Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P01 Room:Convention Hall Time:May 27 14:00-16:30

JUNEC Focal Mechanism Catalog Using P-wave First Motion Polarities and Its Characteristics

Takeo Ishibe[1*], Hiroshi Tsuruoka[1], Kenji Satake[1], Kunihiko Shimazaki[1]

[1]ERI, the Univ. of Tokyo

We determined about 14,000 focal mechanisms which occurred in and around Japan from July 1985 to December 1998 by using P-wave first motion polarities of the Japan University Network Earthquake Catalog (JUNEC) and HASH algorithm (Hardebeck and Shearer, 2002), and compiled a focal mechanism catalog. The Earthquake Information Center, Earthquake Research Institute (ERI), the University of Tokyo has compiled observed data with the cooperation of universities and determined hypocenters amounting to about 190,000 (magnitude 2.0 or above).

The JUNEC P-wave first motion focal mechanism catalog includes abundant small-magnitude earthquakes and it is applicable to various analyses. As an example of such analyses, we investigated the temporal change of probability distributions of the earthquakes against the static changes of the Coulomb Failure Function (dCFF) due to the 1995 Kobe earthquake. The dCFF was calculated on nodal planes of focal mechanisms. The probability distribution after the mainshock clearly sifts to the positive dCFF side relative to that prior to the mainshock. This supports the seismicity rate changes due to the dCFF discussed in the previous studies (e.g. Stein et al., 1992; Toda et al., 1998).

The distribution of focal mechanism solutions is spatially and temporally heterogeneous, and it clearly reflects both the development of observation station network and spatial variation of first motion polarity report rate (i.e. first motion polarity report number / the number of picked onsets). Focal mechanism solutions determined in this study are basically consistent with previously reported ones such as F-net moment tensor solutions by the National Research Institute for Earth Science and Disaster Prevention (NIED) or P-wave first motion focal mechanisms observed by the Kanto-Tokai seismic observation network though some focal mechanisms are significantly different from them.

Acknowledgments

We used the program modified from HASH (Hardebeck and Shearer, 2002) for estimating focal mechanisms and the program by Okada (1992) to calculate the dCFF, as well as pick files observed by the Hokkaido University, Hirosaki University, Tohoku University, Earthquake Research Institute (ERI) University of Tokyo, Nagoya University, Disaster Prevention Research Institute (DPRI) Kyoto University, Kochi University, Kyushu University and Kagoshima University. We also used focal mechanisms determined by NIED and Japan Meteorological Agency (JMA). We thank all of these organizations and individuals. This study is partially supported by the Special Project for Earthquake Disaster Mitigation in the Tokyo Metropolitan Area from the Ministry of Education, Culture, Sports, Science, and Technology of Japan.

Keywords: Japan University Network Earthquake Catalog (JUNEC), Focal mechanism, P-wave first motion

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P02 Room:Convention Hall Time:May 27 14:00-16:30

Objective Repeating-earthquake Analysis beneath Japan

Koji Tamaribuchi[1*], Masaki Nakamura[1], Yasuyuki Yamada[1]

[1]JMA

The long-term earthquake prediction has usually used the characteristic earthquake model, which has an almost constant recurrence interval time. We detected some repeating earthquake sequences (that is, those seismic waves are similar at the same stations between each other quake) to find characteristic earthquakes (JMA, 2010, Nakamura et al., 2010), including the case of off Kushiro (M4.8; Sakoi et al., 2010), the cases of off Iwate Prefecture (M6.1 and M6.0; JMA, 2009a), the case of off Fukushima Prefecture (M5.7; JMA, 2009a), the cases of off Okinoerabujima Island (M5.3 and M5.2; JMA, 2009b, Tamaribuchi et al., 2009) and the case of near Miyakojima Island (M5.1; Tamaribuchi et al., 2010). However, it was not objective that all of them were detected by human on a case-by-case basis. Therefore, we attempted an objective and comprehensive analysis to find repeating earthquakes, using digital records of the type 87 and type 95 seismographs.

Our method is as follows. First, we searched a relation between magnitude and frequency which has high coherence value within a band of 0.1-10Hz as a preliminary step. As a result, we obtained the following, f_{lower} = log a - b M (a=22.4, b=0.86), where f_{lower} is the lower frequency in calculating coherence value and M is the magnitude by JMA. The upper frequency is the following, $f_{upper} = 4{*}f_{lower}$. Second, we computed coherences for three components using the above relational expression. We chose earthquake pairs whose median coherences were 0.95 or more. Finally, we classified those pairs into groups on the basis of cluster analysis.

We found many repeating earthquakes of M4-6 beneath Japan. Most of groups located on the plate boundary, including beneath the Hidaka region, beneath the east coast of Ibaraki Prefecture and beneath the northwest of Chiba Prefecture. No repeating earthquake was detected near the major asperities such as off Sanriku, off Tokachi, the Tokai and the Nankai. On the other hand, there are some candidates of repeating earthquakes in aftershocks and swarms. We wondered that the same asperities were actually ruptured in those cases.

In this study, we used the type 87 and 95 seismographs, but there was not enough data to grasp the characteristic earthquake sequences of M5-6. By using the type 59 analog seismographs, we would detect more characteristic earthquake sequences.

References: JMA, 2009a, Report of the Coordinating Committee for Earthquake Prediction . Japan, 82, 84-90; JMA, 2009b, Report of the Coordinating Committee for Earthquake Prediction, Japan, 82, 417-422; JMA, 2010, Report of the Coordinating Committee for Earthquake Prediction, Japan, 83, 613-632; Nakamura et al., 2010, Abstr. 2010 Japan Earth Planet. Sci. Joint Meeting, SSS013-P05; Tamaribuchi et al., 2009, Abstr. 2009 Japan Earth Planet. Sci. Joint Meeting, S149-P005; Tamaribuchi et al., 2010, Zisin2, 62, 193-207; Sakoi, 2010, Abstr. of SSJ 2010 Fall Meeting, D11-06.

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P03 Room:Convention Hall Time:May 27 14:00-16:30

Disagreement of first motion polarities of P wave with the focal mechanism solution

Sadaki Hori[1*]

[1]NIED

We frequently observe disagreement of the polarity data of P wave first motions with the focal mechanism solutions obtained from a high density and wide coverage observation network like Hi-net. It would be acceptable that the opposite polarities at stations around the nodal plane of the mechanism solution are observed since the model of the velocity structure used in determination of the solution is different from the real Earth. However, we sometimes find the polarity data inconsistent with the solution around the anti-node of the radiation pattern even in the catalog data compiled with human inspection. In this report we discuss this phenomenon from a viewpoint of the non-double couple earthquakes occurring in the subducting slab.

Mechanism for the intraslab seismicity is generally explained by a dehydration embrittlement, which is caused by mechanical instability associated with dehydration of hydrated minerals in the slab. Because the dehydration occurs in the serpentinized slab mantle as well as in the oceanic crust being direct contact with ocean water, the existence of the double seismic zone observed in the northeast Japan arc may also be explained by this mechanism.

Instability due to volumetric change or heating associated with a phase change of the minerals occurring in the mantle has also been a plausible hypothesis to explain the deep seismic activity under the condition of large confining pressure. Previous studies on deep earthquakes by waveform analysis, however, have hardly succeeded to resolve any evidence of the volumetric change, which would be observed as an isotropic component of a CMT solution. The volumetric change in the seismic source is, therefore, considered to be negligibly small to radiate detectable seismic energy. On the other hand, we might expect the first motion data obtained from high sensitivity seismograph network to bring us important information for the initial status of the source process with detectable signals.

We used the Hi-net event catalog to analyze the polarity data inconsistent with the mechanism solution, which is given from the F-net moment tensor catalog to avoid possible bias of the first motion solution in a case with many inconsistent polarities. We selected the events deeper than 40 km to focus on the intraslab seismicity and to avoid head wave first arrivals. From the analysis we found that there are not a small amount of earthquakes which could not be explained by a simple double couple source and that the number of polarities with negative inconsistency is slightly larger than that with positive inconsistency. The latter result might reflect the volumetric change in the seismic source.

Keywords: focal mechanism solution, first motion polarity, non-double couple model

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P04 Room:Convention Hall Time:May 27 14:00-16:30

Low frequency earthquakes in aftershock activity

Yasushi Ishihara[1*]

[1]JAMSTEC

What is aftershock? The problem is old one but still unsolved problem. Redistribution of stress field around main shock area causes main role for the understanding. Reduction of aftershock activity may be caused by relaxation process. On the process relative low stress field may excite somewhat specific seismic event. We monitor very broadband seismic data as for aftershock activity of large scale earthquakes around Japan. Ishigaki (ISG) and Ogasawara (OGS) of OHP seismic network are used in this analysis. They had large earthquakes, magnitude of greater than 7, and had high aftershock activities nearby these stations. We applied to distribute earthquakes some classes by their spectrum and/or dominant frequency of signal. In our applications, low and very low frequency earthquakes are identified in these activities. And the beginnings of these events are originated about one to some days delayed from main shock. The delay of very low frequency seismic events' activation is also known in 2004 SE off Kii-hanto earthquake. The time history is related with stress relaxation indirectly. The fine monitoring of aftershock expects to be new view for aftershock activity.

Keywords: Low frequency earthquake, aftershock activity

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P05 Room:Convention Hall Time:May 27 14:00-16:30

Seismic activity of the December 2, 2010 Sapporo earthquake(MJMA4.6)

Masayoshi Ichiyanagi[1*], Teruhiro Yamaguchi[1], Ryosuke Azuma[1], Masamitsu Takada[1], Kazunori Kuroi[1], Takuji Yamada[1], Jun'ichi Miyamura[1], Hiroaki Takahashi[1]

[1]ISV, Hokkaido University

Shallow seismic activity including felt earthquakes had started in southern Sapporo region since October 22, 2010. Largest earthquake with M4.6 occurred on December 2, 2010. JMA issued earthquake early warning for this event. This activity indicated foreshock, mainshock and aftershock sequence. One temporal seismic station with mobile-phone realtime telemetering system was installed just after foreshock occurrence, and two more stations were deployed just same day of largest event. Precise hypocenters of 86 earthquakes by using above dense network were determined. Aftershock distribution concentrated on an eastward dipping plain with 60 degrees, which is agree with one of nodal plains of focal mechanism determined by P-wave polarities in this study. Foreshocks were distributed on deeper extend of aftershock region. Geometry of total hypocenter distribution is consistent with an estimated active fault beneath Sapporo urban region.

Keywords: Hokkaido, Aftershock Distribution, Active fault

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P06 Room:Convention Hall Time:May 27 14:00-16:30

Hypocenter distribution before and after in the source region 2008 Iwate-Miyagi Nairiku Earthquake

Kota Koshika[1*], Masato Oikawa[1], Akiko Hasemi[1]

[1]Yamagata Univ.

Koshika et al.(2011) relocated the hypocenters of earthquakes that occurred before the 2008 Iwate-Miyagi Nairiku Earthquake using the Hi-net data, and studied whether the source fault form could be estimated from hypocenter distribution before the main shock. As a result, the hypocenters relocated were not distributed on a plane corresponding to the source fault, and it was difficult to estimate the source fault form. Comparing with aftershock distribution by Okada et al.(2008), the hypocenters were not located in the aftershock region, but they were distributed surrounding aftershocks. However a method and a velocity structure used for locating hypocenters were different between Okada et al.(2008) and Koshika et al.(2011). It is necessary that aftershocks and earthquakes before the occurrence of the main shock are determined in the same manner for comparing hypocenter locations.

Therefore in this study, aftershock and earthquakes before the main shock occurrence were located simultaneously by using the DD method. Earthquakes before the main shock were the same as those used by Koshika et al.(2011). They occurred in about 60km$*$35km region covering the aftershock area in 2006-2007. We selected aftershocks that occurred from 8:43 to 23:59 on the same day of the main shock. We used 40 stations whose epicentral distance was within about 50km from the main shock. We displayed waveforms on the computer screen, and picked P- and S- wave arrival times. The number of earthquakes before the main shock and aftershocks was 383 and 324, respectively (total: 707).

A vertical cross section showed that hypocenters were not located within 3km from the main shock hypocenter while aftershocks were distributed in this area. In the north and south parts of the aftershock, aftershocks seemed to occur in the region where hypocenters were not distributed before the main shock, though it was not as remarkable as around the main shock hypocenter. From a WNW-ESE vertical cross-section of S-wave velocity perturbation around the main shock by Okada et al.(2008), both main shock and aftershocks were distributed in a high-velocity zone that extended in WNW-ESE direction. Hypocenters before the main shock were also included in this high velocity zone. Hypocenter distribution relocated in this study may indicate a small scale heterogeneity that can be estimated by velocity perturbation.

Acknowledgment
We appreciate having used the hypocenters by Japan Meteorological Agency (JMA) and waveform data of JMA, Tohoku University, and the National Research Institute for Earth Science and Disaster Prevention (Hi-net).

Reference
Koshika et al., 2011, Zisin2, 63(4), in press.
Okada et al., 2008, Kagaku, 78(9), 978-984.

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P07 Room:Convention Hall Time:May 27 14:00-16:30

Microearthquake observation in the Hokuriku region for these 35 years

Fumiaki Takeuchi[1*], Takuo Shibutani[1], Kin'ya Nishigami[1], Norio Hirano[1], Kazuo Matsumura[2], Fumio Ohya[2], Takuo Okamoto[3]

[1]DPRI.,Kyoto Univ., [2]retired from DPRI.,Kyoto Univ., [3]Fukui National College of Technology

We have been observing the Microearthquakes in the Hokuriku region, by the telemetering system from 1976 to the present. At the beginning, the observation points were set about 30 km apart from each other. Nowadays, the number of the points grew up several times as big before, particularly after 1997, when the Kishouchou Ichigenka started. We will show some features of the earthquake occurrence in this region in these 35 years. And we also will show you the data of the extensometers set in the tunnel of the Hokuriku observatory

Keywords: microearthquake, Hokuriku region, 35 years

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P08 Room:Convention Hall Time:May 27 14:00-16:30

Observation of low frequency seismic events in the Nankai Trough region by broadband ocean bottom seismometers

Kazuo Nakahigashi[1*], Yuya Machida[1], Takehi Isse[1], Tomoaki Yamada[1], Kimihiro Mochizuki[1], Hajime Shiobara[1], Masanao Shinohara[1], Toshihiko Kanazawa[1], Kenji Uehira[2]

[1]ERI, [2]SEVO

Recently, low-frequency earthquakes and slow slip events are recognized in deep region of the plate boundary between the landward plate and the subducting Philippine plate below the southwestern Japan [e.g., Obara, 2002; Kawasaki, 2004]. The very low frequency earthquakes (VLFEs) occurring close to the Nankai Trough are also reported by using the broadband seismograph data obtained in the land area [e.g., Obara and Ito, 2005]. Such unusual seismic events might reflect coupling properties at the plate boundary. It is important to understand such events for consideration of the subduction process and estimation of generation mechanism of the interplate earthquake in the Nankai Trough. Because the VLFEs in the Nankai Trough region occurred far from land seismic stations, observations using broadband Ocean Bottom Seismometers (BBOBSs) near the trough are needed to understand such VLFE activities.

In December 2008, we started an observation campaign off Kii Peninsula. For the first observation, three BBOBSs with Guralp CMG-3T sensors, and six 1Hz type Long-term OBSs were used. The spatial intervals among OBSs were about 20km. In 2009, we recovered them. The data recorded by each OBS were merged and continuous records were reproduced. VLFEs with predominant frequency of 0.01-0.1 Hz were found from continuous records in March 2009. The occurrence of the VLFE has a temporal change. In addition, seismicity of ordinary micro-earthquakes became high simultaneously during the VLFE activities. In November 2009, we started the second observation off Cape Muroto, the westward of the first observation, using three BBOBSs with pressure gauge, and five Long-term OBSs. The subducting seamount was found by an OBS survey in this region [Kodaira et al., 2000]. In February 2011, all the OBS were retrieved, and we deployed five BBOBSs in the same region to continue the observation. In this presentation, we will report the new analysis results using the seismic and the pressure gauge data.

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P09 Room:Convention Hall Time:May 27 14:00-16:30

Characteristics of shallow seismic activity in the Beppu-Shimabara area, Kyushu, Japan

Hiromi Chikura[1*], Satoshi Matsumoto[2], Takahiro Ohkura[3], Hiroshi Shimizu[2], Hiroyuki Inoue[3], Shin Yoshikawa[3], Yuki Abe[4], Yoshihiro Masaki[4], Masahiro Miyazaki[1], Kenji Uehira[2]

[1]Grad. Sch. Sci., Kyushu Univ., [2]SEVO, Kyushu Univ., [3]AVL, Kyoto Univ., [4]Graduate School of Science, Kyoto Univ.

In the middle part of Kyushu Island, Japan, called the Beppu-Shimabara graben, there are active volcanoes: Tsurumi, Kuju, Aso, and Unzen. Most of historical large earthquakes occurred in this area. In addition, seismic activity of microearthquake is also high in this area. We investigated the cause of high seismic activity in this region from seismological analysis. Temporal seismic stations were deployed in this area in order to determine hypocenters of microearthquakes with high accuracy because their depth provided us with important information about thickness of seismogenic layer. We carefully determined hypocenters of microearthquake and focal mechanisms from the observed data.

Focal depths in Beppu-Shimabara area are shallower than 15 kilometers, especially become shallow in the vicinity of Kuju volcano. While focal mechanism of strike-slip fault type dominates in Kyushu Island, many earthquakes in normal fault type occur in Beppu-Shimabara area. It means that the stress field in the area changes from strike-slip fault regime to normal fault one. In other words, the maximum horizontal principal stress drops and becomes moderate principal compressive stress from maximum. Generally, high seismic activity under a condition of lower compression stress can result from low strength of the medium. Our results suggest that the strength of the crust in Beppu-Shimabara area is weak. As an interpretation, high fluid pressure in the crust can be attributed to high volcanic activity in the area.

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P10 Room:Convention Hall Time:May 27 14:00-16:30

Characteristics of repeating earthquake activirt in Hyuga-nada and east off the northern part of Nansei-shoto, Japan

Kazuhiko Goto[1*], Hiroshi Yakiwara[1], Syuichiro Hirano[1]

[1]NOEV, Kagoshima Univ.

Earthquake family composed of more than 4 repeating earthquakes in Hyuga-nada and east off the northern part of Nansei-shoto, Japan is classified into three types by its activity. First is R-type; the event occurs regularly over a long period of time. Second is C-type; the events occur closely in a short period. Third is O-type: the family belongs to not only R-type but C-type. In the middle of Hyuga-nada and east off Tanegashima, almost all earthquake families are O-type. On the other hand, east off Toi-misaki and Tokara islands, the R-type families occur predominantly. The shallow large earthquakes more than M7.0 from 1923 (according to JMA) occurred only in the O-type predominant regions. It may suggest that the existence of asperity of large earthquake controls the type of earthquake family. East off Amami-ooshima is also the O-type predominant region, where earthquakes more than M7.0 did not occur from 1923. However, it is noticeable that the large earthquake of M8.0 occurred in this region in 1911 (a common opinion of depth of this event being 100km).

Keywords: repeating earthquake, earthquake family, asperity, plate boundary, Hyuga-nada, Nansei-shoto

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P11 Room:Convention Hall Time:May 27 14:00-16:30

Relocation of earthquake swarm distribution in the south Okinawa Trough using double-difference method

Mamoru Nakamura[1*]

[1]Faclty Science, University of the Ryukyu

The south Okinawa Trough is distributed at the 100 km northwest of the Ryukyu arc, which is in the rifting stage with extension. The earthquake swarms with the maximum earthquake magnitude of 6 frequently occur along the axis of the south Okinawa Trough. The accuracy of the hypocenter distribution is not good along the axis of the Okinawa Trough because the hypocenters are about 100 km far from the local seismic network of the Japan Meteorological Agency (JMA).

I determined the locations of the hypocenters along the axis of the south Okinawa Trough using the combination of local and tele-seismic network data. The hypocenter determination was employed using the double-difference technique. The catalogued data of the local seismic network (JMA) and tele-seismic network (ISC catalogue) were used. The P and S arrival time at the station whose epicentral distance is within 90 degrees were used for the hypocenter determination. The earthquakes which occurred between January 1st, 2002 and October 31, 2020 and whose magnitudes are over 3.5 were used for the relocation.

The results show that the each strike and dip of the earthquake swarm along the south Okinawa Trough is complicated. The seismic plane of the earthquake swarm of July 2002 are striking east-northeast direction and dipping northward, while the seismic plane of the earthquake swarm of October 2002 is striking east-west direction and dipping southward. These are consistent with the strike and dip of the normal faults estimated from seafloor topography.

Keywords: Okinawa Trough, hypocenter determination, earthquake swarm

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P12 Room:Convention Hall Time:May 27 14:00-16:30

Focal depth distribution using depth phase in the south Ryukyu trench

Yasuhisa Arashiro[1]*, Mamoru Nakamura[2]

[1]Graduate School of Science,Ryukyu Univer, [2]Facul. Science, Univ. Ryukyus

Focal depth distribution using depth phase in the south Ryukyu trench
#Yasuhisa Arashiro[1];Mamoru Nakamura[1]
[1]Sci.,Univ.Ryukyus

Determination of accurate hypocenter distribution is important for the investigation of stress field and geometry of the plate near the locked zone of Ryukyu trench. Recently, the locked zone, very low frequency earthquake and slow slip evens have been detected along the Ryukyu trench region. However errors of the hypocenters are large because seismic stations are far from the Ryukyu trench. Then we determined the focal depths of earthquakes along the Ryukyu trench. using depth phase

Total 15 JMAs seismological stations are employed in this study. We used the events which occurred near 24.3N,125.3E between January 2005 and December 2006, where magnitudes are over 3.5.Most of them were the thrust type event from the CMT catalogue by NIEDs F-net. In their wave pattern, large amplitude phase is confirmed between P phase and S phase. The phase is dominant with vertical component, These suggest that the phases are the converted sP phase from S phase at seafloor. Then we determined the focal depth using the phase.

The time difference between sP phase and P phase are distributed from 8 to 14 seconds at the epicentral distance of 100 km. The estimated depths using the sP-P difference time range from 20 to 40 km. In consequence, it is clear that earthquake is occur 20 to 40 km in south Ryukyu trench. This result compare with JMAs depth distribution of 16 to 40 km, Its range is more smaller than JMAs.Most of hypocenter is about 20 km, as a result. Philippine plate depth is estimated 20 km.

Keywords: hypocenter determination, Ryukyu trench, Philippine sea plate, depth phase

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P13 Room:Convention Hall Time:May 27 14:00-16:30

Generation mechanism of the swarm activity following the 2004 Sumatra-Andaman earthquake

Shinya Hiratsuka[1*], Tamao Sato[1]

[1]Sci. and Tech., Hirosaki Univ.

A swarm activity occurred east off Nicobar Islands about a month after the 2004 Sumatra-Andaman earthquake. We discussed three problems of the swarm activity, i.e.,(1) How could the spatial distribution of strike-slip events and normal fault events be explained? (2) Why was the swarm activity triggered east off Nicobar Islands? (3) What is the cause of the swarm activity that started about a month later? In order to answer these problems, we relocated the hypocenters of the swarm activity using the Modified Joint Hypocenter Determination (MJHD) method and investigated the spatial distribution of fault plane solutions. As results, we found that the spatial distribution of strike-slip events and normal fault events can be explained by the activation of Riedel shears in the region between West Andaman Fault (WAF) and Sumatra Fault System (SFS). Normal fault events may have been triggered by the increase in tensional stress associated with injection of magma into tension fractures. Moreover, we calculated the change of the Coulomb Failure Function (dCFF) due to the mainshock and afterslip of the Sumatra-Andaman earthquake. Based on the results of these analysis, we found that the spatial pattern of dCFF due to mainshock could explain why the swarm activity occurred east off the Nicobar Islands. The delay of the swarm activity may be due to the afterslip or the injection of magma into tension fractures.

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P14 Room:Convention Hall Time:May 27 14:00-16:30

Seismicity of Eastern Turkey: A Case Study

Dogan Kalafat[1]*, nurcan meral ozel[1]

[1]Kandilli Observatory and ERI, Turkey

The March 8, 2010 Basyurt-Karakocan Earthquake (MlISK=6.0 ; 04:32 L.T.) occurred on the East Anatolian Fault (EAF) in Elazig Province. 42 People were killed and 137 people were injured. Over 100 villages and hamlets which were closely located to the epicenter were affected by the earthquake. The Basyurt, Gokdere and Kovancilar were the most affected villages and in general this area falls within the deformation field in the East Anatolian Fault Zone. It was observed that the aftershocks were densely distributed in SW-NE direction. In this study, we have analyzed the faulting mechanism solutions of 14 earthquakes (M>4.0) in the region and their source characteristics. The fault plane solution of the main shock revealed that the earthquake occurred with a left lateral strike slip faulting. The March 8, 2010 Basyurt-Karakocan Earthquake demonstrated that the region sustains the earthquake activity under the effect of strike slip tectonic regime. When the regional faulting structure is taken into account, it can be considered that the Basyurt-Karakocan Earthquake has occurred in Bingol-Palu fault system with the fracture of NE-SW main direction fault segments in the East Anatolian Fault Zone. The estimated intensity distribution map was prepared and delivered to the relevant public institutions immediately after the earthquake by KOERI. The earthquake intensity was estimated as Io=VII around the epicenter, and this was confirmed by field studies. The estimated PGA distribution map, the loss and damage maps were also prepared in a short time after the earthquake and sent to the relevant public institutions as well.

Keywords: seismicity, fault plane solutions, aftershock, Elazig earthquake

Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS026-P15 Room:Convention Hall Time:May 27 14:00-16:30

Observation of glacial earthquakes by GreenLand Ice Sheet monitoring Network (GLISN)

Seiji Tsuboi[1*], Masaki Kanao[2], Yoko Tono[1], Tetsuto Himeno[2], Genchi Toyokuni[2]

[1]JAMSTEC, [2]NIPR

The GreenLand Ice Sheet monitoring Network (GLISN) is a new, international, broadband seismic capability for Greenland being implemented through the collaboration of Denmark, Canada, France, Germany, Italy, Japan, Norway, Poland, Switzerland, and USA. Glacial earthquakes have been observed along the edges of Greenland with strong seasonality and increasing frequency since 2002 (Ekstrom et al, 2003, 2006) by continuously monitoring data from the Global Seismographic Network (GSN). These glacial earthquakes in the magnitude range 4.6-5.1 may be modeled as a large glacial ice mass sliding downhill several meters on its basal surface over duration of 30 to 60 seconds. The detection, enumeration, and characterization of smaller glacial earthquakes are limited by the propagation distance to globally distributed seismic stations, i.e., the Global Seismographic Network (GSN) with the International Federation of Digital Seismograph Networks (FDSN). Glacial earthquakes have been observed at seismic stations within Greenland (Larsen et al, 2006), but the current coverage is very sparse. In order to define the fine structure and detailed mechanisms of glacial earthquakes within the Greenland Ice Sheet, a broadband, real-time seismic network needs to be installed throughout Greenland's Ice Sheet and perimeter. The GreenLand Ice Sheet monitoring Network (GLISN) should complemet the station distribution in Greenland and become useful to study activities of glacial earthquakes.

Keywords: Greenland ice sheet, glacial earthquake, broadband seismograph, GLISN