

Your abstract submission has been received

Click [HERE](#) to print this page now.

You have submitted the following abstract to 2016 AGU Fall Meeting. Receipt of this notice does not guarantee that your submission was free of errors.

Determination of focal mechanism of induced seismicity by using regional stress data

Kazumasa Fuse¹, Yusuke Mukuhira², Makoto Naoi³, Hirokazu Moriya¹, Takatoshi Ito², Hiroshi Asanuma⁴ and Markus O Häring⁵, (1)Tohoku University, School of Engineering, Sendai, Japan, (2)Tohoku University, Institute of Fluid Science, Sendai, Japan, (3)Kyoto University, Graduate School of Engineering, Kyoto, Japan, (4)Fukushima Renewable Energy Institute, AIST, Koriyama, Japan, (5)Häring Geo-Project, Liestal, Switzerland

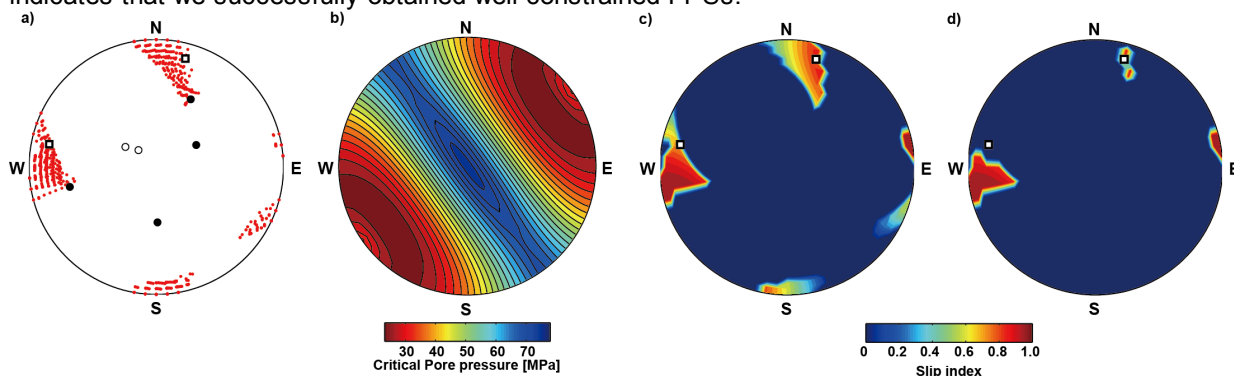
Abstract Text:

Fault-plane solutions (FPSs) of earthquake are generally estimated using P-wave first motions observed at seismic stations. FPSs can provide information on fracture geometry in EGS or shale gas reservoir, but accurate estimation of FPSs of microseismic (MS) events induced in those fields is usually difficult owing to limited number of MS stations.

This study aims to constrain FPSs estimated from insufficient number of stations, using other available geophysical data. In this analysis, we used regional stress data and wellhead pressure during stimulation. First, we estimate all possible FPSs from P-wave first motion observed at MS network (Fig. (a)). Next, regional stress data is used to calculate critical pore pressure (CPP) for arbitrary FPSs based on coulomb failure criterion (Fig. (b)). Then, 'slip index' is evaluated for each FPSs by combining the FPSs with the CPP (Fig. (c)). Note that slip index indicates relative potential for fractures to slip; the maximum/minimum CPP corresponds to 0/1 for slip index. Finally, we eliminated FPSs whose CPP was higher than the wellhead pressure at the event occurrence time (Fig. (d)).

We applied this method to one of the induced seismic events recorded during hydraulic stimulation in Basel, Switzerland. The reliable FPSs of this event, the two squares in Fig. (a), were estimated by Swiss Seismological service (SED) with about 80 stations. We also estimated FPSs of this event by using only 6 MS stations with following the process, to check the validity of the method.

Red dots in Fig. (a) show the pole distribution of all FPSs that can explain all P-wave first-motion polarities (black/white circles indicates push/pull) of the 6 MS stations. Fig. (c) shows the contour of slip index evaluated from the CPP, and the modified one with the wellhead pressure (=30MPa) are shown in Fig. (d). In Fig. (d), the high slip-index area agrees with one of the FPSs determined by SED. This result indicates that we successfully obtained well-constrained FPSs.



Topic Selection: Induced and Triggered Earthquakes: Theory, Observations, Impact

Submitter's E-mail Address: kazumasa.fuse.r2@dc.tohoku.ac.jp

Abstract Title: Determination of focal mechanism of induced seismicity by using regional stress data

Requested Presentation Type: Poster Only

Previously Published?: No

AGU On-Demand: No

Abstract Payment: Paid (agu-fm16-127940-4310-5151-9811-1072)

I am interested in participating in OSPA (student).

Advisor Name: Takatoshi Ito

Advisor Email: takatoshi.ito.c5@tohoku.ac.jp

Select your degree-granting institution below. This is the university or college that you will graduate from or that will award your diploma: Tohoku University

that will award your diploma. TOHOKU UNIVERSITY

First Presenting Author

Presenting Author

Kazumasa Fuse

Primary Email: kazumasa.fuse.r2@dc.tohoku.ac.jp

Phone: 818018692405

Affiliation(s):

Tohoku University
School of Engineering
Sendai 982 (Japan)

Second Author

Yusuke Mukuhira

Primary Email: mukuhira@geo.ifs.tohoku.ac.jp

Phone: 81-22-217-5235

Affiliation(s):

Tohoku University
Institute of Fluid Science
Sendai 982 (Japan)

Third Author

Makoto Naoi

Primary Email: makonaoi@gmail.com

Affiliation(s):

Kyoto University
Graduate School of Engineering
Kyoto 606 (Japan)

Fourth Author

Hirokazu Moriya

Primary Email: hirokazu@m.tohoku.ac.jp

Phone: 81222449597

Affiliation(s):

Tohoku University
School of Engineering
Sendai 982 (Japan)

Fifth Author

Takatoshi Ito

TAKAOSHI ITO

Primary Email: ito@ifs.tohoku.ac.jp
Phone: 81222175234

Affiliation(s):

Tohoku University
Institute of Fluid Science
Sendai 982 (Japan)

Sixth Author

Hiroshi Asanuma

Primary Email: h.asanuma@aist.go.jp
Phone: 81-29-861-6204

Affiliation(s):

Fukushima Renewable Energy Institute, AIST
Koriyama (Japan)

Seventh Author

Markus O Häring

Primary Email: haring@geoproject.ch

Affiliation(s):

Häring Geo-Project
Liestal (Switzerland)

If necessary, you can make changes to your abstract submission

- To access your submission in the future, point your browser to: [User Portal](#)
- Your Abstract ID# is: 127940.
- Any changes that you make will be reflected instantly in what is seen by the reviewers.
- After the abstract proposal is submitted, you are not required to go through all submission steps to make edits. For example, click the "Authors" step in the Abstract Submission Control Panel to edit the Authors and then click save or submit. When you have completed your submission, you may close this browser window or submit another abstract proposal: [Call for Abstracts](#).

[Tell us what you think of the abstract submission process](#)