

Tonalitic clasts mingled with volcanoclastic debrites of Tanzawa Terrane: implications for Miocene IBM arc middle crust

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The Tanzawa Terrane in the Izu Collision Zone is a place exposing the past northern Izu-Bonin-Mariana (IBM) arc crust. Volcanoclastic debrites of the Tanzawa Terrane are mingled with locally plutonic rock clasts varying from gabbro (two-pyroxene hornblende gabbro) through diorite to tonalite (hornblende tonalite), although their amounts and distribution are minor. These clasts would be derived originally as xenoliths. Formation ages of plutonic bodies originating these clasts are obviously older than the known average ^{40}Ar - ^{39}Ar age, 7 Ma, of the Tanzawa Plutonic Complex (TPC) (Saito, 1993) regarded as the exhumed IBM arc middle crust. Accordingly, these clasts provide expectedly information regarding the generation of the IBM arc middle crust prior to cooling of the complex and during deposition of the Tanzawa Group corresponding to the IBM arc upper crust before 10 Ma. In the Tanzawa Group, tonalitic rock clasts, attaining to cobble-size, get to be yielded from the horizon of about 17 Ma (middle part of the Togatake Subgroup), and the largest clasts are reached to boulder-size over 1 m in length. Such large clasts of tonalite are also mingled with volcanoclastic conglomerate of about 8 to 6 Ma, correlated with the Nishikatura Group, distributed in the central part of the Tanzawa Terrane, where there were no influx of terrigenous coarse sediments at that time. A fission track analysis in respect to the tonalite clasts of which the depositional ages of the host beds are about 15 and 7 Ma, provides a result showing reset ages of approximately 9 Ma (9.2 ± 0.6 Ma and 8.7 ± 0.4 Ma, respectively). This reset age suggests that overall uplift of the Tanzawa Terrane began just before 9 Ma. Consistently, the doming of the terrane is considered to have started at about 11 Ma from the formation age of the syndepositional fold system in the eastern part of the Tanzawa Terrane. Characteristics of bulk chemical composition of these clasts demonstrate that there are two types of clast, in generally, showing similar fractional trends to that of low-K tholeiitic rocks and that of tonalites of the TPC. In addition, felsic lava, intrusive rocks and tuffs are roughly separated into the above two types. These results imply that both magmatic processes similar to that generating the TPC, dehydration partial melting of low-K tholeiitic rocks, and to another one, fractionation of low-K tholeiite, were governed to form the Miocene middle crust, although an argument which type is the major process to grow the middle crust is remained.