**Japan Geoscience Union Meeting 2011**
(May 22-27 2011 at Makuhari, Chiba, Japan)


SGL042-01 Room:202 Time:May 23 16:30-16:45

# A result of Marine Seismic exploration in deep region and Gravity investigation in the western part of Seto Inland Sea

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Japanese only

Keywords: marine seismic exploration in deep region, reflection seismic survey, refraction seismic survey, gravity investigation, median tectonic line

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# Folded granite with axial planar foliations, the Cretaceous Kitakami type granite, north-east Japan

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The Kitakami type granitic plutons are in the Kitakami zone. The southern and northern Kitakami zones consist of continental and accretionary facies rocks, respectively. All the rocks of the Kitakami zone possess severe pressure-solution cleavages and associated folds formed under sinistral, although lateral component was mild, transpressional stress field, but the most plutons usually have igneous textures only. Therefore deformation is basically thought to predate the plutonic intrusions. The Kesengawa granite, and some other plutons and intrusions are, however, known to have foliations penetrated by the cleavages observed in surrounding sedimentary rocks, unrelated to the outer shape of granitic plutons. We newly found tectonic fold with axial planar foliations in part of the Kesengawa granite. Granite can be folded, and because of association of newly crystallized and aligned amphiboles and biotites, folded granite can be called a gneissose granite. Furthermore, the Kesengawa pluton at least, and the Kitakami rocks, were exhumed as a whole, by giant doming associated with upright folds (associated with asymmetric parasitic folds) and their axial planar cleavages, when subducting Izanagi-Kura ridge strongly compressed the forearc and the following transform faulting overprinted the sinistral deformations. Most plutons are known to be adakitic indicating slab melting, and consequently, contrary to the probable older Kesengawa granite, not well foliated. The tectonic and igneous event is called the Oshima orogeny, and its final expression is a major and unique unconformity.

Keywords: Kitakami granitic pluton, aplite marker, asymmetric fold, axial planar foliation, exhume, ridge subduction

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# Relationship between detrital chromian spinels from the Paleozoic and Mesozoic clastics and ophiolite zones in the Japan

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The detrital chromian spinels in SW Japan were obtained from the Paleozoic and Mesozoic strata of the Circum-Hida tectonic zone (Renge belt), Oeyama belt, Akiyoshi belt, Maizuru belt and Mino-Tanba belt of Inner Zone, and the Kurosegawa tectonic zone (Chichibu belt) and Shimanto-Sanbagawa belt of Outer Zone. In addition, they were obtained from the similar strata of the South Kitakami belt in NE Japan. All detrital chromian spinels are categorized into two major types based on the scatter pattern on the Cr#-TiO2 diagram; alpha and beta types. alpha type is represented by a wide range of Cr#, usually 0.3 to 0.9 , and very low TiO2 content, less than 0.5, whereas beta type is characterized by a narrow range of Cr#, 0.4 to 0.6, and higher TiO2 content, 0.0 to 2.0. The occurrence of two types is different in respective belt and depositional ages of contained sediments. The detrital chromian spinels of alpha type is limited in the Paleozoic strata of the Kurosegawa tectonic zone and the South Kitakami belt as well as the Mesozoic strata of the Circum-Hida tectonic zone. On the other hand, those of beta type are restricted in the post-Carboniferous of the other belts. The chemistry of detrital chromian spinels from the Japanese Islands suggests that the sediments provenance occurred in the late Paleozoic age as evidenced from alpha type to beta type. This might be caused by the difference of formative process among accretionary complexes.

Keywords: detrital chromian spinel, ophiolite, the Japanese Islands, forearc, Paleozoic, Mesozoic

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# Geochronology of the Sanbagawa belt, Southwest Japan

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The high-pressure metamorphic rocks of the Sanbagawa belt, originated from deeply underplated accretionary complexes, show long and narrow distribution from the Kanto Mountains to east Kyushu. The metamorphic rocks are overlain on the south by non- to weakly-metamorphosed accretionary complexes of the Chichibu composite belt, which are, in turn, underlain by Cretaceous accretionary complexes of the Shimanto belt further on the south. The Cretaceous Shimanto belt consists, in apparently descending order, of Late Albian-Turonian (characteristically contains Triassic limestone blocks), Coniacian-Campanian, Campanian-Maastrichtian, and Maastrichtian-Paleogene units. The metamorphic or metamorphic cooling ages from the Sanbagawa belt revealed by the $^{40}Ar/^{39}Ar$ and K-Ar methods are approximately 95-60 Ma, although the peak metamorphic age and the protolith age of the eclogite unit are believed to be 120-110 Ma and Jurassic-Early Cretaceous, respectively.

In spite of the protolith age assumption of the eclogite unit, recent studies have started to show that substantial amounts of the Sanbagawa metamorphic rocks, psammitic schists in particular, have been originated from Late Cretaceous protoliths. The results of recent preliminary studies mentioned above strongly encourage the author to revise the structural division and tectonic history of the Sanbagawa belt. Hence this study aims to carry out the U-Pb age dating of detrital igneous zircons in the Sanbagawa psammitic schists.

The author measured the age of detrital igneous zircons from 18 psammitic schist samples from the Sanbagawa belt in the Kii Peninsula, central Shikoku, and eastern Kyushu. Detrital zircons that show oscillatory zoning structure under cathodoluminescence, a typical feature of igneous zircons, were separated from these samples, and the U-Pb age of each zircon was measured with LA-ICP-MS.

The results of the analysis clearly show that the 18 psammitic schist samples in the Sanbagawa belt were deposited in Late Cretaceous time or a little later. From the regional geologic structure mentioned above, the author proposes that the metamorphic rocks of the Sanbagawa belt, except for the eclogite unit and surrounding rocks occupying 10 % or less of the belt, have presumably been originated from the accretionary complex of the Cretaceous Shimanto belt. In other words, most of the protoliths of the Sanbagawa metamorphic belt had not been accreted to a continental or island-arc margin by the end of Early Cretaceous time, but were accreted from Late Cretaceous to earliest Paleogene times. In the present study, the metamorphic rocks of the Sanbagawa belt originated from the rocks of the Cretaceous Shimanto belt are called the Shimanto metamorphic rocks. The Shimanto metamorphic rocks are subdivided into three units as Lower, Middle, and Upper, from the zircon ages obtained in the present study and lithofacies. The Lower unit was formed in 75-70 Ma (Late Campanian-Maastrichtian) and are almost lacking in the zircons of 150-110 Ma. The Lower unit can be correlated with the Campanian-Maastrichtian unit of the Cretaceous Shimanto belt. The Middle unit is formed about 90 Ma (Turonian) and, is correlated with the Coniacian-Campanian unit of the Cretaceous Shimanto belt. Although chronological data from the Upper unit are scanty, the metamorphic rocks along the southern margin of the Sanbagawa belt contain lenses of calcareous schist yielding Late Triassic conodonts. Judging from the tectonostratigraphical position and lithofacies, the author proposes that this part of the Sanbagawa belt is occupied by metamorphic rocks originated from the Late Albian-Turonian units of the Cretaceous Shimanto belt.

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# MESOZOIC ZIRCON GRAINS FROM THE DEVONIAN YOSHIKI FORMATION, TAKAYAMA CITY, JAPAN

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Many studies had made clear the post-Carboniferous radiolarian biostratigraphy in the world, and radiolaria nowadays receives wide recognition as an important tool for revealing the Earth history. Whereas the biostratigraphy of pre-Devonian radiolaria has not been made clear yet. In order to confirm practical ages of Devonian radiolarians, we did radiometric dating of zircons in the radiolarian-bearing Yoshiki Formation, Takayama city, Japan. The Yoshiki Formation, composed mainly of alternating beds of tuffaceous sandstone and tuffaceous mudstone, felsic tuff, and alternating beds of sandstone and mudstone, yields very well-preserved radiolarian fossils. Although the formation was once believed to be Ordovician in age based on ostracods from a mudstone float beside outcrop (Igo et al., 1980), it is now considered to be Devonian as a result of recent radiolarian studie (Kurihara, 2004). Well-preserved radiolarians and zircon grains were collected from 21 tuffaceous mudstone and 30 tuff horizons. Identified radiolarian species are *Zadrappolus* (?) *nudus*, *Zadrappolus lunaris*, *Oriundogutta* (?) *varisoina*, *Futobari solidus*, *Oriundogutta* (?) *kingi*, *Futobari morishitai*, *Zadrappolus tenuis* and *Zadrappolus yoshikiens*. These radiolarians show Late Silurian to Early Devonian. On the other hand, U-Pb SHRIMP ages ranging from163 Ma to 2605 Ma were obtained form 58 zircon grains in this formation. This fact suggests that the Yoshiki Formation could be formed with detrital Devonian radiolarian fossils in Middle Jurassic. But the critical question is how were the so well-preserved radiolarians deposited into the formation as detrital grains. This point remains as a matter to be discussed further.

Keywords: DEVONIAN YOSHIKI FORMATION, MESOZOIC ZIRCON