

The relationship between the Nature and the Society: GIS "Disasters"

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The natural and social disasters generate a huge stress in the world community. Most researches searching for the relationships between different catastrophic events consider the limited sets of disasters and do not take into account their size. This fact puts to doubt the completeness and statistical significance of such approach. Thus the next indispensable step is to overpass from narrow subject framework researches of disasters to more complex researches.

In order to study the relationships between the Nature and the Society a database of natural disasters and dreadful social events occurred during the last XXXVI (36) centuries of human history weighted by the magnitude was created and became a core of the GIS «Disasters» (ArcGIS 10.0). By the moment the database includes more than 2500 most socially significant ("strong") catastrophic natural (earthquakes, fires, floods, droughts, climatic anomalies, other natural disasters) as well as social (wars, revolts, genocide, epidemics, fires caused by the human being, other social disasters) events. So far, each event is presented as a point feature located in the center of the struck region in the World Map. If the event affects several countries, it is placed in the approximate center of the affected area. Every event refers to the country or group of countries which are located in a zone of its influence now. The grade J (I, II and III) is specified for each event according to the disaster force assessment scale developed by the authors. The GIS with such a detailed database of disastrous events weighted by the magnitude over a long period of time is compiled for the first time and creates fairly complete and statistically representative basis for studies of the distribution of natural and social disasters and their relationship.

By the moment the statistical analysis of the database performed both for each aggregate (natural disasters and catastrophic social phenomena), and for particular statistically representative types of events led to the following conclusions: natural disasters and dreadful social events have appeared to be closely related to each other despite their apparently different nature. The numbers of events of different magnitude are distributed by logarithmic law: the bigger the event, the less likely it happens. For each type of events and each aggregate the existence of periodicities with periods of 280 ± 60 years was established. The identified properties of cyclicity, grouping and interaction create a basis for modeling essentially unified Geosocial Process at a high enough statistical level and prove the existence of the uniform planetary Geosocial Process. The evidence of interaction between "lifeless" Nature and Society is fundamental and provided a new forecasting approach of demographic crises taking into account both natural disasters and social phenomena. The idea of the interaction of Nature and Society through the disasters «exchange» as a uniform planetary Geosocial Process is an essentially new statement introduced for the first time.

Keywords: geodynamics, society, magnitude of disaster, interaction of disasters, geosocial process

Modeling of Information Flow for Early Warning in Mount Merapi Area, Indonesia

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Indonesia's Mount Merapi is one of the world's most active, dangerous volcanoes. Its 2010 eruption -- the largest following the 20th century -- and succeeding 2011 lahar events killed 389 persons and injured and displaced many more. One way to mitigate a disaster's impact on its potential victims is to provide the public with reliable information through early warning. Warning information must reach down to the community levels. However, little research has been done on the contents of warning information flowing from the monitoring and forecasting institutions to the public. For Merapi's early warning, the routes of information from monitoring and forecasting agencies down to the citizens was studied by Rahardjo in 2007, yet the contents of information itself was not understood. This study reinvestigated Merapi's early warning information flow down to the citizens by conducting interviews among stakeholders to collect the data received and from which stakeholder, data sent and to which stakeholder, and the method of delivery. The sender-data-receiver as the basic unit of information transfer was introduced for the construction of information flow networks. In terms of information flow networks, it was necessary to construct individual networks for eruption and lahar per local government district due to the complexity of structures. Among the districts, inconsistencies in relation to past and current network structures for both disasters and in each district, roles of institutions, decision-making for issuance of evacuation order, and monitoring sources were found. Information transfer redundancies and vulnerabilities such as bottlenecks and decision-making issues were also revealed. These issues could offer a new point of view on early warning information delivery for Merapi's disasters.

Keywords: information, early warning, Merapi, eruption, lahar

The impact of the Great East Japan Earthquake to human society described in haiku
The Great East Japan Earthquake's Impact to Human Society as Described in Haiku

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1.はじめに

2011年3月11日に起きたマグニチュード9.0の大地震は構造物の破壊や生命の損失だけでなく、人間社会に大きな影響を残した。その心理的影響は現在も続いている。気仙沼においては海岸の居住地の壊滅だけでなく、人々の心の支えも失ってしまった。豊かな海と自然と共に生きてきた者にとって、震災、津波は筆舌に尽くし難い深い悲しみと痛みを残した。一年、二年過ぎても深い傷を負ったままの人が多くいる。それでも焼け残った桜が咲いた時、魚市場再開で魚が水揚げされた時、ボランティアや被災者同志が絆を深めた時、被災地では遅々として進め復興に苛立ちながらも、希望を持ち前進していく姿がある。震災復興で、多くの工事が始まり、完成にはまだ長い時間がかかる(写真)。現在の町の活気は、工事に依る人や車の流入により生じている。当然、大きな資金も投入されているが、何時まで続くので有ろう。投入資金は終われば、漁業と観光を中心とした日常生活を続けるのであろう。

俳人はその影響を記録すべく、被災地気仙沼において2012年7月29日に気仙沼海の俳句大会を実施し、国内外から1752句を集めた。また、2013年7月28日には1734句を集めた。多くのボランティアの参加と募金により俳句大会は実施された。ここでは俳句に残された影響について述べる。

2.調査の方法

大会に集まった俳句には、震災によって作られた俳句が多く見られた。俳句は読んだ人により、それが震災の影響であるか否か、判断は別れる。また、俳句に関する知識に依っても理解能力が異なる。そこで、調査の協力が得られた被災地の人、被災地に住まない人に俳句を読ませ、震災俳句の数を数えた。

3.結果

2012年では、被災地からは635句を選んだが、この句に対して、被災地外からは123句を選ばなかった。一方、被災地以外からは600句を選び、この句に対して被災地からは94句を選ばなかった。このことは被災地の人と、それ以外の人では異なった句を多く選んだことを示し、被災地を知るかどうかで異なった結果を示した。また、多くの俳句が一人の人だけに選ばれた。これらは、被災地に対する知識の影響が俳句の選び方に影響していることを示している。2013年では、被災者は370句、被災地外からは432句を選んだ。投句総数は大きな違いがないので、1年で震災俳句が少なくなったと言える。選ばれた俳句は多くは悲惨な出来事の記録であるが、中には鯉の水揚げのように人々がほっとするような俳句も見られた。

4.統計的分析

2012年から2013年にかけての震災俳句の減少は統計的に0.01水準で有意であった。また選ばれた人の数のどのレベルでも有意であった。

5.選ばれた個別の俳句

選句者によって選ばれる句は異なる。しかし10人以上に選ばれた句を震災俳句とする。2012年には109句が、2013年には28句が選ばれた。よってこの調査により、震災俳句が見出されたと言える。

6.結論

6.1震災によって作られたと思われる俳句は2012年には被災者には635句、被災地で無い人により600句が選ばれた。

6.2選句は被災地に関する知識に寄り異なる。

6.3多くの人が震災句と認める俳句が見つかった。

キーワード：haiku、effect of disaster、emotional damage

Keywords: haiku, effect of disaster, emotional damage



Subsidence hazard assessment and mapping around underground space considering the angle of collapse

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As the human activities in underground area increased in order to enhance the land use, the number of ground subsidence occurrences are also escalating. It is observed not only domestically but also globally that the ascending trend in both pecuniary losses and casualties where the ground foundation is unstable. Analyzing and mapping the ground subsidence hazards in advance is one of the most essential process. GIS (Geographical Information System) is powerful tool for quantitative estimation and display of ground subsidence hazards on regional sites. In recent studies, it is popular that conducting statistic approaches on hazard assessments using GIS. The objective of this research is to design the analysis model to assess subsidence hazard adopting the triggering factors within the radius of influence. The radius of influence can be calculated with the spatial analysis algorithm, which is mainly concerned with the angle of collapse, and allocated to each underground cavity. Ground subsidence inventory obtained by Korea Expressway Corporation and Mine Reclamation Corporation are applied to training stage of frequency ratio analysis, which identifies the degree of each triggering factor. The whole analysis stages are designed as a spatial analysis module to automate the whole process. As a result, the ground subsidence hazard map is composed to display the risk level of target site. It is supposed that this analysis can help in decision-making stage for the reinforcement and urban planning.

Keywords: Ground subsidence, Hazard assessment, Hazard mapping, GIS

Microclimatic characteristics of three different urban districts in a context of more frequent and intense heatwaves

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Located in the south-eastern part of France, the territory of the Greater Lyon consists in 59 communes covering an area of 524 square kilometres and housing a population of about 1.3 million. First signs of climate change have taken the form of a rise in average annual and seasonal temperatures and the number of very hot days, indicating that heatwaves can be considered as the main hazard to deal with. If the Greater Lyon has been fully involved for ten years in the national effort for a local reduction of greenhouse gases, the local adaptation policy is still being developed. It is up against several scientific obstacles in particular local climate measurement. To address this issue, this study proposes the first results of a multidisciplinary research at the crossroads between engineering sciences and humanities. It is now well known that characterising heat-related risk needs to identify the spatial components of the urban heat island phenomenon, which may amplify the impacts of coming heatwaves on citizens and urban systems (Romero-Lankao et al., 2012). A first mesoscale approach is currently led covering the whole Greater Lyon using remote-sensing and computer modelling but it does not allow to ensure an in-depth knowledge of the local microclimates.

As a first step to solve this problem, a map of human vulnerabilities has been displayed as an early result from a vulnerability index (Renard et al., 2015). This allowed identifying the most vulnerable urban districts of the Greater Lyon, which generally correspond to high density residential areas with rather different urban morphologies. Three different districts with high vulnerability values have been retained : "Lyon-Terreaux", in the historic old city ; "Lyon-Perrache", an ancient suburb in full renovation and "Rillieux-Semailles" in the residential suburbs.

A characterization of the related microclimate is completing this approach to evaluate the corresponding exposure in these three districts. Microclimatic simulations are currently performed using "SOLENE-microclimat" model, developed by the CRENAU Laboratory from the Nantes School of Architecture (Musy et al., 2015). This model has been chosen because of its capacity to take into account radiative transfers, conduction and storage in walls and soils, airflow and convective exchanges, evapotranspiration from natural surfaces (vegetation, water ponds, humidification systems) and the energy balance. A recent enhancement allows now its coupling with Code-Saturne Computer Fluid Dynamics (CFD) for a more accurate characterisation of local microclimates in terms of surface temperature, air temperature and velocity.

First results and analysis highlight some urban properties that significantly influence the local microclimatic conditions and human comfort, and which are especially challenging for urban planning, in a context of more frequent and intense heatwaves. Effects of urban morphology are especially stressed, while this factor may also be related to social and economic trends.

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Keywords: microclimatic, urban district, urban heat island, heat waves