

## Abstracts of the 25<sup>th</sup> Symposium on Geo-Environments and Geo-Technics, 2015 27 to 28 Nov 2015

Takao NAKAGAWA

### **Concentration and repetition of damage due to earthquake, from examples of Niigata and Nagano Prefectures, central Japan**

In the last several decades, many earthquakes ranging in magnitude from 5 to 6 hit Niigata and Nagano Prefectures of central Japan and caused considerable damage, e.g. destruction of wooden houses, liquefaction of ground and collapse of slopes. In some stricken areas of both prefectures, distribution of the damage was investigated. The results showed that in three areas, the damage was large as compared with their surroundings, and moreover, similar damage also occurred due to the past earthquake. These concentration and repetition of the damage presumably result from the geo-environments such as distribution of active fault and presence of shallow groundwater, and there is a large possibility that the area damages again by the next earthquake. Such area should be described clearly in the hazard map and countermeasures for disaster prevention are indispensable.

Wataru NIREI, Osamu KAZAOKA, Tomoyo HIAYMA, Sachiyo MASHIKO, Hideyo TAKAHATA, Masaaki UZAWA, Kazuya KIMURA, Kunio FURUNO, Shoichi UESUNA, Mitsuo SATO, Shigeari OKETANI, Hideo YOSHINO and Hisashi NIREI

### **Examples leading to the solution for liquefaction-fluidization hazards in Tokyo Bay Area**

Osamu KAZAOKA, Mitsuo SATO, Yoshihisa HORII, Itaru OGITSU, Yutaka SAKAI, Atsushi KAGAWA, Kunio FURUNO, Takashi KUSUDA and Takeshi YOSHIDA

### **Liquefaction-fluidization part and Un-liquefaction-fluidization part in man-made strata on the reclaimed land around Tokyo bay at the 2011 off the Pacific coast of Tohoku Earthquake, central Japan: from relief peel and X-ray CT image on continuous core**

Serious subsidence was happened by liquefaction-fluidization phenomenon on the 2011 off the Pacific coast of Tohoku Earthquake on the reclaimed land around Tokyo bay. Continuous cores were taken on the terrible subsided part, B2 point, and neighbor little subsided part, B1 point, in Inagekaigan district, Mihama-ku, Chiba city. Based on the observation of these cores, lithofacies and liquefaction-fluidization part are compared B1 point with B2 point. Liquefaction-fluidization parts of the sites were recognized by relief peels and X-ray CT image of the continuous cores. The above data show that shelly bed with high permeability did not liquefy and fluidize, and fine-very fine sand beds with coarse silt beds and thin silt beds liquefied and fluidized. That is to say, lateral change of lithofacies on man made strata controls liquefaction-fluidization phenomena.

Itaru OGITSU, Yutaka SAKAI, Akiko KATO, Osamu KAZAOKA, Atsushi KAGAWA, Takeshi YOSHIDA and Shun KAMEYAMA

### **Liquefaction of reclaimed land**

The 2011 Tohoku earthquake liquefied reclaimed land around Tokyo bay. In Mihama ward, Chiba city, the liquefaction area shows NE-SW trending band-shaped distribution. In order to reveal the origin of this distribution, ground motion amplifications and changes of pore water pressure triggered by earthquakes were studied. Two observation stations, where the three seismometers and two piezometers were installed, were built at the liquefied

site (TKS) and the non-liquefied site (MSG) in Mihama ward. The boring data show that the alluvium is two times thicker at TKS than at MSG. The degree of ground motion amplification at TKS is much higher than MSG. On the other hand, the changes of the pore water pressure triggered by the same level of ground motion are comparable for TKS and MSG. From these observations, the distribution of liquefaction area in Mihama ward seems to be reflecting the spatial variation of the degree of ground motion amplification controlled by the subsurface geology.

Ryoichi KOUDA

#### **On the geological usage of high-resolution satellite image**

On the occasion of using high-resolution satellite image which is free in charge and browsable in the internet, it should be an issue that the private and confidential data of geology are shared by others. In this presentation, an example of Vietnamese mining is in consideration.

Kazuho HIROSE, Shinsaku NAKAMURA, Tomomi TAKEDA, Gino Germana GOMEZ, Vladimir RAMIREZ, Josue Mercado FUENTES, Johana SALAZAR and Jose L. Yucra SALAS

#### **Practical satellite data utilization for monitoring artisanal and small-scale gold mining in Peru**

Utilization of satellite data has diversified in recent years because of an increase of technological advances and availability of data with open source/free software. Combination of satellite data and open source software is most promising for monitoring Artisanal and small-scale gold mining (ASGM) which causes serious environmental degradations such as mercury pollution, deforestation and sedimentation. The WebGIS developed of open source software was installed at Tambopata National Reserve office in Madre de Dios, Peru for helping officers to monitor ASGM activity practically and to share own datasets anytime they want.

Yuriko ISHIKAWA

#### **Release of the River Model AIST-SHANEL Ver.3.0**

AIST-SHANEL is a simulation model for estimating spatial and temporal distribution of chemical concentrations over most of river basins in Japan for risk assessment using the data of emission, climatic, geographical, sewage and industrial statistics in river systems included in the model. The new version of the AIST-SHANEL, Ver.3.0, has just been released via the website. The model has been improved with a spatial resolution of 250 m grid square and a temporal resolution of one day, which enables us to estimate chemical concentration affected by an accident in terms of environmental impact assessment. This model will give us much useful information on aquatic risk assessment and watershed management in Japan.

Takashi SUZUKI

#### **Depth variation of diatom assemblages in surface sediments off estuary of Echi River, Lake Biwa**

We investigated the diatom assemblages in 15 surface sediment samples from the lake bottom between 5m depth and 30m depth off estuary of Echi River, Lake Biwa.

The number of valves and frequency in surface diatom assemblages indicates that they characterized by depth variation. In particular, the number of valves is characterized by remarkable increasing between 20m depth and 25m depth. And Frequency of each species is characterized by remarkable decreasing of benthic diatoms between 10m depth and 20m depth.

We expect that more detailed investigation of the relationship between diatom assemblage and lake depth will

contribute reconstructing of freshwater paleoenvironments.

Yoshio INOUCHI, Keisuke OHTSUKA, Yasuhumi SATOGUCHI, Hiroki HAGA and Ryouma HAYASHI

#### **Lake -level changes of Lake Biwa, Japan, during the last 45 kyrs**

Lake-level history is regarded as one of the most important indices of water budget of each area. Reconstruction of lake-level change history of Lake Biwa during the last 45 kilo years has been clarified based on the transfer function of sand content and water depth of surface sediment. Depths of reflectors in acoustic record coincide well with those of abrupt sand content decreasing horizon. Several horizons of cyclic change in sand content profile can be observed which start and end at high sand content and show low sand content at the middle. Sand contents are lowest at the beginning of so-called Heinrich events. This means that lake level is high at warm stages and low at cold stages. Levels of archaeological sites during the last 10 kilo years around Lake Biwa confirm this hypothesis.

Kunio FURUNO, Atsushi KAGAWA, Osamu KAZAOKA, Takashi KUSUDA and Hisashi NIREI

#### **Groundwater basin management based on monitoring wells –Kanto Groundwater Basin, Central Japan-**

Over 40 million people live on and exploit the groundwater resources of the Kanto Plain. The Plain encompasses metropolitan Tokyo and much of Chiba Prefecture. Useable groundwater extends to the base of the Kanto Plain, some 2,500 to 3,000 m below sea level. Much of the Kanto Plain is at sea level. By the early 1970's, with increasing urbanization and industrial expansion, local overdraft of groundwater resources caused major ground subsidence and damage to commercial and residential structures as well as to local and regional infrastructure. Parts of the lowlands around Tokyo subsided to 4.0 m below sea level; particularly affected were the suburbs of Funabashi and Gyotoku in western Chiba. In the southern Kanto Plain, regulations, mainly by local government and later by regional agencies, led to installation of about 500 monitoring wells and almost 5000 bench marks by the 1990's. The monitoring systems are costly, but the resulting data provide continuous measurement of the "health" of the Kanto Groundwater Basin, and thus permit sustainable use of the groundwater resource.

Hisashi YABUSAKI, Osamu KAZAOKA and Atsushi KAGAWA

#### **An estimation of land subsidence and areas below sea level in 2100 at Kujukuri Plain**

A land subsidence in Kujukuri Plain make progress with a rate of about 2 cm/year at the present time. It indicates that the subsidence in this area approaches up to 2 m in 2100. We calculated the accumulation of the subsidence and estimated areas below sea level in 2100 of Shirako Town and the surrounding area, a part of Kujukuri Plain. In consequence, it revealed that the subsidence might cause a massive expansion of areas below sea level in every situation, such as sea level rise by global warming, high tide, storm surge and tsunami.

Atsushi KAGAWA and Kunio FURUNO

#### **Groundwater level monitoring in Chiba prefecture, 2014**

In 1960' to 1970', industrial plants that expanded into Tokyo Bay area pumped up a large quantity of groundwater. In the results, many artesian wells stopped discharge and heavy land subsidence problem occurred. Many local governments regulated groundwater pumpage, and surface water source supplied for industry. Thus,

groundwater level rebounded rapidly and many artesian wells revived. Groundwater in the lower aquifer has now stabilized to near historic level. Nevertheless, groundwater pumping requires constant monitoring for sustained use.

Takeshi YOSHIDA, Osamu KAZAOKA, Minoru FUJIGASAKI, Masaharu SAKAMOTO, Kohsuke NAGANEYAMA and Hisashi NIREI

### **Hydrogeology units and groundwater flow in northern west part of Chiba, central Japan**

We interpreted some hydrogeologic units in the northern west part of Chiba, central Japan.

The aim of this paper is to connect groundwater flow of Narashino and Yachiyo city. As a result of the connection, groundwater flow direction is to the northeast in first aquifer of northern part of study area. In its southern part of study area, the direction is to the south.

Osamu KAZAOKA, Takeshi YOSHIDA, Itaru OGITSU, Atsushi KAGAWA, Minoru FUJIGASAKI, Kunio FURUNO, Yutaka SAKAI and Hisashi NIREI

### **Groundwater Recharge Pass in aquiclude, Fresh water mud: example on the Shimousa upland, northern Boso peninsula, central Japan**

Shimousa upland, northern part of Boso peninsula, is composed of the upper Pleistocene shallow marine sand strata (Kioroshi Formation), fluvio-lacustrine sand and mud strata (Joso Formation) and weathered ash strata (Kanto loam Formation), in ascending order.

The rainfall sinks into the Kanto loam layer and, through the Joso clay member in the Joso Formation, flows to the lower sand layer. Joso clay member deposited in shallow lake.

It became clear that there was a tube pore of up to 5mm in diameter in Joso clay member by the X-ray CT image of continuous cores of the Joso clay member. This means that the shallow lake mud strata may not have difficulty permeability. It is important for the prevention to the geopotential that distribution of aquitard mud strata is grasped.

Hisashi NIREI, Jonas SATKUNAS, Osamu KAZAOKA, Muneki MITAMURA, Takayuki KAWAB and Kunio FURUNO

### **On man-made strata and the Jinji Unconformity**

At a small evening meeting, "Urban Geology Countrywide Meeting of the Geological Society of Japan," part of its Annual Meeting in Toyama 25 years ago, the need for a geological term for the boundary between natural strata and man-made strata (the 'Jinji Unconformity,') and its importance was stressed; however, no agreement between the participants, who included the authors of this paper, was achieved. As a result, the concept was shelved and gained no recognition in Japan.

Harmful geopotential pollutants accumulate on the Jinji Unconformity below the surface of the land. The nature of harmful chemical substances is also different between man-made strata and natural strata. The Geopotential Mechanism, however, requires clear definition. During the Great East Japan Earthquake, in March 2011, most liquefaction-fluidization and Jinami phenomena were found to occur in man-made strata on the Unconformity. These results have led to the importance of this concept being acknowledged outside Japan.

As civilization advances, the prevalence of the Unconformity and man-made strata on Earth is accelerating. As a result, progress of research into Anthropogenic deposits is urgently needed to be able to mitigate geo-pollution

and geological disasters.

In this paper, we propose scientific terms for Anthropogenic sediments to assist research into them.

Kazuya KIMURA, Hisahi NIREI, Kunio FURUNO, Tomoyo HIYAMA and Shoichi UESUNA

**Radioactive measurement and collective sampling by Geostartigraphical Unit Investigation Method on Jinji Unconformity**

The Great East Japan Earthquake happened on March 11, 2011. After that, Fukushima Daiichi Nuclear Power Plant Disaster occurred as a second accident. In a result, radioactive material (mainly Cesium-137 and Cesium-134) was emitted into the atmosphere. And it brought on emissive geo-pollution in each place.

In the current study, we researched one field site that has been contaminated with radiological matter. In concrete terms, we collected a sampling in according with geostartigraphical unit, and measured radioactivity concentration. As a result, we found out that “Geo-Stratigraphical Unit Investigation Method” is very efficient in the case.

Kazuya KIMURA, Hisahi NIREI, Kunio FURUNO, Tomoyo HIYAMA and Takeshi YOSHIDA

**Air dose rate that should be the standard of decontamination evaluation.**

Fukushima Daiichi Nuclear Power Plant Disaster caused radioactive geo pollution in the east japan. The environment ministry work decontamination by various methods to this problem. For example, peel away topsoil, by cleansing high-pressure water, removal of deposition, etc. And an evaluation of decontamination is judged only the air dose before the decontamination and the air dose after the decontamination. However, that seems like insufficiency. Because they are not consideration that radioactive may be redeposition.

In fact, there is a result as radioactive redeposition by our research. So, when the decontamination takes place, we need to think the background of the place.

Eri HONDA, Osamu KAZAOKA, Minoru FUJIGASAKI, Kohsuke NAGANEYAMA, Takeshi YOSHIDA, Ayako WATANABE, Jyunpei NAKAMARU, Hiroki TEZUKA, Yoshiyuki TAMURA and Shojiro MUKAI

**Recharge mechanism and oxidation-reduction condition of groundwater aquifer on Shimousa upland by in situ groundwater quality measuring in monitoring wells on each aquifer, northern Yachiyo city, Boso peninsula, southeast Japan**

It is important to find out mechanisms of the groundwater recharge and the groundwater flow for conservation of the water resources. In this study, we investigated the vertical distributions of groundwater quality with pH, Do, EC and ORP by portable submerged water quality sensor on a groundwater monitoring site in Yachiyo city, central Shimousa upland.

Haruka NOJO, Shinji TAKEUCHI and Hiroshi TAKASHIMA

**Volatile Organic Compounds Migration in Aquifer**

We analyzed time dependence of concentration (molarity) of Tetrachloroethilen (TCE) and 1,1-dichloroethylen (1,1.DCE), cis 1,2-dichloroethylene (c1,2.DCE) and vinyl chloride monomer (VCM) taken from three aquifer systems in the 11 boreholes drilled along the groundwater flow from 2005 to 2013. Data are plotted at early (2005), middle (2008) and late time (2013), respectively. The result suggests that concentration of each material and its distribution with time and space along the borehole can be explained that the 1,1.DCE,

c1.2.DCE and VCM are disassembly product of TCE.

Takao NAKAGAWA

**Pneumoconiosis recorded in 1840 at Aikawa Mine of Sado Island, central Japan - Part 2: Countermeasure to and treatment of the disease –**

Many gold mines were worked in Sado Island belonging to Niigata Prefecture, situated in the eastern margin of the Sea of Japan, and the Aikawa Mine (Sado Mine) is most famous within them. Toshiakira Kawaji, a "Sado Bugyo" (magistrate of the island) in the Edo era (from 1603 to 1867), recorded serious health damage of "Daiku" (miners) of this mine in his diary, "Shimane no Susami" (amusement in the island), written during 1840. The damage was due to pneumoconiosis (silicosis), and most of the miners died within five years from three years and nobody exceeded 40 years old. Countermeasure to and treatment of the disease at the mine is investigated on the basis of historical documents. In spite of such wretched situation, positive countermeasures such as use of dust mask and relief for the miners who got sick were hardly taken, and it can be stated that these were considerably backward compared with some mines of the same period. Moreover, a medicine named "Shikintan" (medicine mixed gold) was prescribed for the patients. However, the effect was presumably limited and there is a large possibility that it ended in symptomatic treatment.

Takeshi KOMAI, Kengo NAKAMURA, Kenzo OOKA, Noboru NARISAWA and Keizo NAKAMURA

**Statistical analysis and geochemical features of arsenic contaminated groundwater in lowland Terai, Nepal**

A series of field survey of groundwater contamination by arsenic in lowland Terai Nepal was carried out to make clear the correlation between the arsenic elution behavior and geological conditions. In the survey, samples of groundwater, sediments and soils were collected by the conventional excavation of wells. The results of site monitoring and chemical analysis of sediments and groundwater samples showed that high concentration of arsenic compounds was mainly observed around the second aquifer and the situation was due to the anaerobic features caused by geochemical and biological conditions. We have conducted a scientific approach of data driven statistical analysis on the geochemical features and behaviors of groundwater and sediments. As a result, it was found some dominant factors and mechanisms play the important role for controlling the elution processes of arsenic into aquifers.

Yoshihiro TAKASHINA

**Characteristic of the heavy metals exists on the epidermis of trees suffered from the war damage**

The trees suffered from the war damage are well preserved in various places around Tokyo Prefecture. Some of them have become black by fire that occurs during the great Tokyo air raid. In generally, it is considered that many substances were diffused by that fire. Especially, it was pointed out that these substances contain lead and these lead has remained in soil in present. For this reason, the great Tokyo air raid has been incriminated as the cause of lead-pollution of land that caused of pollution is unclear in Tokyo Prefecture. The purpose of this study is to clarify the diffusion phenomenon of lead by fire of the great Tokyo air raid. If lead has ware diffused by that fire, these lead has remained on the surface of the carbonized parts of trees suffered from the war damage. The adhered substances on surface of the carbonized parts of these trees collected from four shrines around Tokyo Prefecture. Concentration and isotope ratio of lead were measured by Inductively Coupled Plasma Mass

Spectrometry (ICP-MS). The high concentration detected from the tree of Fuji Shrine. The isotope ratio of this lead similar to that of soil collected from the lead-polluted lands in which the cause of pollution is unknown. This result suggests the fire occurs during the great Tokyo air raid diffused lead and the lead that diffused by fire will be the substance of causing of lead-polluted land in which the cause of pollution is unknown.

Atsuko FUKUYAMA, Teruo HORI, Susumu YONEZAWA, Masayuki OKUNO, Eiichiro KINOSHITA and Kazuhisa HASEGAWA

#### **The adsorption experiment to a shellfish fossil on the cadmium - Cadmium suppressant effect to a plant with the material –**

In the issue of cadmium pollution there had food pollution by the cadmium absorption by the groundwater contamination of mineral dig ruins. In Japan, the food-containing standard value is determined by the food hygiene law. And it is said that the cadmium standard values in rice are less than 0.4ppm. The component standard value of cadmium was established in the international standard in Codex Alimentarius Commission in July, 2006. Since Japan has much acid soil and minerals are easy to be ionized, we must therefore deal it as an important problem. There is a method to add alkali material to raise pH as one of the measures. In our examination, we calculated cadmium equilibrium adsorption quantity by a cadmium adsorption examination using two kinds of shellfish fossils and dyeing grime diatomaceous earth burning slag and publish the result as our report.

Tsutomu SATO

#### **Importance of geochemical modeling in management of hazardous inorganic anions**

Behavior of dissolved anionic chemical species in the natural environment has proved to be the most important factor in determining their toxicity and their accumulation in minerals that comprises rocks and soils. However, the behavior has been one of mysterious issue because anions have a large variety of dissolved species. In this context, this paper presents a review of the chemical speciation of hazardous inorganic anions in groundwater. It is one of main objectives of the manuscript to depict and understand anion mobility at different pH and redox conditions in the natural geochemical environment. A substantial part focuses on adsorptive behavior of the anions onto hydrous ferric oxide as the representative adsorbent in the natural environment. Surface complexation modeling is powerful to understand adsorption behavior of target anions on mineral surfaces in different chemistry of groundwater with other competitive anions. In understanding of chemical speciation and adsorption behavior of anions, geochemical modeling is unambiguously necessary for the understanding in complex natural system.

Yurie OZAKI, Paul Clarence FRANCISCO, Tsutomu SATO and Tsubasa OTAKE

#### **Uptake of Se on Si-bearing ferrihydrite at alkaline condition**

Adsorption and co-precipitation experiments of Se (VI) and Se (IV) with ferrihydrite (Fh: hydrous ferric hydroxide) and Si-bearing Fh (Si-Fh) at alkaline condition and geochemical reaction modeling were conducted to understand the effect of silica on uptake mechanism of Se by Fh. From the findings were obtained; 1) little Se (VI) and around 50% and 40% of Se (IV) can adsorb on Fh and Si-Fh in the present experimental condition, respectively, 2) 90-95% of Se (IV) can sorb in Fh coprecipitation process (much more than in adsorption process) without Si in the present experimental condition, 3) dissolved Si interferes uptake of Se by Fh in the both adsorption and co-precipitation processes due to decreasing of adsorption sites and site occupancy of Se (IV).

Hisahi NIREI and Kazuya KIMURA

### **The validation of technique that heavy metal removal and safety disposal of burned ash**

In Edo Period, Japan was the primary society of the resource recycles. But, after high economic growth period, it changed to massive production, heavy consumption and mass disposal. Accordingly, they have increased incineration filling in land. In the result, waste disposal problems and garbage issues occurred. Environment ministry and elsewhere took a measure, for example, Wastes Disposal and Public Cleansing Act and Act for Promotion of Use of Recycled Resources. However, there are still many problems. In particular, there are no ends of environmental pollutions by final disposal places.

In this paper, we will introduce the technique of heavy metal removal and safety disposal of burned ash. This technique was established by Tanimoto and Yanagimoto (2007). We wish that this technology will become some help the solution of these problems.

Shoichi UESUNA and Nobuyuki AIKAWA

### **A new method for assessing insolubilization treatment of incinerated ash by using insolubilizing agents**

On March 7, 2008 Japan's Geo-Environmental Protection Center proposed a leaching test (GEPC-TS-02-S1, S2) to assess the stability of soil polluted by heavy metals and other pollutants and then insolubilized. This test uses sulfuric acid or hydrated lime to comparatively assess leaching behaviors in response to changes in soil pH. However, the test results can be compared with neither the soil leaching standards nor the soil content standards. Therefore, this test cannot assess or ensure the long-term stability of insolubilized soil.

From this perspective, the Geo-Pollution Control Agency of Japan has proposed new leaching tests for assessing the stability of insolubilized soil more accurately. The new tests use a mixed solution of sulfuric and nitric acids, because the mixed solution is more similar in composition than conventional solutions to acid rain. Acid rain has been reported to contain sulfuric and nitric acid in a wide range of proportions. We used an average ratio obtained from an analysis of these reports, namely a mass ratio of  $\text{SO}_4^{2-}$  to  $\text{NO}_3^-$  of 2 to 1.

We propose a new assessment method consisting of the following three kinds of tests, all of which use a mixed solution of sulfuric and nitric acids. The first is an accelerating test that predicts and assesses changes in a weakly acidic environment from the results obtained in a strongly acidic environment. Assuming that the pH of rain is constant for 100 or 500 years and that annual precipitation is also constant (2000 mm), the amount of acid that is considered to affect waste materials disposed of in final disposal sites and backfilled insolubilized soil over 100 or 500 years is calculated on the basis of acid rain at pH 4.0. By using a solution containing the same amount of acid obtained by the calculation (100 years: pH 2.8; 500 years: pH 2.1), the leaching test can be performed over a short period of time. The other two tests are a test similar to the two-step batch leaching test proposed by the European Union and a wet and dry repeated leaching test (5 repetitions) using a weakly acidic solution similar to acid rain.

Hiroshi TAKASHIMA

### **Re-examination of groundwater protection bill**

Water circulation basic law is enforced on July 1, 2014 and a water circulation master plan was approved in a Cabinet meeting on July 10, 2015. At the same time, groundwater protection bill was considered by federation

of bipartisan member of the Diet league. However, large quantities of opinions were given for this bill by each ministries and government offices. As a result, this bill was not introduced to the Diet. The groundwater was defined as the existing water below the surface of the earth by this bill. It became the contents which handled all groundwater in equivalence. However, it is difficult to divide and prescribe water of the various forms. In this paper, it was pointed out that the target of the law should be made the geology, not groundwater.

Ritsuko SUGITA

#### **Application of organic matter and DNA analyses to forensic geology**

Soil is important evidence, which can indicate connection among the victim, the criminal, the scene and objects involved a crime. Organic matter and DNA in soil are expected to be useful indicators to discriminate and provide useful information about the environment of the source. This report reviews newly developed and introduced techniques and concepts on these substances with future perspectives.

Fumihiko AZUMA, Satoshi MURAO and Shinji YAMAMOTO

#### **Points of dispute in the court trial on the responsibility of scientists for the earthquake disaster at L'Aquila, Italy**

On April 6, 2009, an earthquake with magnitude 6.3 hit the town of L'Aquila in Italy and more than three hundred people were killed or injured. In response to this incident, a municipal agency and *La Commissione Nazionale per la Previsione e la Prevenzione dei Grandi Rischi* were accused for the responsibility, and the case was brought to the court. This short report describes the particulars regarding this disaster and argument to base the further discussion on the social responsibility of scientists.

Satoshi MURAO, Baatar TUMENBAYAR, Jambaldorj URAMGAA and Sainbileg MINJIN

#### **Present status of ethical gold production in Mongolia**

The Mongolian NGO "XAMODX" has joined the existing "Fairmined" certified organizations. They produce gold without using mercury and cyanide. On the way to certification, a Swiss funded project supported XAMODX with organizational capacity strengthening, safety and environmental training, and mining site management. However our interview with the Head of XAMODX revealed that the fair-trade system has not yet been finalized although miners are willing to thrust their movement.

Kazuo NAKASHIMA, Satoshi MURAO and Yuya IZUMINO

#### **Characterization of Mongolian gold ore and tailings - Towards ethical gold production -**

Gold-bearing quartz veins, alteration material along the gold ore and soil were studied with X-ray diffraction method. The result indicated that the ore and alteration zone do not contain much chlorite while soil contains more montmorillonite. Both alteration material and tailings contains more sericite than soil. This fact suggests the importance of surface adsorption of mercury to clay minerals when mercury control plan is envisaged.

Ari NAKANO, Satoshi MURAO and Tai ODAKA

#### **Questioning the "Sustainable Development" of transitional economy - A case of mineral development in Vietnam -**

The authors have focused on the governance issues of bauxite mining and alumina production in the south-

central highlands of Vietnam, initiated in 2008 by a Vietnamese mineral enterprise and Chinese aluminum enterprise. In previous decades, the Socialist Republic of Vietnam shifted from state-run economy to market economy, and its communist government advocates “industrialization and modernization” and “sustainable development” at the same time. However, the authors found out the gap between the policy and practice through field researches in the bauxite mining areas in 2012 and 2014. Moreover, in the growing tensions between Vietnam and China in these few years, urban intellectuals critical of the projects have paid more attention to the issues arising from Chinese contract, while the natural environment and health of local residents have been taken very little interest. This paper reports the recent development of bauxite mining and alumina production in the two project sites in the south-central highlands of Vietnam in order to consider the meaning of “sustainable development” for the transitional economy under one party dictatorship.

Niichi NISHIWAKI

### **Social, scientific and ethical responsibility in the course of geosciences information processing**

Geoethics is now recognized in the geosciences community as an interdisciplinary field between Geosciences and Ethics, dealing with the way of human thinking and acting in relation to the significance of the Earth. Deontology is generally accepted in Europe as a main ethical decision-making approaches for the whole area of human activity. Deontological guidelines and codes have been discussed for various fields, and several deontological codes for geosciences were proposed and approved in recent years. Geoscientists have not only scientific but also legal, social and ethical responsibility for their activities. It is unavoidable for any geoscientist to fail his research caused by various errors, and the type and level of his responsibility differs based on the factor of his error. It is unrealistic to force ethical elements by legal systems. Codes, guidelines, and/or recommendations on Geoethics may be effective until Geoethics was fully permeated through the human society. Duty and responsibility of geoscientists on natural hazards are also discussed, including elements to be considered.

Tai ODAKA

### **Sino-Vietnam relationship and South China Sea – Focusing on the mineral development issues**

This short note presents how Vietnam corresponds to territorial dispute with P. R. China in South China Sea, especially within the U-shaped line. Although P. R. China is an ally to Vietnam based on the communism, its recent actions in the South China Sea do not allow Vietnam to stand still. It is a challenge for Vietnam to take balance between the contest and conciliation.