

## **Report on the 2023 Slow-to-Fast Workshop held in Tokyo**

The workshop portion of this meeting was held at the Ito International Center of Tokyo University, which provided a good room for the meeting's main session, coupled with space just outside where posters could be discussed during coffee breaks. The workshop format of a single suite of talks, with a fair amount of time to discuss talks and interact with the speakers worked very well, as did the broad range of topics that were scheduled for the plenary sessions. The posters were able to be placed in a good viewing space.

The meeting was a very effective way for an interested scientist to become aware of the current state-of-the-art in research on seismic slip associated with a range of slip styles in terrestrial shear zones (ranging from tremor activity to regional and megathrust earthquakes), and the geophysical, geological, and geodetic tools used to study them. It also proved very useful for stimulating connections between researchers investigating different aspects of these phenomena, and in introducing the novice practitioner to the wide range of approaches and field areas that are useful for studying these phenomena. It was a pleasure to learn so much in a concentrated meeting, with the area near the venue also providing a nice range of relatively inexpensive meals and evening activities.

## **Report on 1-day Field Trip to see elevated Boso Peninsula (Tokyo) beach terraces that were created by the 1923 Taisho (M7.8) and the 1703 Genroku (M8.2) Megathrust Earthquakes**

The field trip was led by Junki Komori (NTU, Singapore) and Ryosuke Ando (U. Tokyo) with the help of Asuka Yamaguchi (U. Tokyo). We travelled in a group bus that left around 8am on Saturday 16 September from the University of Tokyo Campus where the meeting had been held, and were dropped at the JR Soga Train station near Chiba (roughly 1 hour metro ride from downtown Tokyo) around 18:00 the same day. Approximately 40 people participated in this field excursion.

The first stop was along the Kenbutsu coastline (Tokyo Bay) where marine terraces resulting from the 1923 Taisho EQ along the underlying megathrust are well exposed. A short (200 m) walk was needed to reach the beach. The gentle (bay exposure) of this outcrop meant that the ~2 m beach uplift associated with this event was well-observed as a discrete beach terrace. (Fig. 1 and 2)



Figure 1. This figure shows the typical geometry of the former coastline (beach terrace) that rises above the present-day beach level in this part of the coast.



Figure 2. Panoramic view of Kenbutsu coastline at stop 1.

The exposed rocks were also interesting, in that they showed material making up this portion of the Japan Trench/Nankai Trough (and the Nankai Trough's northward extension, the Segami Trough that currently subducts offshore the southern Boso Peninsula) subduction system. In particular, we could see frequent clasts within a volcanoclastic matrix (Fig. 3).





Figure 3. Blocks of fine grained (silty clay material) within a volcanoclastic matrix. (The small umbrella is ~20 cm, for scale.)

Stop 2 - Shirahama area along the coast between Kenbutsu and Chikura.



At this stop we also had the chance to appreciate both sets of beach terraces, with the lower one (1923) being almost at sea level. At this stop we also saw beautiful examples of block-in-matrix complexes where the clasts had deformed after they became less strong than the matrix in which they were embedded.





Figure 4. Embedded clast.



Figure 5. Flame structures within the volcanoclastic sandstone.





Figure 6. Embedded clast behaving like a weak block within its deforming matrix.

In this outcrop it was possible to see small-scale rheological behaviour in the accretionary prism. This was as interesting as the beautiful examples of beach terraces that we saw on all 3 field stops during this trip.

During the second stop (the Shirahama area) the larger, earlier up to ~6m high terraces of the 1703 Genroku event were particularly well exposed, and at the 3<sup>rd</sup> stop near Chikura we could see examples of even earlier beach terraces preserved as terraces in agricultural and residential areas.

### Stop 3 - Chikura

Because the 3<sup>rd</sup> stop was on a Pacific-ocean-facing area of the coastline, the smaller uplifts associated with the 1923 event were harder to see, implying that beach erosion processes are a key factor in the preservation or non-preservation of these features. However at Chikura we were able to appreciate a longer time frame, with terraces dating back to 6000 years ago (Figure 7).





Figure 7. Here the train line appears to be built on a pre-existing terrace (this terrace was seen at the end of the small hike associated with the 3<sup>rd</sup> stop).