

様式 A-1
(FY2025)

7年 11月 26日

サイエンス・ダイアログ 実施報告書

1. 学校名: 神奈川県立厚木高等学校
2. 講師氏名: Dr. Usman ALI
3. 講義補助者氏名: 佐藤 鷹
4. 実施日時: 7年 11月 7日 (金) 16:00 ~ 17:30
5. 参加生徒: 1年生 14人、2年生 9人、3年生 1人 (合計 24人)
備考: (例: 理数科の生徒)
6. 講義題目: Effect of crushing-induced particle size and shape change on the mechanical behavior of granular materials
7. 講義概要: 土の中にある粒(粒子)は、重いものが乗ると砕けて小さくなります。すると、粒のサイズや形が変わり、それによっても土の性質も大きく変化します。実験では、角ばった粒が多い土ほど、粒同士がしっかりかみ合って強くなり、崩れにくくなることがわかりました。一方で、粒が丸くなると転がりやすくなり、土は弱くなって流れやすくなってしまいます。つまり、目に見えないほど小さな「粒の形の変化」が、地面の安全性に大きく関わっているのです！
この講義では、土の中の小さな粒子が、ほんの少し形を変えるだけで、地面の動き方がガラッと変わる不思議な仕組みを解き明かします。目に見えないミクロの世界が、地震や建物の安全にどう関わっているのか——高校生にもわかりやすく、そしてワクワクする内容でお届けします！(教員による日本語訳)
8. 講義形式:
対面 ・ オンライン (どちらか選択ください。)
 - 1) 講義時間 60分 質疑応答時間 30分
 - 2) 講義方法 (例: プロジェクター使用による講義、実験・実習の有無など)
プロジェクター使用による講義、実験あり
 - 3) 事前学習
有 ・ 無 (どちらか選択ください。)
使用教材:
9. その他特筆すべき事項:

Form B-2
(FY2025)
Must be typed

Date (日付)
12/11/2025 (Date/Month/Year: 日/月/年)

Activity Report -Science Dialogue Program-
(サイエンス・ダイアログ 実施報告書)

- Fellow's name (講師氏名): Usman Ali (ID No. P24370)

- Name and title of the lecture assistant (講義補助者の職・氏名)
Mr. Taka Sato – Master student

- Participating school (学校名): Kanagawa Prefectural Atsugi High School

- Date (実施日時): 07/11/2025 (Date/Month/Year: 日/月/年)

- Lecture title (講義題目):
Effect of particle shape change due to crushing on the mechanical behavior of granular materials

- Lecture format (講義形式):
◆ Onsite ・ Online (Please choose one.)(対面 ・ オンライン)((どちらか選択ください。))
◆ Lecture time (講義時間) 45 min (分), Q&A time (質疑応答時間) 45 min (分)
◆ Lecture style (ex.: used projector, conducted experiments)
(講義方法 (例: プロジェクター使用による講義、実験・実習の有無など))
used projector for lecture and afterwards conducted onsite experiments with students

- Lecture summary (講義概要): Please summarize your lecture within 200-500 words.

In this lecture, I began by introducing my background and explaining my interest in studying the behavior of granular materials such as soils. I showed students how granular matter exists widely in nature, how humanity benefits from it, and its existence on other terrestrial planets. Then, I presented my recent research on how particle shape and its evolution due to breakage or crushing affect soil resistance to shearing, which can lead to landslides, as well as how particle shape influences the flow distance of soil after failure. To engage the students, I mainly used figures and animations to illustrate these ideas. Throughout the lecture, I related scientific concepts to real-life examples that students could easily imagine, such as videos of actual landslides, and used simple but practical analogies to strengthen their understanding. To make the content more accessible, I used minimal text and also included Japanese translations on the slides.

Both students and teachers seemed to enjoy the lecture and showed great interest. My main goal was to make learning enjoyable while clearly conveying the core idea of my work. After the lecture, many students asked thoughtful questions, reflecting their keen attention. We concluded with a

hands-on experiment related to the lecture, a granular collapse test comparing round and angular particles. The experiment was simple yet captured the idea of the lecture. Students performed it themselves and directly observed how particle shape significantly affects granular flow, similar to what happens during landslides. Afterwards, we had a discussion to logically explain the observed results and connect them back to the research concepts.

◆Other noteworthy information (その他特筆すべき事項):

The teachers coordinated with me well before the lecture, planned everything thoroughly, and gave us a warm and welcoming reception. Moreover, the English proficiency of students was good, and they confidently asked engaging questions about both my life in Japan and the content of the lecture. They were particularly curious about why I chose Japan for my studies. I explained that the state-of-the-art research and innovations in Japan in my field were the main reasons behind my decision. We also discussed the importance of English as a global communication tool in science and education. Since landslides are common in earthquake-prone countries like Japan, the students showed great interest in understanding the phenomenon and ways to prevent it. Together, we discussed various natural challenges and potential solutions to reduce the impact of landslides.

At the end of the session, I asked the students to share one key message they learned from the activity. I was delighted to hear their thoughtful responses, which confirmed that I had successfully communicated the core idea of my research. Two students said:

Student 1: "Particle shape is very important in affecting landslides."

Student 2: "Something small in nature, like particle shape, can have significant impacts."

- Impressions and comments from the lecture assistant (講義補助者の方から、本プログラムに対する意見・感想等がありましたら、お願いいたします。):

It was a lecture where the students' high level of curiosity could be seen everywhere, and I believe it was a very meaningful experience for them. What impressed me first was that they had carefully read the abstract distributed in advance and had even asked their teachers about unfamiliar technical terms to understand them before attending the lecture.

During the Q&A session at the end, although we told them that they could ask questions in either English or Japanese, every student chose to ask their questions fluently in English. Despite the fact that the research topic was complex and the lecture was conducted in a non-native language, they faced it earnestly, and I could strongly feel their genuine desire to engage with both the research and the English language.