Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SGL43-01 Room:411 Time:May 1 14:15-14:30

Tectonic evolution of Karwar and Coorg blocks, southern India

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The Karwar and Coorg blocks in western India are important terranes in the point of paleogeographic study of India and Madagascar. The *c.* 1300 Ma Kumta suture separates the Karwar and Dharwar blocks within the western Dharwar craton of India (Ishwar-Kumar et al., 2013a). The major rock types are quartz phengite schist, chlorite schist, fuchsite schist, garnet biotite schist etc. Isochemical phase diagram estimates of the quartz phengite schist suggest peak metamorphic *P-T* conditions were *c.* 18 kbar and 550^o C. Towards the east of the suture Sirsi shelf contains weakly deformed sedimentary rocks, unconformable on high-grade gneisses of the Dharwar craton. The Karwar block to the west of the Kumta suture is mainly composed of undeformed tonalite-trondhjemite-granodiorite (TTG) with minor enclaves of amphibolite cut by later granites. Whole-rock major and trace element data suggest that the TTGs were derived from a volcanic arc, and that the granites have within-plate signatures. Amphibolites have a chemical composition comparable to basalts to basaltic andesites with MORB signatures. The TTGs from Karwar block shows a U-Pb zircon magmatic ages of *ca.* 3200 Ma (Ishwar-Kumar et al., 2013a). The K-Ar biotite age from the TTGs (1746 Ma and 1796 Ma) and amphibolite (*ca.* 1697 Ma) represents late-stage *c.* 1700 Ma uplift event of both TTGs and amphibolites. The Coorg block, which is about 100 km south of Karwar block, contains mainly granulite grade rocks (Chetty et al., 2012; Ishwar-Kumar et al., 2013b; Santosh et al., 2014). Major rocks types are charnockite, mafic granulites, hornblende-biotite gneiss, garnet-hornblende gabbro, anorthosite and granite. The Coorg (Mercara) suture which separates the Coorg block from the Dharwar craton to the east contains garnet-kyanite-sillimanite gneiss, mylonitic gneiss, calc-silicate granulite, mafic granulite, granite and syenite. Pseudosection calculations indicate that the constituent calc-silicate granulite and mafic granulite were re-equilibrated under high-pressure conditions of 15-20 kbar at a temperature of 800-900^o C (Ishwar-Kumar et al., 2013b). Santosh et al. (2014) recorded a metamorphic age of *c.*1200 Ma from metapelites from the Coorg (Mercara) suture zone. Integration of our structural, geological and geochronological results integrated with published data suggests the presence of a 1300-1200 Ma paleosubduction zone in western India. We propose that the Kumta and Coorg sutures are an eastern extension in western India of the northern and southern parts of the Betsimisaraka suture of north-eastern Madagascar.

Keywords: Karwar block, Coorg block, Kumta suture, Dharwar craton, Southern India, India-Madagascar

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Cambrian tonalite from Horei, Ofunato in southern Kitakami Mauntains, Japan

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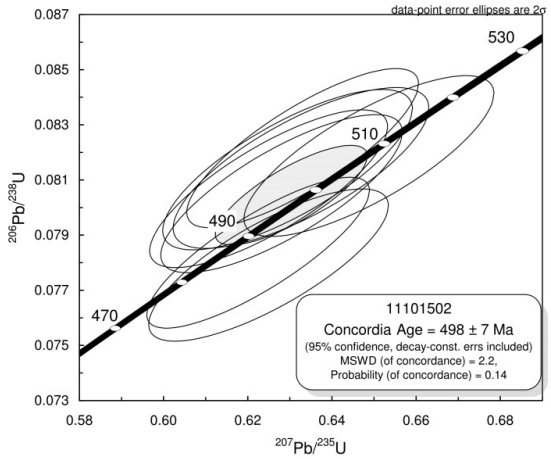
The Lower Cretaceous volcanic rocks of Ofunato Group and plagioclase quartz diorite porphyry dikes are distributed in Ryori district, south Kitakami belt, Japan. The felsic volcaniclastic rocks and tonalite is discovered within the Ofunato Group in Horei, Ofunato, Japan. The felsic volcaniclastic rocks occur as blocks less than 10 m size, and tonalite are found as blocks less than 2 x 1 m in size. The tonalite composed mainly of plagioclase, quartz, biotite, and hornblende and is characterized by poverty of K-feldsper. The tonalite is rich in SiO_2 (73.1–73.4%), and is classified as volcanic arc granite after Pearce et al. (1984). However, it is characterized by low K_2O (0.72–1.27wt%), Rb (16–32ppm), and Ba (91–97ppm) concentrations. This rock is considered to be derived from arc magmatism in immature oceanic arc setting.

U-Pb dating of zircons were carried out using Agilent 7500cx quadrupole inductively coupled plasma mass spectrometer (ICP-MS) with a New Wave Research UP-213 Nd-YAG UV (213 nm) laser ablation system (LA) installed at the Kyushu University (Adachi et al., 2012). Zircon grains from tonalite concentrate around ca. 500 Ma, 8 analyses from 8 grains define a concordia age of 498 +/- 7 Ma. U-Pb zircon age obtained here correspond to latest Cambrian age, and is similar to U-Pb zircon SHRIMP age of the granitic rocks from the Daiouin granite in Hitachi metamorphic rocks (490.8 +/- 6.1 Ma) and the Hikawa granite in Higo metamorphic rocks, Kyushu (502.5 +/- 9.6 Ma) after Sakashima et al. (2003). In addition, Tagiri et al. (2010) described U-Pb zircon SHRIMP age of metamorphic porphyry (505.1 +/- 4.4 Ma) and metamorphic granite clast (499.6 +/- 5.6 Ma), and Tagiri et al. (2011) reported U-Pb zircon SHRIMP age of felsic schist (510.0 +/- 4.0 Ma) from the Hitachi metamorphic rocks. These rocks are considered to be resulted from Cambrian arc-trench system in proto-Japan (Isozaki et al., 2010). In south Kitakami Mountains, Shimojo et al. (2010) described U-Pb zircon SHRIMP age of trondjhemite in Hayachine complex (466 +/- 6 Ma), and Sasaki et al. (2013) reported that the solidification age of the Hikami granites is 450 Ma. In addition, Osanai et al. (in press) described U-Pb zircon LA-ICPMS age of granitic rocks in the Kurosegawa tectonic line in Kyushu (446–472 Ma). These data suggests that the granitic activity in early Paleozoic of proto-Japan arc occurs at ca. 500 Ma and ca. 450 Ma.

Keywords: Kitakami, Cambrian, zircon, U-Pb age, tonalite



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U-Pb ages of zircon in plutonic rocks within the southern Abukuma Mountains

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Abukuma Plutonic and Metamorphic Rocks are widely distributed in the southern Abukuma Mountains. These rocks had been studied in detail (e.g. Miyashiro, 1958; Research Group of the Abukuma Plateau, 1969; Kano et al., 1974; Maruyama, 1979). Radiometric age datings of the Abukuma Plutonic Rocks were carried out by Kawano and Ueda (1965), Maruyama (1978), Shibata and Uchiumi (1983), Shibata (1987), Shibata and Tanaka (1987) and others. These studies indicated that radiometric ages of the Abukuma Plutonic Rocks are almost 90 to 120 Ma. Recently, Ar-Ar age dating of hornblende (Takagi and Kamei, 2008) and U-Pb age dating of zircon (Kon and Takagi, 2012) for plutonic rocks in northern Abukuma Mountains were carried out. They showed that the ages of gabbro and granitic rocks are similar. On the other hand, U-Pb age dating of zircon for plutonic rocks in southern Abukuma Mountains is not yet performed. Therefore, U-Pb age dating of zircon for major plutons of southern Abukuma Mountains was carried out, result of which is reported and tectonics of the Abukuma Mountains is discussed based on the cooling history of the plutons.

Plutonic rocks in the southern Abukuma Mountains are classified into gabbro and diorite, fine-grained diorite, hornblende-biotite granodiorite (Irishiken Pluton, Kamikimita Pluton, Tabito Pluton, Ishikawa Pluton, Miyamoto Pluton and Samegawa Pluton), biotite granodiorite (Torisone Pluton), biotite granite and fine-grained leucogranite, based on the geological relations. The U-Pb ages of zircon for gabbro are 102.7+/-0.8 Ma (Tabito Pluton), 109.0+/-1.1 Ma (Hanawa Pluton), 114.2+/-0.8 Ma (Miyamoto Pluton). As for the hornblende-biotite granodiorite, U-Pb ages are 105.3+/-0.8 Ma (IrishikenPluton), 105.2+/-0.8 Ma (Kamikimita Pluton), 113.8+/-0.7 Ma (Tabito Pluton), 104.4+/-0.7 Ma (Ishikawa Pluton) and 106.4+/-0.8 Ma (Miyamoto Pluton). Also for the biotite granodiorite (Hanawa Pluton), the biotite granite and fine-grained leucogranite U-Pb ages are 105.7+/-1.0 Ma, 104.5+/-0.5 Ma and 100.2+/-0.8 Ma, respectively. These data indicate that the intrusion ages of Gabbro and surrounding granitic rocks are similar to each other. Furthermore, K-Ar ages of biotite and or hornblende, and fission track ages of the same rock samples were measured. Accordingly, it is clear that these rocks had been cooled rapidly to 300 degree C (Ar blocking temperature of biotite) after their intrusion. This implies that the Abukuma Mountains were uplifted rapidly after the intrusion of the Abukuma Plutonic Rocks.

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Keywords: Abukuma Granites, Gabbro, Abukuma Belt, UU-Pb age, zircon

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Structural trends and tectonic inversion in Miocene sedimentary basins in the Tsugawa-Aizu province, Niigata prefecture

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The Tsugawa and Mikawa Sedimentary Basins in the northeastern part of Niigata are composed mainly of Early to Middle Miocene formations that contain so-called ”Green Tuff” volcanic sediments. Previous studies emphasized the NW-SE trend in the basement during the genesis of the Tsugawa basin. This outcrop-based study intends to discuss structural trends in the development of the Miocene sedimentary basin in the Mikawa area, Aga Town, Niigata.

The Miocene in this study area are divided into the Kanose, Tsugawa, and Araya/Igashima Formations in ascending order. Sedimentary facies analysis showed that the Kanose and Tsugawa formations filled half graben or graben. N-S to NNE-SSW trending faults of a map-scale limited the extent of the formations. NW-SE trending faults formed minor steps on the basement as well as minor, syn-sedimentary faults in the Miocene. They also affected the dyke intrusion trend. In short, the genesis of the Tsugawa basin involved 2 structural trends in this study area, while more significant is the N-S to NNE-SSW trend.

At present, the extent of the Miocene in this study area is, in many places, limited by thrust faults. Thrust faults locate at the position where rift-border faults are suggested. This indicates that tectonic inversion occurred with reactivation of N-S to NNE-SSW trending faults of the two. The trend of fault reactivation suggests that development of the basin in this study area is influenced by the Shibata-Koide tectonic line.

Keywords: Niigata sedimentary basin, Miocene, rift, structural trend, inversion