuscript is to establish the capability evaluation system of space-air-ground remote sensing cooperative technology in terms of observation effectiveness and geohazard emergency response, so as to grasp its technical operation and mission accomplishment, and provide a basis for decision making for space-air-ground remote sensing cooperative work. For the problems in the language expression and structure of the manuscript, we will make adjustments and modifications, and reorganize to highlight the focus of our doing work, so that it becomes more concise and logical.

Detailed issuesïijŽ Issues 1ïijŽ1. Instruction → I guess it is Introduction Reply 2: We will fix it in the manuscript

Issues 2ïijŽ Section 2, DATA. Subsection 2.1: This part is not about the data used but a general discussion on the classification of sensors and some info on GIS. It presents an overview of the type of sensors, that is useful but not so much important to fill one page of the manuscript. I would expect to find here a focus on the way you set up the table A1 (that is not exhaustive and maybe can be neglected), giving the criteria adopted

to build the table, and some number about the final database. Indeed, this initial part is linked with subsection 2.2 and 2.3 Abut Table A1: why do you list and consider satellites/missions that are no more working? E.g. ERS-1 and ERS-2, ALMAZ, JERS, IRS-P4. . ..and others. It has no sense. The Subsection 2.1 presents also a description of a GIS for emergency management. I think that this unit should be related to the main components of the system (or service) you want to analyse. Fig.1 very small. About the GIS emergency service: I think it is important to improve figure 2, trying to give information about the connections among all the modules/blocks in the scheme. Reply 3: In this section 2.1, we mainly want to summarize the current development of space-air-ground remote sensing technology, and later analyze it to build a database. Table A1 is a brief list of remote sensing satellites launched by countries/regions according to their categories. Some satellites that are no longer working are listed because we think their technical parameters still have some reference, and we understand that the historical data of some of these satellites are still being used in some disaster emergencies. We will further revise the contents related to GIS in disaster emergencies, including Figures 1 and 2, to enhance the information expression.

Issues 3ïïjŽ Section 2.2 and 2.3 I think they could merge because the indexes presented in table 1, are then used to build the database. Figure 3, to small, and the content is not appreciable in the pdf provided for the review Maybe split it into 2 figs, one for SAT_RS and one for SE_RS would help. What is UML? No info about the acronym. Reply 4: For sections 2.2 and 2.3 we will merge the content, including Figure 3, which will enhance its information representation. UML-Unified Modeling Language, which is our unification of metrics for the purpose of creating a database, we will modify the corresponding section.

Issues 4ïïjŽ Section 3. Methodology The commonly used evaluation methods are. . .for evaluating what? a Decision Support System? The performance of ?? what are we talking about? After reading the simulation results I understand what you want to evaluate. You should say what you are evaluating here, considering you are giving some

references of methods. Please express all the acronym: AHP?? TOPSIS? Some are declared (RSR, BN) some other no. This also happens in subsections titles (RSR and Bayesian Network) Section 3.1: how you determine the weighting vector W? I guess they are calculated using RSR, but there is no explanation on the relationship between RSR and TOPIS. It is almost clear only after reading sect. 3.2 and then at the simulation results section. Section 3.2: in equation 9, are the elements Rij the same in matrix A (or B) of the section 3.1? not clear. Why change meanings of m (objects) and n (indicators) indexes with respect matrix A (or B)? Equation 10 and 11 are equal. What is SR term? And W' with respect W? Please explain. Reply 5: We mainly want to evaluate the observation effectiveness of remote sensing technology and disaster emergency service capability respectively, and need to use some methods of system capability evaluation, the details of which we will strengthen in this section. AHP- The Analytic Hierarchy Process, TOPSISI- Technique for Order Preference by Similarity to an Ideal Solution, the expression of the abbreviation is an oversight in our manuscript, and we will further check and improve it. There are various methods for determining the weights in the TOPSIS method, and in this paper we use the RSR (Rank-sum ratio) method, which we will explain in the corresponding section of the expression. Equation 9 (in the revised manuscript into Equation 3) in Rij refers to the rank corresponding to the index value bij of the jth evaluation index in the ith evaluation object, different from the matrix in 3.1, for this part of the matrix A, B and the specific meaning of the index m, n we will strengthen the description to eliminate the expression of misunderstanding. In Equations 10 and 11, SR (Score Ratio) is calculated from the RSR value of each evaluation indicator, referring to the proportional relationship between the levels of indicators, W' is the empirical weight, in order to somewhat eliminate the subjectivity of the evaluation, the final weight W is calculated using SR and W'.

Issues 5ïïjŽ Sect. 4 Results and discussion The two subsection 4.1 and 4.1.1 are not related to presentation of results, but they seem a sort of introduction. The content repeats what already written before. Section 4.1.2: can you give the criteria you adopt for selecting the remote sensing synergies (A), (B) and (C) for mudslide? I understand

it is an example, but you have to justify this choice. Otherwise you can apply it also for earthquakes or other events. How you set values in matrix A? In table 4, in the first column two indicators have the same rank 1. One of them should be 2. Section 4.2.1: figure 6 small, not well visible in the pdf provided for the review Section 4.2.2: table 6. I would suggest to put horizontal lines for separating the related indexes. For example, Data Acquisition should be with Planning and Observation. These two are related to Response Time & Raliblity, and Technique+Range+Timeliness, repsctively. This will also help on reading figure 7. About BN model? Hwa do you set the values for the third level (root) nodes? Part number (4) (on page 18) seems an example of part number (3) (page 17), indeed figure 9 is the same of figure 8 excepting few values (maybe only the one of Forecast Accuracy. Hence, why duplicate it? Finally, Section 4.3 Analysis: this is not an analysis section, rather a summary of the work with few comments at the end, in points (1), (2) and (3). This part must be improved and expanded, to figure out some issues and considerations about the results, the limits, the applicability, the selected environment for the example etc. etc. Reply 6: The contents of 4.1 and 4.1.1 will be streamlined to reduce repetitive expressions. In 4.1.2 (4.1.1 in the revised manuscript), the selection of performance evaluation indicators is mainly based on the characteristics of synergistic technologies and observation needs, and we will explain the details of this part in the corresponding part of the manuscript. The data in matrix A are of two types: qualitative and quantitative, for which qualitative data are obtained directly based on relevant information and experience, while quantitative data are defined and replaced by numbers, as we will explain further in the text in the manuscript. We apologize for the error in the data in Table 4, it is a mistake in our work and we will revise it. For Figure 6 and Table 6, we will revise them to make their presentation clear. For the determination of the root node in the BN model, theoretically, it is necessary to determine its a priori data and then correct it by parameter learning, but due to the lack of data in this area, parameter learning is not possible, and we determine the data in this part mainly by expert experience. Figure 8 shows the initial evaluation network model established, and Figure 9 shows the calculation results with certain nodes in the evalu-

ation model taking values (setting them as evidence variables), which are illustrated by the change of data in the evaluation model to have a predictive assessment and guidance for the disaster emergency process. Section 4.3 does have many shortcomings, thank you for your valuable comments, we will make further improvements.