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Natural Hazards and Earth System Sciences
Discussions
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Interactive comment on "The susceptibility assessment of multi-hazard in the Pearl River Delta Economic Zone, China" *by* Chuanming Ma et al.

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Comments of referee 1: the authors did not provide/collect enough data to support their study which make the results based on the inadequate data unbelievable. For example, the authors only presented datasets of precipitation, topography, geology etc. Such datasets are enough to assess geological hazard susceptibility? Obviously, no. For instance, soil erosion and landslides have a strong relationship with vegetation cover; without vegetation cover map, how the authors could provide a correct susceptibility map for landslides or soil erosion? Author's response: It is our negligence that some data used to assess geo-hazards susceptibility are not presented in

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this paper. According to your kind suggestion, we have now added data in section 2 to support this study. Author's changes in manuscript: We have provided the spatial distribution map of vegetation type (Fig.08) in line 206. Vegetation coverage is shown in Fig.07. In addition, we have add fracture data in Fig.04. Due to the limitations of coverage, other data are provided in supplement data. Fracture information has been added in section 2.2 in as following: "The Pearl River Delta belongs to the South China fold belts, the Northern and Central Guangdong depression belt, and the main depression is the Sanshui Depression Basin. Some large fractures develop in the study area (Fig.04). These large faults are characterized by multiple phases of activity, especially since the late Tertiary, and they have affect on formation and evolution of The Pearl River Delta, structure development and crustal stability." Comments of referee 1: Seawater intrusion also has a strong relationship with freshwater discharge provided by the Pearl River, without hydrological data (e.g., annual mean runoff and long-term runoff fluctuation; besides, insufficient seasonal runoff caused by human activities (irrigation, water impoundment for energy generation) also can led to seawater intrusion), is it possible to identify regions with high susceptibility to seawater intrusion? Author's response: We fully agree with the referee on the effect of above hydrological data on seawater intrusion. However, we select influencing factors to assess seawater intrusion susceptibility based on occurrence mechanism and formation conditions of seawater intrusion, and we consider basic formation conditions of seawater intrusion as assessment indexes. So, hydrological data (e.g., annual mean runoff and long-term runoff fluctuation) and insufficient seasonal runoff are not considered in this paper, the type of Quaternary sedimentary rock only is considered in seawater susceptibility assessment. The type of Quaternary sedimentary rock affects the hydraulicÂărelation between the seawater and the land aquifer, so it affects the occurrence of seawater intrusion. Comments of referee1:The second problem, which is the key issue, is that the results are questionable. As we all know, for each geological hazard listed in this study, there is susceptibility map already. We can just compare the results in the study with the maps released by government or previous studies. For example:

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Zhao et al. (2014) released susceptibility map for landslides for the whole Guangdong Province (obviously include the entire delta area of the Pearl River): (Figure from Zhao et al. (2014), please see the attached pdf file) The authors' result failed to identify the circled area as the high susceptibility area for landslides. Author's response: It is our negligence that the range of the study area is not clarified in the paper. The circled high susceptibility area from Zhao et al. (2014) is located in Qingyuan City, which does not belong to the Pearl River Delta Economic Zone. Zhao et al. (2014) took cities at county level as evaluation units, which affected the accuracy of susceptibility assessment. Moreover, Zhao et al. (2014) carried out collapse, landslide and debris flow hazards susceptibility assessment based on the existing methodology for debris flow hazard assessment, resulting that the result provided Zhao et al. (2014) has a slight difference with our result of collapse and landslide susceptibility. Comments of referee 1: According to the investigation by Geological Survey Bureau of China (http://www.cigem.cgs.gov.cn/cgkx_4859/201703/20170316_424756.html),the high susceptibility areas for ground subsidence in the Pearl River Delta area are Foshan, Guangzhou, Jiangmen, Zhongshan, Zhuhai and Shenzhen. However, the result map provided by the authors didn't identify Shenzhen as the high susceptibility area. In fact, ground subsidence events in Shenzhen have been reported by many studies. Author's response: We carried out ground subsidence susceptibility assessment based on the consideration of occurrence mechanism and formation conditions of ground subsidence. The thinner mollisol is distributed in Shenzhen City, and the intensity of groundwater development and utilization is small, the probability of formation of ground subsidence is small. Lu et al. (2006) released geological disaster susceptibility map through the research on the distribution of geological environment conditions and the effecting factors of the geological disasters. The result provided by Lu et al. (2006) shows that ground subsidence is not prone to occur in Shenzhen City, which is consistent with our study result. Shenzhen City are under increasing urbanization and development intensity, resulting that load on the ground trends to increase, which has a effect occurrence of ground subsidence. It is limi-

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tation of our study that urban development is not considered in ground subsidence susceptibility assessment. Comments of referee 1: For soil erosion susceptibility map, we can also get the soil erosion map for the Guangdong Province via the link (http://www.dsac.cn/DataProduct/Detail/20080604) (please see the attached pdf file) The soil erosion map provided by the study also failed to identify the circled area as the high susceptibility area for landslides (please see the attached pdf file). All in all, I think the results provided by the authors are quite unbelievable. Author's response: It is our negligence that the range of the study area is not clarified in the paper. The Pearl River Delta Economic Zone includes Guangzhou City, Shenzhen City, Foshan City, Zhongshan City, Huizhou City, Dongguan City, Zhuhai City, Jiangmen City, Zhaoqing City. The circled high susceptibility area in the soil erosion map (shown the attached pdf file) is located in Shaoguan City, So it does not belong to the Pearl River Delta Economic Zone. Comments of referee 1: the third problem is that the manuscript has too many English grammatical mistakes, the authors MUST carefully check each sentences before next submission. For example (in first six pages I can find near 20 problems): Author's response: According to your kind suggestion, we have corrected English grammatical mistakes in first six Page, the revised portions were marked in red as following. And, we carefully have checked and corrected all language of this paper. Author's changes in manuscript: Grammatical mistakes in lineÂă13 has been corrected as following:Âă"TheÂămainÂăscopeÂăofÂăthisÂăpaper is to assess multiâĂŘhazardÂăsusceptibilityÂăandÂăidentifyÂăareaÂăby usingÂăanÂăintegratedÂăsusceptibility. . .". LineÂă29:Âă"geoâĂŘhzardsÂămanagement" has been corrected as "geo-hazards management". LineÂă57:ÂăThis sentence has been corrected as "in order to minimize the economic loss and reduce threaten on people's lives and property" in now line 52-53. LineÂă58:Âă"Meaning" has been corrected as "meaningful" in now line 54. Line 61: This sentence has been corrected as "Since geological hazards are a phenomena" in now line 56. Line 65: This sentence has been corrected as "relation between different hazards is an important tool " in now line 59-61. Grammatical mistakes in line 69 has been corrected as "a complex process and confronts

with challenges” in now line 64. LinesÂă73âĂŘ74:ÂăThis sentence has been corrected as following: “which are based on statistical analysis of the scale and density of occurred geological hazards, but it is difficult to describe the affect of different influencing factors on occurred geological hazards” in now line 67-69. Grammatical mistakes in line 77 has been corrected as “OneÂăwidelyÂăusedÂămethodÂăfor susceptibilityÂăassessment” in now line 72. Grammatical mistakes in line 77 has been corrected as “hazardsÂăsusceptibilityÂăinÂăthisÂăaÂăÂăunitÂăisÂăconsideredÂăhigh” Âăin now line 82. LineÂă91:ÂăLanguage of this sentence is right. LineÂă93:Âă“TheÂădifferenceÂămethod” has been corrected as “the Difference Method” in now line 89. The basic principle of the Difference Method is CannikinÂăLaw. Grammatical mistakes in line 94 has been corrected “the five fiveÂăaforementionedÂăgeohazard susceptibility assessments” in now line 89-90. Line 109: the caption of Fig.1Âăhas been corrected as “Fig.1ÂăTheÂăspatialÂădistributionÂămap of geo-hazards in the study area” in now line 104. Grammatical mistakes in line 112 has been corrected as “ The rainfall is characterized by high precipitation” in now line 107. The caption of fig.2 has been corrected as “Fig.2ÂăTheÂăspatialÂădistributionÂămap ofÂăprecipitationÂăofÂătheÂăstudyÂăarea” in now line 113. LineÂă121:ÂăÂă“smooth”Âăhas been corrected asÂă“flat” in now line 117. LineÂă122: Genetic type can be understand as origin type in geology.

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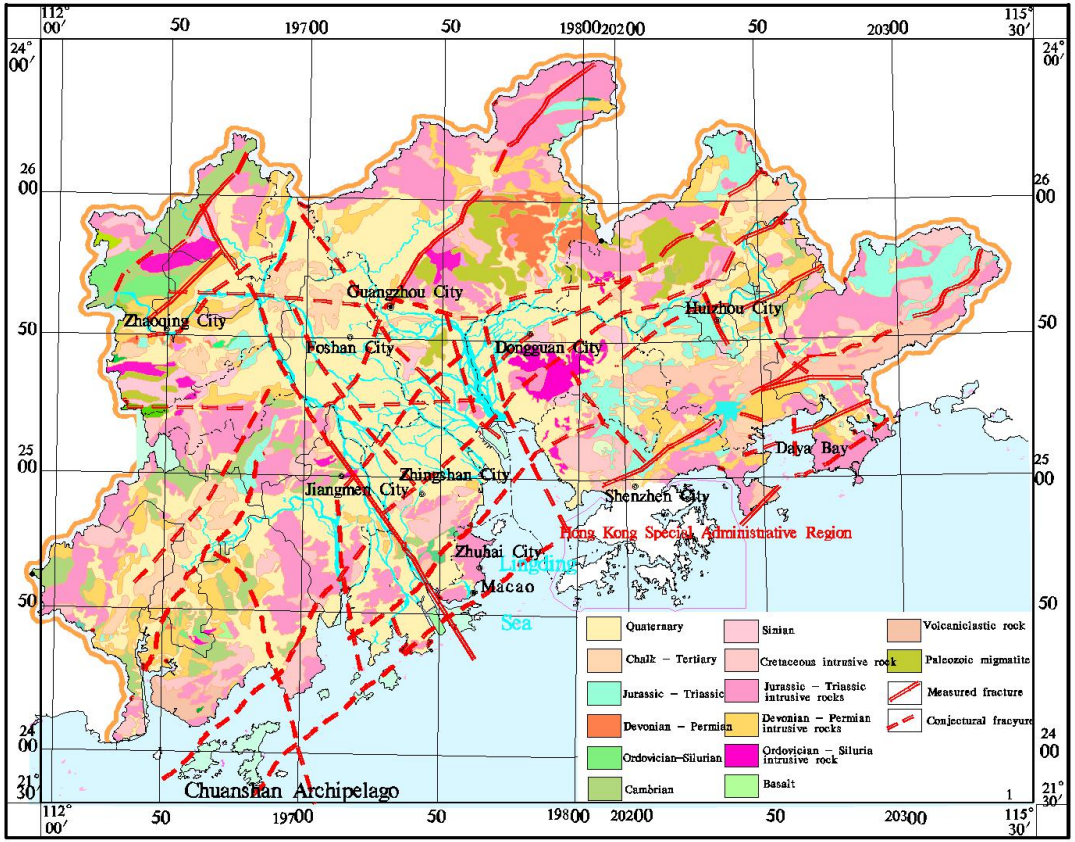

Fig. 1.

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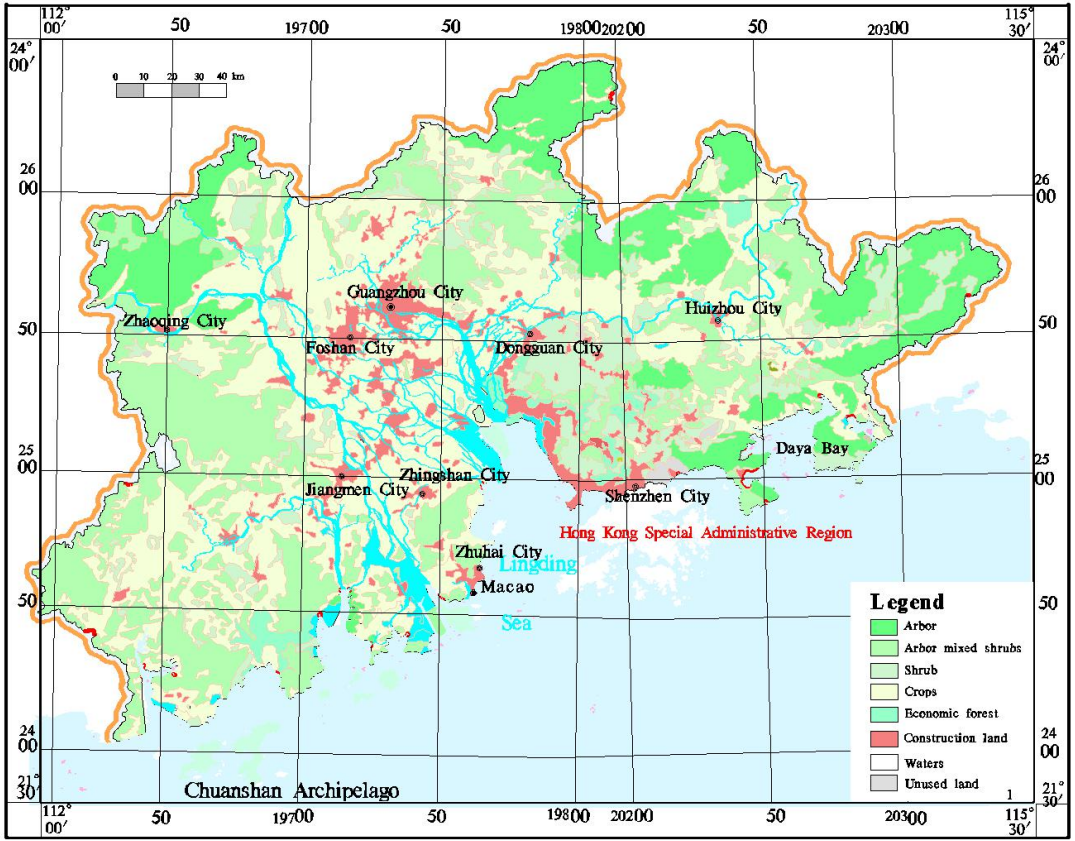

Fig. 2.

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