Title:

Urgent survey of coastal response in beach and coral reefs to the Sunda Strait tsunami

Principal investigators:

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Aim of the research

- We study coastal response in beach and coral reefs to the 2018
 December Sunda Strait tsunami through the urgent survey along the northwestern coast of Banten, Java Island, Indonesia.
- The objective of the tsunami deposit survey is to examine the early stage of post-depositional change in the deposits including their distribution, composition, and sedimentary structure.
- The objective of the coral survey is to understand the response of corals to the tsunami.
- As both tsunami deposits and coral skeleton are important geological evidence of tsunami, these basic data and information must be useful for identification and utilization of the past evidences to assess the future tsunami hazard in this area.

Research team and period

Japan:

Yuichi Nishimura (Hokkaido University) Tsuyoshi Watanabe (Hokkaido University) Atsuko Ishida (Kyushu University)

Indonesia:

Eko Yulianto (LIPI) Purna Sulastya Putra (LIPI) Septriono Hari Nugroho (LIPI)

Period:

Our field survey will be held in November 2019 – February 2020. It will take less than one week for both the tsunami deposit survey and the coral research. We plan to do the surveys in the same period but depending on the situation we will do two surveys in the different period.

Research area



Post-depositional change

Physical

- washing out of the surface fine sediment
- re-deposition of the sediment
- leveling of the surface
- disturbation by frost heaving

Chemical

- removal of salt
- dissolusion of carbonate materials
- oxidation of metalloids

Biological

- bioturbation by roots and animals
- human activity



shortly after the tsunami



1 year after the 2011 Tohoku tsunami



Inundation area estimated by distribution of sandy tsunami deposit

1 year after the 2011 Tohoku tsunami



Sandy tsunami deposits that buried by new soil observed in Misawa, Japan

Post-tsunami alternation: Tropical coast

Solomon Islands

Due to severe biological disturbances, layer thickness changes and the disappearance of sedimentary structures are fast.

Identification of Paleo-tsunami deposit

Know characteristics of tsunamigenic deposit.
 Where and how?
 (tsunamigenic process)

Evaluation of taphonomy of tsunami deposit.
 (post tsunami process)

Important to study the alternation process from newly formed tsunami deposit to young paleo-tsunami deposits

Field work this year (tsunami deposit)

- Revisit the deposit study sites by LIPI.
- Describe the sedimentary structure and take samples by using a handy geoslicer and peat sampler.
- Coordinate of the sample location is determined by GNSS precisely.

Tsunami deposit

Sampling by a geoslicer

Core sample in a geoslicer

Field work this year (tsunami deposit)

- Grain sizes and density characteristics of the sand and composition of microfossils (foraminifera and diatom) will be analyzed in laboratories in LIPI in Bandung or Hokkaido University in Sapporo.
- The distribution and sedimentary features will be compared with that observed in the previous survey that was done in one week after the event.
- Where we can find the well-preserved deposits in peat or sandy soil, we will try to find the 1883 Krakatau tsunami deposits and compare their special distribution, sedimentary structure and composition with the 2018 deposits.

Coral response to tsunami?

- We have collected modern and fossil coral cores by underwater drilling of massive *Porites* colony in S. Pagai Is., Mentaiwai Is., and Simeulue Is, Sumatra.
- We obtained coral cores of 100-150 years annual bands including past earthquake and tsunami records.
- We use high-resolution geochemical analysis to reconstruct past records of earthquake and tsunami.
- We apply this strategy to agedetermined fossil corals.

Field work this year (coral reef)

- Collect small tsunami boulders of dead corals (diameter of 10 to several tens cm each) or pieces of them on land and a part of living corals under water and compare skeletal microstructures and geochemical signals from each skeletal part.
- We will take soft x-ray images of the cut samples and observe the annual bands. Geochemical analyses will be performed for samples took every 0.1 mm interval along the bands.

Sampling a part of coral reef (project in 2010). In our proposed project this year, we do not use these tools.

Coral boulders carried up by the 2018 tsunami

Expected results

- We can understand the early stage of post-depositional change in the sandy tsunami deposits in the tropical region.
- We can understand the coral response to tsunami impact.
- As both tsunami deposits and coral skeleton are important geological evidence of tsunami, these basic data and information must be useful for identification and utilization of the past evidences to assess the future tsunami hazard in this area.