

Depositional processes and recurrence of seismo-turbidites along the southern Ryukyu Trench

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Large earthquake and tsunami is a triggering mechanism of the turbidity current and a formation mechanism of turbidite. The 1771 Meiwa tsunami was one of the most destructive and largest historical tsunami along the southern Ryukyu arc. Recent study on the tsunami boulders (big coral boulders) on the coast of southern Ryukyu islands suggested that the large tsunamis hit the coast with their intervals around 150-400 years. On the other hand, the previous report indicated that the averaged interval of turbidite deposition at SW of Ishigaki Island was around 1000 years. Therefore, there is still uncertainty of the past large earthquake and tsunami history along the southern Ryukyu arc. To understand the depositional processes of the southern Ryukyu forearc area and to obtain more precise recurrence interval of turbidite deposition, we collected sediment cores from the forearc basins and the Ryukyu Trench floor. Many turbidite beds composed of bioclastic carbonate grains were intercalated in calcareous silt in the cores obtained from a small submarine fan at the mouth of a submarine canyon at SW of Ishigaki Island. Comparison of lithology of four cores from the fan indicated the temporal shift of depocenter of turbidites. This suggests that at least some cores need to reconstruct the depositional history of the turbidites on the submarine fan. Preliminary result of the radiocarbon datings of two cores suggests that the recurrence intervals of the turbidites on the fan might be 400-1000 years since the last glacial maximum. This still shows a discrepancy with the estimation from onshore tsunami boulders. To solve the discrepancy, we should clarify the exact source of the turbidite sands and their transport mechanisms.

A core collected from a terminal forearc basin at SW of Iriomote Island contained thick and massive muddy turbidites with sharp erosional basal contact and thin sandy layer composed of lithic fragments. Two cores from the nearby forearc basin also intercalates with the similar muddy turbidites but also with thick calcareous sandy beds with chaotic structures, suggesting at least two different sediment sources for the event deposits. Two cores obtained from the southern Ryukyu Trench floor composed of gray silt with numerous thin coarse silt layers composed of lithic fragments. These lithic materials both in forearc basins and trench floor might be originated from Taiwan. Therefore, the southern Ryukyu forearc and trench is a unique location where both Ryukyu arc and Taiwan provides the mass transport deposits.