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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Developing open geographic data model and analysis tools for disaster management: landslide case" *by* A. C. Aydinoglu and M. S. Bilgin

A. C. Aydinoglu and M. S. Bilgin

arifcagdas@gmail.com

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Anonymous Referee #1 (RC C2441) has some comments to emphasize scientific significance of this paper. These comments, response, and changes in the manuscript are explained below;

1. The data model in this paper looks more like a combination of different spatial data sources, namely a kind of organizational structure of spatial data, not like a general data model.

- Disaster management uses geographic data sets coming from different sources with

different quality and content standards. All these data sets are managed on a different commercial platform. Thus, in this study, ADYS data model as a general data model was developed and tested for integrated disaster management. ADYS model is interoperable with Turkey National GIS data model that was accepted as base standard but has not implemented yet. With this vision, data sets coming from different sources should be converted to these ADYS and TUCBS data exchange formats. All products and disaster management applications should be developed based on these open input data sets (ADYS / TUCBS.GML) that was encoded from UML application schemas based on ISO/TC211. As seen on case study of this paper, activity analysis tools can be developed independent from any software and hardware and analyze these open data sets to manage disasters. Some explanations are summarized below to support this;

Page 2 / Line 29: ... data content standards supporting interoperability should be defined independent from any software and hardware for the successful functioning of the disaster management system. Otherwise the system working with inconvenient data will be ineffective in the case of disasters...

Page 3 / Line 12: ...Integrated disaster management and developing data models compatible with National GDI are current research topics.

Page 3 / Line 19: ... As the first case of Turkey National GIS (TUCBS) infrastructure following GDI vision, the interoperable data model for disaster management (ADYS) that makes up-to-date exchange of geographic data sets from different sources possible was designed. The ADYS analysis tools that are open, flexible, and independent from any software and hardware were developed.

Page 5 / Line 6: As a result of a fieldwork applied to the experts and the actors and examining academic research, for landslide, 39 sub-activities of 15 activity group were defined at all disaster management phases...

Page 13 / Line 23: The ADYS, disaster management data model, was designed as

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open and object-oriented geographic data model and compatible to ISO/TC211 standards and national data models. It is supposed that if data providers produce geographic data sets depending on these data models, data sharing and cooperation will be possible between actors for disaster management activities at mitigation, preparedness, response, and recovery phases. This model, therefore, is a new approach for geographic data interoperability in Turkey.

Page 14 / Line 20 (Results): In this way, using these analysis tools with open geographic data sets provide costless and improvable solutions for the landslide activities of Disaster Management Centres in any province of Turkey.

2. In this paper, the authors use Quantum GIS, GRASS GIS, and SAGA GIS respectively to complete different spatial analysis tasks, but we did not know whether this is a software that integrated all these functions to a new open source software. If it is please describe in details and show the software UI in a picture.

- This study uses interface of Quantum GIS (QGIS) and Sextante tools. Activity analysis tools were developed in this toolbox. The functions of GRASS GIS and SAGA GIS were added to the processing steps of the activity analysis tools. Thus, Figure 6 and Figure 9 can be accepted as user interface of ADYS tools. ADYS tools and toolbox will be used as plugin of QGIS next time. To explain this, article text was revised;

Page 10 / Line 18: . . . As user interface of ADYS toolbox, the Sextante toolbox is a Java-based framework and processes vector and raster data with several desktop GIS tools. Its functionalities can be enhanced with GIS functions of other programs . . .

- Explanations in other paragraphs also support this;

Page 11 / Line 1: The ADYS analysis toolbox was developed to manage landslide activities according to the activity analysis explaining task steps. The framework provides templates for the custom construction of model components arranging the schedule of the integrated model. The high-level Python language, allowing domain experts with-

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out in-depth knowledge of software, was used for model construction of the activities (Schmitz et. al., 2013). . .

Page 11 / Line 6: Figure 6 shows ADYS toolbox including landslide activities as example. As the activities of mitigation phase,. . .

Page 14/ Line 14: . . . Modeller environment of QGIS provides opportunities for using various open source software tools in the processing steps of the same activity. . .

3.In introduction part, the author did not address the current research progress of data models and tools which already exist in the field of disaster management clearly. Are there any similar works published before? Then we can see what new work the authors do in this paper.

- After GIS, data management, and GDI vision was explained, current situation about disaster management data models were summarized.

Page 3 /Line 3: . . . As a part of National GDI initiatives, Federal Geographic Data Committee (FGDC) Department of Homeland Security (DHS) developed the DHS data model to support data interoperability in disaster management community with allies (FGDC, 2009). Hazus is a national methodology that contains models for estimating potential losses from earthquakes, floods, and hurricanes especially (Schneider and Schauer, 2006). Geo-spatial Data Infrastructure for Disaster Management (GDI4DM) project develops open national data models to manage preparedness and response phase of disasters. Information Model for Safety and Security (IMOOV) compliant with other national data specifications of the Netherlands provides a general approach for disaster or event management, similar to GDI4DM (Geonovum, 2008; Zlatanova et al., 2010). Integrated disaster management and developing data models compatible with National GDI are current research topics.

Additional citations; FGDC: Geospatial Data Model. V.2.7, Federal Geographic Data Committee, Homeland Security Working Group, Washington, USA, 2009. Schneider,

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P.J., Schauer, B.A.: HAZUS- Its Development and Its Future. Nat. Hazards Rev. 7, Special Issue: Multihazards Loss Estimation and HAZUS, 40–44, 2006. Geonovum: Information Model IMOOV- Conceptual Model. V.1.1, Geonovum, The Netherlands, 2008. Zlatanova, S., Dilo, A., De Vries, M., Fichtinger, A.: Models of Dynamic Data For Emergency Response: A Comparative Study. A special joint symposium of ISPRS Technical Commission IV & AutoCarto, Orlando, Florida, 2010.

- Section 2.4 was reorganized. And, section title is named as “Designing interoperable geographic data model of Turkey with landslide case” to increase the emphasis on the disaster management of Turkey. Current situation about disaster management was explained at the beginning of this section.

Page 7 / Line 8: Disaster management projects of Turkey have been initiated after devastating Marmara earthquake in 1999. Turkey Disaster Information System (TABĂřS) project developed a database structure and GIS standards for disaster management. These standards were implemented for Istanbul in a project (Bilgi et al., 2008). Hazturk project based on Hazus developed an earthquake loss estimation for Turkey. Various projects more have been triggered, such as meteorological early warning system, seismic risk mitigation, emergency transportation network planning, and disaster information system projects especially focused on earthquake (Korkmaz, 2009). In 2009, the Prime Ministry of Turkey established Disaster and Emergency Management Presidency according to the law N.5902. It aims to coordinate all disaster events under a central administration structure and provincial administrations are responsible for managing disaster events (Gazette of Republic of Turkey, 2009). However, data management and coordination approach have not been determined yet to manage disaster types, actors, and disaster activities (Aydinoglu, et al., 2011; Erden 2012). . .

Additional citations; Bilgi, S., Ipbuker, C., Ucar, D., Sahin, M.: Map Entropy Analysis of Topographic Data Used in Disaster Information Systems. Journal of Earthquake Engineering 12(2), 23-36, 2008. Erden, T.: Disaster and Emergency Management Activities by Geospatial Tools with Special Reference to Turkey. Disaster Advances 5(1),

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29-36, 2012. Erden, T., Karaman, H.: Analysis of earthquake parameters to generate hazard maps by integrating AHP and GIS for Küçükçekmece region. Natural hazards and earth system sciences 12(2), 475-483, 2012. GDGIS: Turkey National GIS Institutional Data Requirement Analysis. Republic of Turkey, Ministry of Environment and Urbanization, General Directorate of GIS, V.1.1, Editor: Yomralioglu T. and Aydinoglu A.C., Ankara, Turkey, 2012-1. Korkmaz, K.A.: Earthquake disaster risk assessment and evaluation for Turkey. Environmental Geology 57(2), 307-320, 2009. Aydinoglu, A.C., Demir, E., Yomralioglu, T.: An Approach to Use Geo-Information Effectively in Disaster & Emergency Management Activities in Turkey. FIG Working Week 2011, Marrakech, Morocco, 2011.

- Then, some explanations were added to different parts of this paper to emphasize why is this study and what is difference. Original conceptual model for integrated disaster management and the method to develop open data model and software tools were explained in detail. And it is the first case of Turkey National GIS (TUCBS) towards GDI vision.

Page 1/ Line 12 (Abstract): . . . This study with an original conceptual approach aims to develop interoperable geographic data model. . .

Page 3 / Line 15: . . . aims to determine an original conceptual model for harmonized and integrated disaster management. According to the conceptual model of disaster type-activity-task-data relations with landslide case, this paper offers a method to develop open/general data specifications based on the requirements of all disaster management activities at different phases and to understand how open data sets can be analysed with open software tools. As the first case of Turkey National GIS (TUCBS) infrastructure following GDI vision, the interoperable data model for disaster management (ADYS) that makes up-to-date exchange of geographic data sets from different sources possible was designed. . ..

Page 5 / Line 7: . . . actors and examining academic research, for landslide, 39 sub-

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activities of 15 activity group were defined at all disaster management phases (Aydinoglu, et al., 2012). As well as landslide hazard and vulnerability analysis studied often at mitigation phase, the activities at preparedness, response, and recovery phases were analysed.

Page 13 / Line 29 (Results): . . . This model, therefore, is a new approach for geographic data interoperability in Turkey.

Page 14/ Line 1 (Results): . . . It is supposed that 39 activities at all disaster management phases of landslide can be managed with this approach and determines a new approach for integrated disaster management of public institutions.

4.What are ADYS and TUCBS? Please clarify.

- In this study, ADYS data model as an open data model was developed and tested for integrated disaster management. ADYS model is interoperable with Turkey National GIS data model that was accepted as base standard but has not implemented yet. What are TUCBS and ADYS explained in detail;

Page 7/ Line 21: Turkey National GIS (TUCBS) base data specifications were designed to enable geographic data interoperability between data providers and users, after General Directorate of GIS was built in 2012. However, TUCBS data models have not put into practice yet and stakeholders have met with problems such as the usability of data models, and data sharing problems, and repetitive data production. Data interoperability is required between sector data models like disaster management and national data models like TUCBS (GDGIS, 2012-1). In this study, The ADYS data model titled as disaster management data model was designed with landslide case according to the data requirement in the activity analysis. As conceptual approach, The ADYS data model is compliant with TUCBS and Urban GIS (KBS) data models. TUCBS base data themes such as Address (AD.Adres), Land Cover (AO.Arazi Örtüsü), Building (BI.Bina), Administrative Unit (IB.Idari Birim), Hydrography (HI.Hidrografya), Geodesy (JD.Jeodezik AltyapÄś), Orthophoto (OR.Ortofoto), Land Registry- Cadastre

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(TK.Tapu- Kadastro), Topography (TO.Topografya), and Transportation (UL.UlaşÄśm) are used as base static data in disaster management activities (GDGIS, 2012-2). It is supposed that data interoperability will be possible at logical level because public institutions accepted TUCBS standards for the exchange of geographic data sets (Figure 2).

5.In the case study, the author use DEM to produce slope and aspect, use TM to produce NDVI and so on, this workflow is very common in landslide research. The authors should write clearly to tell the readers what different things they did.

- Although familiar methods have been used in applications, this article determines a new approach for integrated disaster management of public institutions. Some paragraphs in result was revised to support this explanation;

Page 13 / Line 31: In general, accepted and familiar methods have been determined for each activity because the model was prepared according to analysis results of the activities and background of available projects. It is supposed that 39 activities at all disaster management phases of landslide can be managed with this approach and determines a new approach for integrated disaster management of public institutions.

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