Japan Geoscience Union Meeting 2012
(May 20-25 2012 at Makuhari, Chiba, Japan)

SSS36-01 Room:303 Time:May 21 15:45-16:00

Change in seismicity rate around major active faults due to the 2011 off the Pacific coast of Tohoku Earthquake

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Significant changes in seismicity rate are observed around major late Quaternary active fault zones in Tohoku and Central Japan due to the 2011 off the Pacific coast of Tohoku Earthquake with a magnitude (M) of 9.0 on the Japan Meteorological Agency scale (MJMA). Changes in seismicity around fault zones in Central Japan are basically well explained by the static changes in the Coulomb Failure Function (dCFF) due to the mainshock. However, increases in seismicity rate around some fault zones (e.g., thrust fault zones in Tohoku region) are inconsistent with dCFF imparted by the giant earthquake and calculated on the major fault zones. In these regions, changes in both hypocentral locations and focal mechanisms are observed. This implies that the stress field in the crust is originally heterogeneous in space.

Occurrences of large earthquakes concentrate on a time interval, several years before and 10 years after an occurrence of a large (giant) interplate earthquake along the Japan Trench (Shimazaki, 1978). For example, Rikuu earthquake (M 7.2) occurred two and half months after the 1896 Meiji Sanriku earthquake. Swarm activity was observed in the Rikuu earthquake source region after the Meiji Sanriku earthquake (Imamura, 1913). It is important to examine changes in seismicity rate in order to infer an effect on large earthquakes occurring on major fault zones.

In this study, we investigated changes in seismicity rate around about 100 major active fault zones, which are selected by the Headquarters for Earthquake Research Promotion, by extracting earthquakes which occurred within 5-km distance from a fault plane from March 11, 2010 to November 11, 2011, and calculating changes in seismicity rate. We also examined the consistency with dCFF due to the mainshock and afterslip (Earthquake Research Committee, 2011). We used the unified JMA catalog from March 11, 2010 to February 28, 2011 and PDE catalog provided by JMA from March 1, 2011 to November 11, 2011.

Seismicity rate increased more than 10 times for 11 fault zones (i.e., the Sakai Toge/Kamiya (Main), Kita-Izu, Mahiru-Sanchi Toen, Nagamachi-Rifusen, Yokote-Bonchi Toen, Nagai-Bonchi Seien, Takada-Heiya Toen, Tokamachi (West), Muika-machi (South), Inohana fault zones, and Gofukuji fault).

Among these, The Sakai Toge/Kamiya (Main), Kita-Izu fault zones, and Gofukuji fault are consistent with the increases in dCFF. However, increases in seismicity rate are inconsistent with dCFF calculated for the Mahiru-Sanchi Toen, Yokote-Bonchi Toen, and Inohana fault zones. The dCFF are small for the Inohana fault zone. For the Mahiru-Sanchi Toen and Yokote-Bonchi Toen fault zones, seismicity rates increased regardless of decreases in dCFF. Focal mechanisms of earthquakes which occurred after the mainshock are dominantly strike-slip even though the thrust-type is dominant before the mainshock. The distribution is complementary with the distribution of earthquakes which occurred before the mainshock. Thrust type of earthquakes in Tohoku region such as the aftershock area of the 2008 Iwate-Miyagi earthquake (MJMA 7.2) drastically decreased after March 11, and this is well explained by the extension in the E-W direction due to the mainshock.

The increases in seismicity rate for the other fault zones are apparent. Swarm activities have been observed after the mainshock near the Nagamachi-Rifusen and Nagai-Bonchi Seien fault zones. Changes in seismicity rate around the Tokamachi, Muikamachi, and Takada-Heiya Toen fault zones are contaminated by the occurrence of the MJMA 6.7 earthquake on March 12.

It is reported that the increases in seismicity rate by dynamic stress changes due to the passage of seismic waves. Other factors such as pore pressure changes due to the fluid migration will also change seismicity rate. Declustered catalog may be more appropriate in order to estimate the change in background seismicity rate.

Keywords: The 2011 off the Pacific coast of Tohoku Earthquake, Change in seismicity, major late Quaternary active faults, static changes in the Coulomb Failure Function

Japan Geoscience Union Meeting 2012
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SSS36-02 Room:303 Time:May 21 16:00-16:15

The modified ETAS analysis on earthquake swarms induced by the Tohoku earthquake

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The ETAS model provides a good estimate of earthquake intensity when the underlying mechanism is uniform, or stationary. Any diversions of it from the data hence imply seismicity anomalies involved temporally into the focal region. Activation and quiescence caused by stress changes from outside are one of such anomalies. Relatively long-lasting changes can be treated by the ETAS model with one or a few change-points; in which framework all or part of ETAS parameters are estimated separately and independently across those change-points. This method, however, has troubles when changes occur gradually over time or kicks in for a short period of time, or appears repeatedly. For such cases, alongside the change-point framework, we consider the following more flexible form of misfit functions q(t)'s which estimate the misfits of the ETAS model from data.

We here adopt two forms of misfit functions. Both of them are to be estimated as the best modifications of the ETAS model to data, evaluated at each occurrence time of event. Because of this large parameterized nature, we use the Bayesian smoothing method to estimate them. The first misfit function modifies the overall reference ETAS intensity itself;

lambda'(t)=lambda(t)∗q(t). (model1)

Any large diversions of q(t) from unity reveals misfit of the ETAS model and hence suggests anomalies in seismicity. The second misfit function re-estimate the background component of the ETAS intensity: mu, which is originally constant, as a time-varying function mu(t) in the form

mu'(t)=mu∗q(t), (model2)

so that the estimated function let us follow the change in the background seismicity which is most susceptible to certain causes among the ETAS parameters. We check the characteristics of these functions with simulated data first, then applied them to some of inland earthquake clusters triggered by the Tohoku Earthquake as well as the data sets with swarm events, to which the normal ETAS model poorly fits. The data sets include earthquakes on Nagano-Niigata prefecture boundary (M6.7), eastern Shizuoka (M6.4), Fukushima Hamadori (M7.0) and swarm events in north-west of Lake Inawashiro.

Keywords: Touhoku earthquake, ETAS model, swarm, Bayesian smoothing, misfit

Japan Geoscience Union Meeting 2012
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SSS36-03 Room:303 Time:May 21 16:15-16:30

Normal-faulting seismic sequences in Ibaraki and Fukushima Prefectures triggered by the Mw9.0 Tohoku-oki Earthquake

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The 2011 M9.0 Tohoku-Oki Earthquake triggered widespread seismicity throughout the Japanese island arc including Hokkaido and Kyushu regions. In particular, a significant increase in the shallow seismicity was observed in the minutes following the main-shock along the Pacific coast of NE Japan, notably the northern part of Ibaraki Prefecture and the southern part of Fukushima Prefecture. The most striking feature of the induced seismicity is that the focal mechanisms reveal normal faulting with a T-axis orientated in a roughly E-W direction. Several large magnitude events including the maximum 7.0 earthquake have occurred during the sequence. It is very important to understand why such intensive earthquake swarm activity associated with large mag-nitude events was triggered therein.

We have, therefore, conducted a series of temporary seismic observations through a dense deployment of about 60 portable stations after outbreak of the intensive seismic swarm. We manually picked P- and S-wave arrival times of earthquakes using waveforms retrieved from the dense seismic network. We determined high-resolution three dimensional velocity structures ap-plying the double-difference tomography method [Zhang and Thurber, 2003] to the datasets.

At the northern part of the Ibaraki prefecture, depth-sections of hypocenters show an earthquake alignment dipping westwards at 40 to 50-degree at depths shallower than 10 km. On the other hand, hypocenters at the south-east part of the Fukushima pre-fecture show diffused pattern, consisting of many small seismic clusters. Most of hypocenters appear to be located along velocity boundaries between high- and low- velocity bodies. Note that a low velocity body is clearly imaged beneath the hypocenter of the largest M7.0 event (2011/04/11) in this seismic sequence.

Keywords: triggered seismicity, velocity structure, earthquake

Japan Geoscience Union Meeting 2012
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SSS36-04 Room:303 Time:May 21 16:30-16:45

Characters of induced earthquakes with normal faulting in southern Abukuma based on a temporal aftershock observation

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[1]CRIEPI

A lot of inland earthquakes with normal faulting were induced to southern Abukuma region by the 2011 off the Pacific coast of Tohoku Earthquake (Mw9.0). We carried out temporary seismic observation in the region to examine the characteristics of induced earthquakes with normal faulting. As results of tomographic inversion analysis, high P-wave velocity anomaly corresponds well with the surface distribution of the metamorphic rocks, whereas low velocity predominates in the granitic rocks. The hypocenters distribute mainly in the low velocity zone, therefore the occurrence of the induced earthquakes may be controlled by the geological structure. Extreme high seismicity is observed in the western side of Itozawa fault, along which surface rupture appeared at the earthquake (M7.0) on April 11th, in contrast with low seismicity in the eastern side. The dip of the seismicity boundary is nearly vertical at shallow depth than 10 km, changing to 60W at the deeper depth. On the contrast low angle (35 SW) seismic plane dips in the western part of the Yunodake fault. Therefore the deeper part of the Itozawa fault and the Yunodake is possible to convergent. Focal mechanisms suggest that normal faulting is dominant in Abukuma area, while the direction of T-axes is variable. The fact suggests that the principal stress sigma-2 is nearly equal to sigma-3, and both orientations are horizontal. The induced earthquakes may be occurred at the existing weak plane which is perpendicular to the local orientation of sigma-3.

Keywords: The 2011 Tohoku-Oki earthquake, Induced earthquake, Normal fault, Aftershock observation, Crustal structure

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SSS36-05 Room:303 Time:May 21 16:45-17:00

Fault length and the past millennium activity of the Fujigawa-kako Fault Zone

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The Fujikawa-kako fault zone, striking NNW-SSE, is located in the western side of the Mountain Fuji. This fault zone is the inland extension of the Nankai Trough, and is considered as a source fault of the Tokai large earthquake which has been altered for more than three decades in central Japan. To understand the seismic potentials for the Fujikawa-kako Fault Zone, quantitative assessment of recent activity is vital.

Previous studies reported that the Fujikawa-kako fault zone is about ˜26 km and the most recent seismic event may occurred before 1,500 years based on the drilling and trench data without direct fault evidence (Yamasaki et al., 2002; The Headquarters for Earthquake Research Promotion, 2010). However, our group has reported that the total length of the fault zone is up to ˜35 km and the most recent seismic faulting event may occur in the recent 1,500 years based on field investigations, trench excavations, and radio carbon dating ages which were carried out during the past decade.

In this study, geological and geomorphological investigations are conducted to identify the tectonic topography and characterize the recent faulting activity of the northern segment of the fault zone. Based on the interpretation of aerial photos and 3D perspective views analyzed using Digital Elevation Model (DEM) data, and field investigations, we have obtained following new findings: 1) distinct fault scarps are recognized in the northern area from Shibakawa to the Omuro volcano; ii) the total fault length is up to 36 km; iii) the AD 896 Jogan lava flow was displaced 2-4 m in vertical along the fault scarp. Trench excavations and fault outcrops, volcanic ash sequence analysis as well 14C dating results also show that the recent seismic faulting event probably occurred in the past millennium. Based on the historical records, it is inferred that the latest fault event occurred along the Fujikawa fault zone is related to one of the three large earthquakes of ˜M8: AD 1096 Eichou, AD 1707 Houei, and AD 1854 Ansei Tokai earthquakes, which all occurred in the Tokai region around the study area. In this presentation, we will report our recent results including field investigations and dating ages and discuss the fault length and recent activity of large earthquakes.

References cited:

1) Yamasaki, H. et al. (2002), Off-fault Paleoseismology in Japan: with special reference to the Fujikawa-kako fault zone, central Japan. Geographical report of Tokyo Metropolitan University. 37, 1-14.

2) The Headquarters for Earthquake Research Promotion (2010). Re-evaluation of the Fujikawa-kako fault zone. 54p.

Keywords: Fujigawa-kako Fault Zone, Tokai Earthquake, Jougan lava, Eichou Earthquake, Ansei-Tokai Earthquake, Hoei Earthquake

Japan Geoscience Union Meeting 2012
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SSS36-P01 Room:Convention Hall Time:May 21 18:00-19:00

Active fault earthquakes triggered by mega thrust earthquakes on plate boundaries

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Crustal movement and seismic waves caused by the 2011 off the Pacific Coast of Tohoku Earthquake (Tohoku Earthquake) effects on the generation the inland active fault earthquakes. For example, earthquakes on Nagano-Niigata prefecture boundary (M6.7), eastern Shizuoka (M6.4) and Fukushima Hamadori (M7.0) are triggered earthquakes of Tohoku Earthquake. Fukushima Hamadori Earthquake impacted on active fault study by the reason of not only the appearance of significant surface faults with displacement up to 2.1 m, but also the reactivation of the normal faults under the E-W compressional stress field. HERP reported that the Tohoku Earthquake increased the probabilities of earthquake occurrence on some active faults, such as Gofukuji, Tachikawa and Miura Peninsula faults. It is important to realize the relation between mega-thrust earthquakes on plate-boundary and intra-plate active fault earthquakes. Triggered earthquakes by Tohoku Earthquake and other plate-boundary earthquakes in Japan and other region are also discussed.

Keywords: active fault, triggered earthquake, plate boundary earthquake

Japan Geoscience Union Meeting 2012
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SSS36-P02 Room:Convention Hall Time:May 21 18:00-19:00

Estimation of ground movement by the 2011 Earthquake in Hamadori, Fukushima Prefecture on April 11, from the Geomorphic

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In the previous work, authors developed the new method to estimate the ground deformation of 1m order quantitatively and easily used high resolution periodical DEM, applied the technique of the image matching analysis - Patent No.4545219. And we showed the result of measurement of displacement of the mass movement due to the earthquake with high accuracy by using this technique. In the present study, we applied the same technique to the area where the surface rupture appeared due to 2011 Earthquake in Hamadori Fukushima Prefecture on April 11, and tried the extraction of wide area ground deformation. The topographical data used in this research is two times of 2mDEM by the airborne laser survey immediately after the disaster in 2006 and 2007, and April 26 in 2011. The slope angle map where the angle of gradient in the grid point had been shown by gray- scale was used for the digital geomorphological image used for the image matching analysis. The software improved to use MPIV described with MATLAB for three dimensional analyses was used for the image matching. When 2mDEM is used, the displacement magnitude that can be extracted by the digital geomorphological image matching is about the 1/10 grid size or more.

As a result of the investigation, tendency to the relative subsidence on the west side area of Idozawa Fault was found in the entire region, and the surface earthquake fault was found along the West segment of Idozawa Fault. In northern part of study area, some surface earthquake fault has corresponding possibility to the boundary of the moving mass movement. The horizontal displacement near the surface earthquake fault is small in the central part of the West segment of Idozawa Fault. Moreover, in the mid zone of the west segment and the east segment of Idozawa fault, the direction and the magnitude of surface displacement is different in each small area, and southward transitional displacement and right-lateral movement stepped over the fault was found. In the previous study, there is no evidence of clear surface rupture in the mid zone of two segments. However it is possible that the sites where the small ground surface displacement was found by existing investigations are corresponding to the places where the direction and the magnitude of displacement of the ground change suddenly. In the future, an unconfirmed surface deformation may be discovered in the area where a big distortion is assumed.

Keywords: active fault, DEM

Japan Geoscience Union Meeting 2012
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SSS36-P03 Room:Convention Hall Time:May 21 18:00-19:00

Characteristics and paleoseismic history of the surface rupture of the April 11, 2011 earthquake at Iwaki City

TSUTSUMI, Hiroyuki[1*], Shinji Toda[2], Hirotake Yasuda[1], Nobuhiko Sugito[3], Masashi Omata[4], Yorihide Kooriya[4], Yoshiki Mori[4], Tatsuya Sugiyama[1], Ryousuke Hayase[5]

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A large normal faulting earthquake (Mw6.6) occurred on April 11, 2011 in Iwaki City, Fukushima Prefecture due to east-west crustal extension associated with the March 11 mega-thrust earthquake. Clear surface ruptures appeared along the previously mapped Yunodake and Itozawa faults. We mapped the surface ruptures in the field and found that 1) the surface ruptures with predominant normal sense of slip along the Yunodake and Itozawa faults are both ˜15 km long and 2) the maximum displacement on the Yunodake fault is ˜80 cm and that on the Itozawa fault is ˜2.2 m. Paleoseismic trenching across the Itozawa fault revealed that the penultimate faulting event occurred sometime during 13000 and 16500 cal yrBP, indicating that the fault was not reactivated during the 869 Jogan earthquake.

Keywords: Fukushima-ken Hamadoori earthquake, triggered earthquake, normal faults, surface rupture, trenching

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SSS36-P04 Room:Convention Hall Time:May 21 18:00-19:00

Investigation of fault activity was induced by Tohoku district Pacific offing earthquake

MARUYAMA, Michiko[1*], KUROSAWA Hideki[1], KUSANO Takashi[2], KATSURAGI Kenta[3], UCHIDA Junichi[4], MICHIGUCHI Yoko[4], TSUTSUMI Hideaki[4]

[1]OYO CORPORATION, [2]Hiruzen Institute for Geology, [3]Natural Consultant, [4]JNES

We investigated the activity history of the fault.
I collected information in order to perform examination about the relevance of inland active fault and massive earthquake.
Announcement that day reports some details.

Keywords: Idosawa Fault, Yunodake Fault, Surface earthquake fault

Japan Geoscience Union Meeting 2012
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SSS36-P05 Room:Convention Hall Time:May 21 18:00-19:00

Shear zones and fault rocks developed along the coseismic normal fault zones of the 2011 M 7.0 Fukushima earthquake

LIN, Aiming[1*], Toda Shinji[2], Rao Gang[3], Tsuchihashi Satoru[3], Yan Bing[3]

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The 2011 Mw 9.0 Tohoku (Japan) earthquake generated a violent tsunami and unexpected high tsunami wave that caused great substantial damage and more than 23,500 fatalities along the east-northeast coast of Honshu Island of Japan. Seismic inversion results reveal a maximum thrust slip of up to ~50 m on a 500-km-long fault plane (e.g., Yagi and Nishimura, 2011; Ide et al., 2011). Following this huge earthquake, several large earthquakes of M >/= 7 occurred in the east-northeastern Honshu Island, which are considered to have been triggered by the drastic change of crustal stress caused by the Mw 9.0 earthquake in the east-northeastern Japan. The 2011 M 7.0 (Mw 6.6) Fukushima earthquake occurred on April 11 in Iwaki City, ~250 km southwest of the epicenter of 2011 Tohoku earthquake, is considered to be one of such post-seismic events. Field investigations and InSAR data reveal that the Fukushima earthquake produced two sub-parallel ~15-km-long surface rupture zones with a normal slip sense along the pre-mapped faults: the Itozawa and Yunodake faults striking NNW-SSE and NW-SE, respectively (Tsutsumi et al., 2011).

In this study, to better understand the nature of seismogenic faults, we focused on the internal deformation structures of coseismic shear zones and on fault rocks within the Itozawa and Yunodake faults that triggered the 2011 M 7.0 Fukushima earthquake, and discuss the seismotectonic implications. Field investigations and structural analyses of the coseismic Itozawa and Yunodake fault zones and fault rocks show that i) the main coseismic shear zones consist of a fault core that includes a narrow fault gouge zone of <10 cm in width (generally 1-2 cm) and a fault breccia zone of < 50 cm in width, and a damage zone of ~5-50 m in width that is composed of cataclastic rocks including fractures and subsidiary faults; ii) the foliations developed in the fault core zone indicate a dominantly normal fault slip sense, consistent with that indicated by the coseismic surface rupture; and iii) veinlet cataclastic rocks composed of unconsolidated fault gouges and fine-grained materials are developed within the fault shear zones as simple veins and complex networks. These structural characteristics of the coseismic fault shear zones and cataclastic rocks indicate that the locations of coseismic slip zones associated with the 2011 Fukushima earthquake were controlled by pre-existing shear zones of the Itozawa and Yunodake faults that have repeatedly moved as normal faults of seismogenic source since the formation of cataclastic rocks.

Keywords: 2011 Mw 9.0 Tohoku (Japan) earthquake, 2011 M7.0 Fukushima earthquake, coseismic surface rupture, Itozawa fault, Yunodake fault, fault shear zone and fault rocks

Japan Geoscience Union Meeting 2012
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SSS36-P06 Room:Convention Hall Time:May 21 18:00-19:00

Wideband magnetotelluric survey over Iwaki region

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Magnetotelluric measurements were carried out around Iwaki area where high seisimicity with normal fault mechanism has been observed after the 2011 Magnitude 9.0 Tohoku-Oki Earthquake. We mamde 24 magnetotelluric measurements over the area in order to reveal the three-dimensional distribution of fluids which may be responsible for the high seisimicity. In this presentation, we will show the preliminary results of the survey.

Keywords: Iwaki, seismicity, resistivity, fluid, fault

Japan Geoscience Union Meeting 2012
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SSS36-P07 Room:Convention Hall Time:May 21 18:00-19:00

Seismic Activity around the Border of Fukushima and Yamagata Prefectures

HAYAMI, Erika[1*], OHTAKE, Kazuo[1], MIYAOKA, Kazuki[1], Kiyoshi TAKEDA[1], Katsuya SHIMAZU[1], Masashi FUJIWARA[1]

[1]JMA

1. Seismicity

Seismic activity has been observed around the border of Fukushima and Yamagata prefecture (around the border of Kitakata city, Kitashiobara village and Yonezawa city) since March 2011. These earthquakes are located at the depth of 5 - 10 km. The distribution of the epicenters had spread northeast and southwest, and formed 4 clusters (center, west, northeast, and southwest) until the beginning of August. At the end of December 2011, the earthquakes mainly occured in the center, west and southwest clusters.

The seismicity retained very high until the end of April 2011, and became lower after that. Until the end of December 2011, more than 1700 earthquakes which magnitudes are 2.0 or over occurred. The largest earthquake of this activity (M4.6) occurred on May 7th, in the west cluster. After the occurrence of this earthquake, the seismicity of the west cluster became lower.

2. Focal Mechanism

Three fault zones are known around the area of this seismic activity; the western marginal fault zone of Nagai Basin (the northeast of this activity), the eastern marginal fault zone of Aizu Basin (the south of this activity), and the western marginal fault zone of Aizu Basin (the southwest of this activity). According to the Headquarters for Earthquake Research Promotion, these three fault zones run in north-south direction, and are reverse faults.

Most of the earthquakes occured in this activity are of magnitude under 3.0, so it is difficult to determine their focal mechanism. 24 mechanisms are determined by JMA as of the end of December 2011. Almost all the obtained focal mechanisms are reverse fault type, and their P-axes are oriented in the east-west to northwest-southeast direction, in accordance with the known fault zones.

3. b-value

We calculated b-values using 150 earthquakes which magnitudes are 2.0 or over, shifting 100 earthquakes in turn. high b-value (1.5 - 1.6) is exhibited until the end of April 2011, coincide with high seismicity, and lower b-value (1.0 - 1.3) after that.

4. JMA's treatment

The activity occured relatively shallow, so people felt them though they were relatively small. We also report reactions of the local residents to this seismic activity and JMA's community relations performed for them.

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SSS36-P08 Room:Convention Hall Time:May 21 18:00-19:00

Application of GPR to a near-surface structure study for damaged zones of the 2011 Naganoken-Hokubu earthquake

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After the Tohoku-off Pacific Ocean earthquake, the Naganoken-Hokubu earthquake occurred along the active fault zone in an area bordered between Nagano and Niigata Prefecures. In Aokura and Mori areas, many houses were damaged by this induced earthquake, while in Kamigo area, Tsunan Town, surface breakages took place along a pre-existence flexure of the Miyanohara active fault. Accordingly, we investigated subsurface structures in the three areas using the ground-penetrating radar (GPR) unit and two 100 MHz antennas on August of 2011. The GPR data were processed to accentuate geologic features by high pass ?ltering, low pass ?ltering. The time pro?le changed to a depth pro?le by the wide-angle measurement. Judging from the GPR results and observation, we conclude that a soft ground with saturated water exists in Mori area, because there is a layer of weak reflected signals on the GPR section. The distribution of the soft ground is almost consistent with that of the remarkable house damages in Mori area. Secondary, in Aokura area, there is also a water-saturated soft ground, based on an analysis of the GPR data. The soft ground layer is bounded by strong reflected signals on the GPR section. This boundary is assumed to be a fault. Thirdly, in Kamigo area, Tsunan Town, anomalous detection, showing a discontinuity of reflected signals, was found on the GPR section. This discontinuity on the GPR section is considered to be the Miyanohara active fault.

Keywords: Naganoken-Hokubu earthquake, ground-penetrating radar (GPR), flexure scarp, Miyanohara fault

Japan Geoscience Union Meeting 2012
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Distribution and activity of active faults in the northern segment of the Fujikawa-kako fault zone, central Japan

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Fujikawa - kako fault zone is an active fault zone that extends from south to north at the mouth of Fuji river at Fuji, Shizuoka, which is considered the landward boundary of the plate. Therefore, which is included in the source region of expected earthquakes along the Nankai Trough in the called Tokai, Tonankai and Nankai . Most previous studies are the fault has been approved by the indirect information such as borehole surveys, studies have confirmed the fault surface is less direct. Moreover, most of which are conducted mainly in central and southern segments, the Nebara segment was not confirmed the presence of active faults.

This paper is to determine the distribution of active faults in the study area due to terrain analysis, and field observations conducted based on it. Analysis of terrain by aerial photographs, and 1:25,000 topographic maps and the DEM has resolution 10m.

This study revealed active faults have not been confirmed so far in central and southern segments. The surface of older lava, Fuji volcano in the Nebara segment (11,000-8,000 y. a) has a few tens of meter high cliff successive are sloping toward the east or southeast, at surface younger lava, Fuji volcano (2,200 - y. a) has the number of meter of low cliffs slope down toward the southeast. These cliffs slope and the lava flow direction are inclined in the opposite direction. From the above, these cliffs are considered to be formed by active faults and it is considered that the accumulation of displacement. Moreover, fault outcrop found in the southern segments and Nebara segment. Continuous cliff have been the location of the northern limit from previous study area, which can be found intermittently about 10km further north, the entire length of the Fujikawa - kako fault zone is likely to be about more than 36km. And the height of the cliffs can be seen in the older lava in the Nebara segment is up to approximately 70m, the average vertical velocity of the Fujikawa - kako fault zone about 7mm/yr reached maximum, and this fault zone displaced the younger lava, most recent activity is considered to be 2,200 years ago that is later.

Keywords: Fujikawa-kako fault zone, active fault, terrain analysis