

international Summer School on Earthquake science (iSSEs) 2015 実施報告

去る9月4-8日に、international Summer School on Earthquake science: "Monitoring physical properties associated with tectonic processes"と題して、国内外の大学院生・PDを対象とした国際サマースクールを開催した。当初予定していた参加者数40名に対して、最終的に48名の受講者を受け入れることとし、講師、世話係（LOC）と併せて計65名ほどが5日間山中湖の会場（ラフォーレ山中湖）に集い、日夜“Monitoring”について活発な議論を行った。以下のアンケートの集計にあるように、2年前の前回と同様好評な会となった。前回の反省点として、“スクールと云う割にはふつうのカンファレンスの形式で物足りない”という参加学生の意見を踏まえ、今回は学生の発言を encourage する形でセッションを始めたところ、すべての講義で学生からの質問・議論がとまらずにセッションが時間超過の形で終わったのは、予想外の喜びである。参加者の中から、将来の地震科学分野のリーダーが出るであろうことを期待させるような展開であった。本サマースクールがきっかけとなり、同世代内の国際的な連携・切磋琢磨が進むことを期待したい。また専門外の学生にもわかりやすくするために、講義時間を90分と長くした。長すぎるとの意見もあったが、イントロダクションに時間を割くことが出来るので、それなりの効果があったとおもわれる。前回同様、スクールとして次世代人材の育成をうたうことで講師陣にも特別なモチベーションが出来るのか、どの講義も準備の行き届いたすばらしいものであった。惜しむらくは、日本人のこの分野の大学院生の参加が期待したほどは伸びなかった。これも前回と同様である。会場の山中湖は東京から離れていることも有り、地震研からバスをチャーターして移動した。地震研を知ってもらうという意味でも今後有効かも知れない。最終日は富士山をテーマに巡検を行った。残念ながら天候が悪く予定を変更せざるを得なかったが、山梨県富士山研究所に多大なご協力をいただき無事実施することが出来た。

今回は SCEC 側から2名の講師（Tsai, Lohman 両教授）と12名の学生・PDが参加した（旅費は SCEC がサポート）。また来年は SCEC 側が2回目の会を開催すると理解している。SCEC との協力体制は来年で終了するが、持続可能な会にすべく今後どのように進めていくか検討を開始する必要があるかも知れない。プログラムコミティには、京大防災研の伊藤喜宏氏、名古屋大学の加藤愛太郎氏にも参加していただいた。今後は日本の地震科学コミュニティ全体の会としてのあり方・可能性も検討すべきであろう。

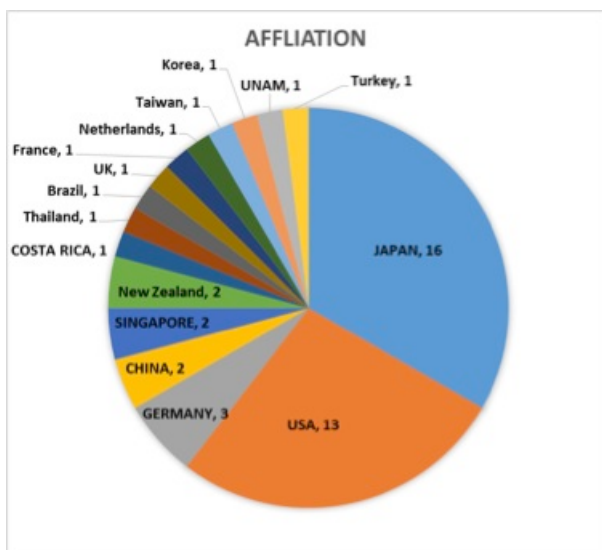
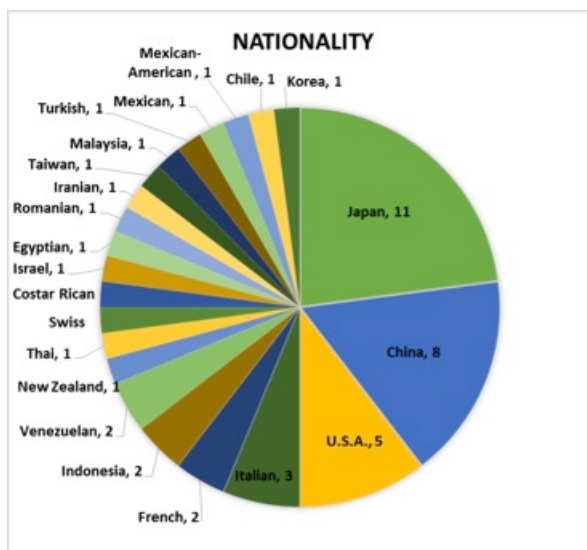
★開催経費について

事前に配分されている国際室経費ですべてをまかなっている。経費として5,125,729円（内訳：招聘交通費869,870円；スクール開催費4,240,439円；その他準備費14,970円）を支出した（9月16日時点での概算）。

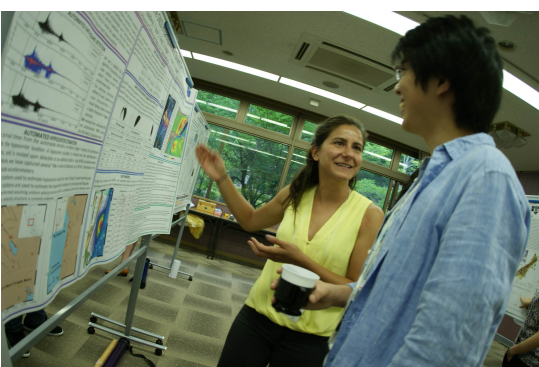
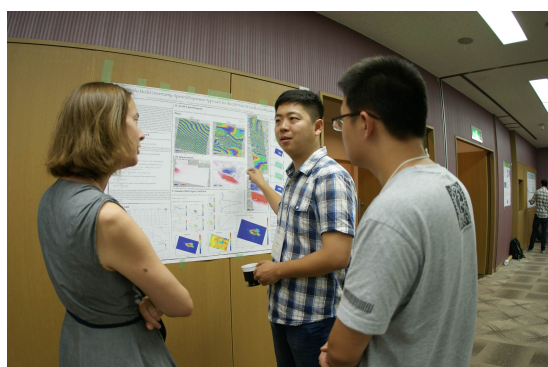
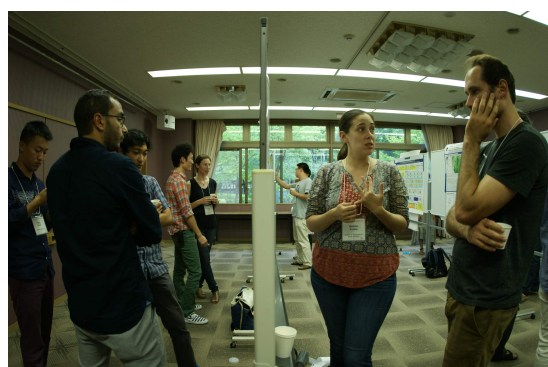
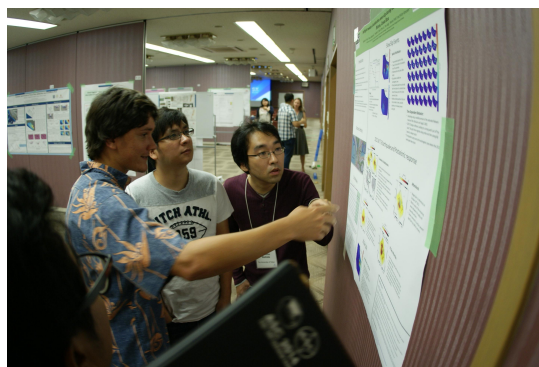
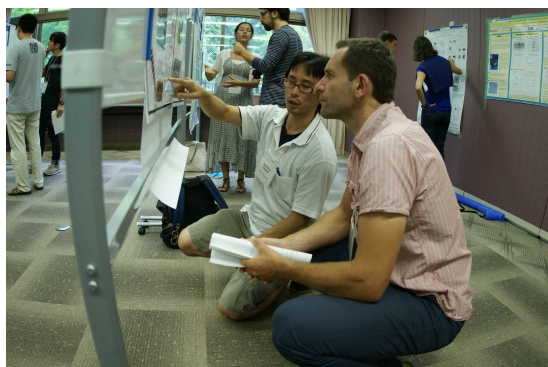
★謝辞： 開催に当たっては、国際室の全面的な支援を受けました。事務支援に当たっていただいた、中村さん、山田さん、またたくさんのすてきな写真を撮って下さった広報アウトリーチ室の福井さん、受講生達へのラボツアーを行って下さった同室黒澤さんに深く感謝いたします。最後に LOC メンバー（三宅、西田、波多野、中川、青木、竹尾）の教員の皆さんには、多くの時間と労力をさいて、また強力な“チーム力”のものと、スクールを成功に導いていただいたことを感謝します。将来のスクールでは、このうちの何人かが主催者または講師に名を連ねるようになることを期待します。

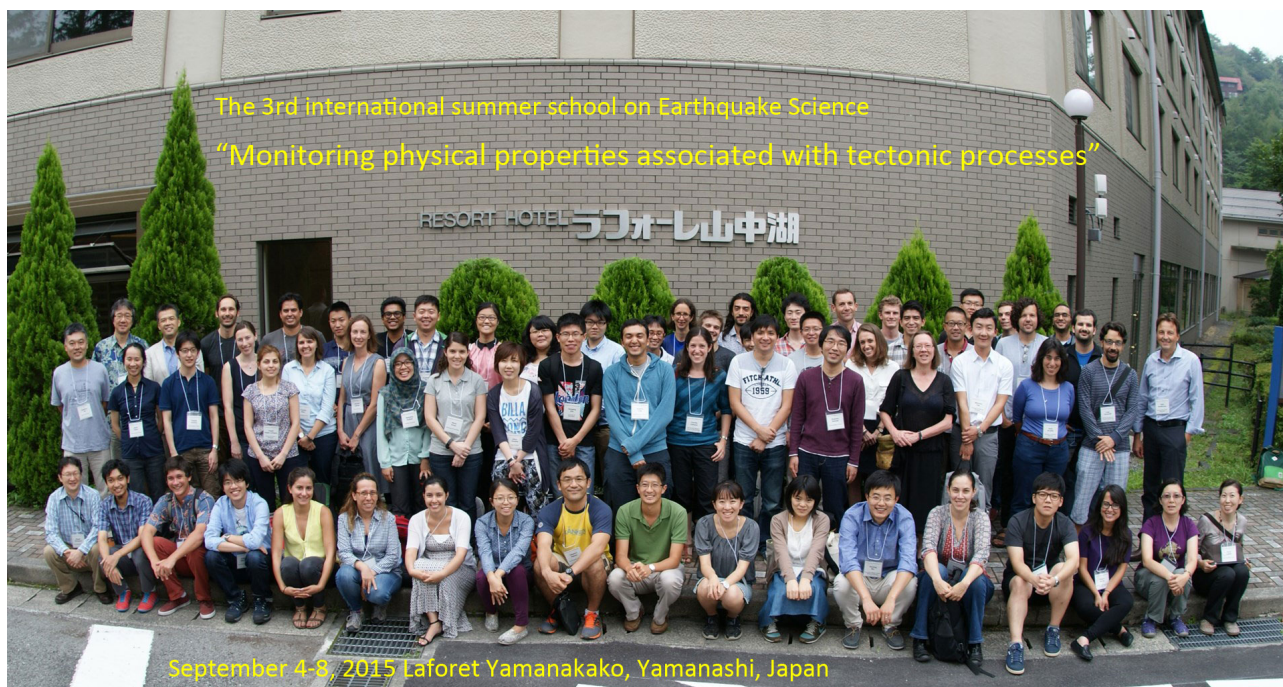
LOC 代表 川勝均

参考資料1. 国別受講者



参考資料2. スクール風景





Result of Survey for iSSEs2015

1. Please read each of the following statements carefully and select one of these five alternatives:

sorted by average points (5: Strongly Agree, 4: Agree, 3: Undecided, 2: Disagree, 1: Strongly Disagree)

- 9: Overall, this summer school was a valuable use of my time (4.59p)
- 3: The general theme was appropriate (4.46p)
- 6: Had great discussions at the poster session (4.27p)
- 2: Lectures were at the right level for participants (4.19p)
- 1: Lectures were at the right level for me (4.08p)
- 5: Length of poster sessions were appropriate (4.06p)
- 8: Field trip was worth to join (4.05p)
- 7: Had great discussions at other than sessions (3.95p)
- 4: Length of lectures were appropriate (3.65p)

2. Which aspects of the Summer School do you anticipate will be the most useful to you in your research? (Please limit to three):

sorted by counts (37 people, more than 3 choice for several people)

- 30p Opportunity to interact with other students/postdocs
- 23p Opportunity to interact with lecturers
- 21p Opportunity to learn about cutting-edge science in other fields
- 16p Opportunity to present your research in the poster sessions
- 15p Opportunity to learn about cutting-edge science in your own field
- 6p Opportunity to visit Japan
- 5p Opportunity to visit ERI

3. What aspects of the Summer School did you like best?

All participants and lectureers were open to discussions all the time, and freely shared ideas, intuitions, findings, etc. It was a very collaborative + educational environment. Local Japanese participants were really nice about answering evitural questions. excellent variety of international participants.

Cutting edge science provided and opportunity to interact with student/postdocs.

Discussion part is great!

Food!!! Onsan(mama)!!! Fuji!!! The way that the lecturer summarizes the basics of a field and explains the theory and some recent publications.

Free talk time, lectures

I appreciated leaning about cutting-edge science in my own field, even research that had not

been published yet.
I enjoy interacting with other students and posdocs because I feel like not only do we do exciting research, but we are able to communicate more easily on a personal level. Sometimes it is more difficult to discuss with professors.
I found some of the lectures vey useful.
I liked how the lectures seemed to tell a story and have a good progression of ideas.
I really enjoyed the style of lectures where basics introduced but talk ends with high level discussion.
It was a good opportunity to interact with students doing similar researches.
It was good to interact with other students, in particular roommates, in this summer school.
learning and knowing the current work for covered topics!
Lecture
Lecture. food.
made some connection with other country students.
Meet with many people from various institute.
Opportunity to have a discussion with other people. Making a connection with another reesarcher/student.
Opportunity to interact with lecturers.
Opportunity to interact with other students/posdocs
opportunity to lean with others in the same major, so I could learn how to be a researcher in geophysics ^o^ Thanks a lot.
Organization and quality of presentations.
Speaking with other students in my field
The lectures were very good. They were very appropriate for the theme of the school, and the lecturers were very dynamic.
The lectures where of cutting edge topics.
The poster sessions.
This summer school is a great opportunity for students to lean new areas and develop innovative new research ideas. Please continue to organise this course, so that future studnts get this opportunity too! The 3-day length of the course is perfect also.
time to interact with fellow students, postdocs from all over the world / overview of cutting-edge research

4. What suggestions for improvement do you have for the Summer School?
(skipped)

5. About the logistics of the Summer School...:

sorted by average points (5: Strongly Agree, 4:Agree, 3:Undecided, 2:Disagree, 1:Strongly Disagree)

7: Onsen was great (4.60p)

4: I would recommend this summer school to others. If you do not agree, please tell us why in the comment area below (4.57p)

6: The hotel was a good choice (facilities and amenities) (4.57p)

3: The food accommodated my diet and kept me going through the course (4.54p)

1: The arrangements prior to the workshop were clear and timely (4.38p)

2: Access to the school site was easy, and well announced (4.27p)

5: The hotel was a good choice (location) (4.19p)

The 3rd international summer school on Earthquake Science
“Monitoring physical properties associated with tectonic processes”



September 4-8, 2015
Laforet Yamanakako, Yamanashi, Japan



This summer school is organized by the Earthquake Research Institute of the University of Tokyo and the Southern California Earthquake Center.

Committee

Program Committee

Kiwamu Nishida	ERI, the University of Tokyo
Yoshihiro Ito	DPRI, Kyoto University
Aitaro Kato	Nagoya University
Victor Tsai	California Institute of Technology
Rowena Lohman	Cornell University

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The 3rd international summer school on Earthquake Science

“Monitoring physical properties associated with tectonic processes”

Introduction:

The Earthquake Research Institute of the University of Tokyo (ERI) and the Southern California Earthquake Center (SCEC) organize an international summer school on Earthquake Science in September 4-8, 2015 at Lake Yamanakako, Japan. We encourage graduate students and postdocs in the field of the international community to participate.

- Date: September 4-8, 2015
- Venue: Laforet Yamanakako, Yamanashi, Japan
- Scope:
- International summer school on Earthquake Science
 - Top-level scientists for key-note lectures
 - Encourage graduate students' and postdocs' presentations
 - Full week poster sessions for discussion
- Participants: 48 graduate students and postdocs

Sessions

With recent improvements in modern geophysical observations and developments of new powerful analysis techniques, we have now reached a stage where we can detect temporal changes of the Earth's interior associated with tectonic processes. These temporal changes include changes of elastic media, crustal and volcanic deformation, and variability in seismicity and earthquake source mechanisms. This summer school, in particular, focuses on monitoring of the Earth's interior using seismic and geodetic methods. The program is divided into the following three sessions.

1. Monitoring seismic velocity structure with seismic interferometry

Probing temporal changes in seismic velocity structure is key for understanding tectonic deformation. Recent developments in seismic interferometry have allowed for use of ambient noise to monitor temporal changes in seismic velocities due to earthquakes and volcanic eruptions. The technique extracts wave propagation between a pair of stations by cross-correlating seismic ambient noise field. This session aims to introduce the technique, and review of new observations.

2. Monitoring crustal deformation

Recent dense geodetic observations on land (e.g., GPS) enable the monitoring of spatial and temporal variations of crustal deformation associated with tectonic processes (e.g. co-seismic and post-seismic deformations of earthquakes, slow slip events, and magma intrusions). Specifically, “high-rate GPS” allows us to measure time-dependent surface displacements related to megathrust events, tsunamis and volcanic eruptions. Satellite geodesy (e.g. inSAR, GRACE) also provides us a finer picture of Earth surface processes and its gravity field. This session aims to introduce recent geodetic methods, new observations, and the physical interpretations resulting from such studies.

3. Monitoring seismicity

Analysis of seismicity and changes to it is a powerful way to identify tectonic processes because of how seismicity is sensitive to slight changes in the mechanical state in depth. The emergence of dense, low-noise, broadband seismic networks worldwide provides better information on the spatial–temporal evolution of earthquakes than ever before. For example, there have been recent observations of earthquakes that are dynamically triggered, seismicity occurring before large earthquakes, and earthquake migration linked to dike intrusions. In addition, anomalous earthquakes such as long/very-long period earthquakes, non-volcanic and volcanic tremor, and repeating earthquakes have been detected. This session focuses on new observations of seismicity changes and quantifying source mechanisms controlling earthquake and volcanic processes.

Program

September 4 (Friday)

- 13:00 Registration (Rooms will be ready at 3 pm.)
 18:00 & 20:00- Icebreaker (light dinner and drinks) at “Ginga”

September 5 (Saturday)

- 7:00 - 8:30 Breakfast at “Dining”
 8:45 - 9:00 Introduction and logistics
 Session: Monitoring seismicity
 9:00 - 10:30 Lecture
 Felix Waldhauser (Lamont-Doherty Earth Observatory)
 Resolving and monitoring changes in seismicity and seismogenic
 properties
 10:30 - 11:00 Coffee
 11:00 - 12:30 Lecture
 Heidi Houston (University of Washington)
 Tidal influence on slow slip and tremor: A window into the physical
 environment deep in subduction zones
 12:45 - 13:45 Lunch at “Dining”
 14:00 - 15:00 Presentations by students/postdocs
 (1) **Suguru Yabe**: Frictional characteristics change due to spatial
 distribution of velocity-weakening patches
 (2) **Ryo Okuwaki**: High-frequency rupture related to the complex
 fault system and variable slip motions, insights from hybrid
 backprojection image of the Mw 7.9 2008 Wenchuan, China,
 earthquake
 (3) **Wenyuan Fan**: How much can we hope to resolve in earthquake
 rupture processes with back-projection?
 15:00 - Group photo & Poster core time
 15:30 - 16:30 Coffee
 16:30 - 18:00 Lecture
 Kazushige Obara (ERI, the University of Tokyo)
 How to discover non-volcanic tremor -Effective monitoring-
 18:30 - 20:00 Dinner at “Dining”
 20:00 - Free discussion

September 6 (Sunday)

7:00 - 8:30	Breakfast at “Dining”
9:00 - 10:30	Lecture Emily Brodsky (University of California Santa Cruz) The Uses of Dynamic Earthquake Triggering
10:30 - 11:00	Coffee <i>Session: Monitoring seismic velocity structure with seismic interferometry</i>
11:00 - 12:30	Lecture Eric Larose (Institut des Sciences de la Terre, CNRS and Université de Grenoble) Ambient seismic noise: from imaging to monitoring mechanical changes
12:30 - 13:30	Lunch at “Dining”
14:00 - 15:00	Presentations by students/postdocs (1) Brent Delbridge : Geodetic Measurements of Slow Slip and Tremor in Parkfield, CA (2) Camilla Catania : A slow rupture episode during the 2000 Miyakejima dike intrusion (3) Loïc Viens : Toward complete extraction of basin-scale Green's functions from the ambient seismic field
15:00 -	Poster core time
15:30 - 16:30	Coffee
16:30 - 18:00	Lecture Victor Tsai (California Institute of Technology) Pushing the Limits of Ambient Seismic Noise
18:30 - 20:00	Dinner at “Dining”
20:00 -	Free discussion

September 7 (Monday)

- 7:00 - 8:30 Breakfast at “Dining”
 Session: Monitoring crustal deformation
- 9:00 - 10:30 Lecture
 Kosuke Heki (Hokkaido University)
 Space geodetic approaches in earthquake science: time-variable
 gravity, crustal movements, and polar motion
- 10:30 - 11:00 Coffee
- 11:00 - 12:30 Lecture
 Rowena Lohman (Cornell University)
 Geodetic imaging of earthquake sources - from high rate GPS to
 InSAR and beyond
- 12:30 - 13:30 Lunch at “Dining”
 Posters
- 15:30 - 16:30 Coffee
 Session: Monitoring seismicity
- 16:30 - 18:00 Lecture
 Hiroyuki Kumagai (Nagoya University)
 Broadband seismic monitoring of active volcanoes
- 18:30 - 20:00 Banquet at “Ginga”
- 20:00 - Free discussion

September 8 (Tuesday)

- 7:00 - 8:00 Breakfast at “Dining”
 Check out & adjourn
- 8:30 (Optional) Field trip to Mt. Fuji