# Emplacement processes and provenance of submarine volcaniclastic deposits (IODP Site C0011, Nankai Trough)

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During IODP NanTroSEIZE Expedition 322, four packages of tuffaceous sandstones (TST 1, 2, 3a, 3b) were recovered within a moderately lithified and bioturbated silty claystone succession in the Late Miocene (>7.6 to 9.1 Ma) upper part of the middle Shikoku Basin deposits. To assess the emplacement processes of the tuffaceous sandstones we investigate modal and geochemical compositions of 24 thin sections that reveal systematic vertical changes within each bed.

The volcanic glass particles (pumice and shards) are the dominant modal constituents of each sandstone bed. They either have homogeneous compositions (major and trace element glass-shard compositions) or define a well-constrained compositional variation trend. This implies that each package derived from a single pyroclastic or a single eruptive event as opposed to gravity currents resulting from collapse of large, heterogeneous slope sections. TST 1, 2 and 3b are single beds whereas TST 3a is composed of at least three beds suggesting several rapidly succeeding sedimentation events. The beds are density-graded such that low-density pyroclasts including pumice lapilli are enriched at the top whereas dense lithic components and minerals are enriched at the bottom.

All tuffaceous sandstones support emplacement by volumetrically large, high-energy, turbidity currents directly derived from major explosive volcanic eruptions, probably involving the entrance of massive pyroclastic flows into the ocean (TST 1 to 3a) or generated by a submarine eruptions (TST 3b) with sufficient momentum to pass over into turbidity currents and travel over hundreds of kilometers at the seafloor.

Moreover, major and trace element glass compositions as well as isotopes show that the tuffaceous sandstones came all from a similar source region at the Japanese mainland despite the vicinity to the Izu Bonin arc or backarc. Trace element ratios like Nb/Zr versus La/Sm, Th/Yb versus Ta/Yb or Ba/Zr versus B/Zr assist this and additionally element ratios of Th/La versus Sm/La, Rb/Hf versus Th/Nb or U/Th versus Th/Nb suggest a mantle source region lying below continental crust, which is inexistent below the Izu-Bonin arc. Regional geological settings, and convergence of some chemical and isotopic indicators toward an early-stage Izu-Bonin influence culminate in the result that the collision zone between Izu-Bonin and Honshu Palaeo-arc on Izu-Peninsula, Japan, has been the most likely potential source area for the ignimbrites of Unit IIa.