Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

SGL37-P01 会場:コンベンションホール 時間:5 月 24 日 18:15-19:30

セグメント化された背弧海盆の埋積過程：西南日本の北陸沖・山陰沖・北九州沖陸棚
Burial process of segmented backarc basins: Hokuriku-oki, San'in-oki and Kitakyushu-oki shelves of southwest Japan

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Backarc sedimentary basins of southwest Japan have developed since the Miocene rifting and opening of the western part of Japan Sea. They are bordered by the eastern Noto Plateau and western Korean Peninsula, and segmented by the Oki Plateau in between. From east to west, Hokuriku-oki, San'in-oki and Kitakyushu-oki shelves have undergone different burial histories reflecting spatiotemporal variation of tectonic events. Hokuriku-oki subbasin is characterized by large topographic reliefs of Oki Trough and Oki Ridge, which were originated from divergent rift system of the western part of Japan Sea. It has a complicated deformation history reflecting successive collision episodes in front of the Izu-Bonin arc and Fossa Magna region. Miocene sedimentation pattern implies development of gentle warping of the backarc shelf having nearly perpendicular trend to the elongate direction of the arc. Thermally subsided margin of the San'in-oki subbasin is buried by a thick pile of Miocene sediments accumulated after post-opening stagnant sedimentation in middle Miocene. Distribution and stacking pattern of the Miocene clastics suggest emergence of highs and lows aligned across the arc, just the same as those in the Hokuriku-oki shelf. Apart from the northern domains, northwestern shelf of the Kyushu Island was a site of Miocene short-lived pull-apart basin formation upon a regional right-lateral fault system bounding the Japan Sea backarc basin. The most remarkable transversal tectonic event on these segments is a strong N-S compression and deformation around the end of Miocene, which is probably related with a change of convergence mode of the Philippine Sea Plate. Seismic profiles delineate intensive folding along the backarc margin and clear angular unconformity at that age for both of the Hokuriku-oki and San'in-oki subbasins. Rifting-induced horst/graben blocks on the Oki Plateau were also strongly inverted and their landward extension is known as the Shinji Folded Zone generated at ca. 5 Ma. The regional fold zone was converging on the Tsushima Islands at the western end of the San'in-oki subbasin, and some of numerous transcurrent faults in the Kitakyushu-oki subbasin were reactivated in an opposite (left-lateral) sense. The latest tectonic episode was brought about by the Quaternary fluctuation of convergence mode of the Philippine Sea Plate. As a result of enhanced highly oblique subduction on the Philippine Sea/Eurasian margin, recent southwest Japan has suffered wrench deformation under simple shear stress, and the backarc shelf is eventually bisected by a right-lateral fault running parallel to the Median Tectonic Line. Although the westward indentation of the forearc sliver of southwest Japan inevitably causes active extrusion of the Kyushu Island, the deformation front has not reached backarc domain since the Kitakyushu-oki subbasin is immune from notable neotectonic deformation.

キーワード: 堆積盆, テクトニクス, 日本海, 西南日本, 背弧, 新生代
Keywords: sedimentary basin, tectonics, Japan Sea, southwest Japan, backarc, Cenozoic

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東北日本弧千島弧会合部三陸沖-道央の古第三紀-新第三紀前期堆積盆群における前弧-横ずれ-前縁セッティング複合相互作用履歴
Cenozoic interaction processes of forearc, strike-slip and foreland basins along the NE Japan and Kuril arc junction

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The N-S trending zone from the forearc side of the northern NE Japan arc to central Hokkaido, which corresponds to the Sorachi-Yezo belt or Ishikari-Teshio belt, demonstrates a complex tectonic history during the Cenozoic, since forearc, strike-slip and foreland settings had been interacted as the junction zone between the NE Japan and Kuril arcs. This study investigated the Paleogene to early Neogene sedimentary basin history along this zone to reveal the temporal and spatial interaction processes between the three tectonic settings, mainly based on 2D and 3D seismic survey, exploration well and outcrop survey data sets.

During the Paleogene, the northern part of this zone was situated in a territory of a strike-slip setting between the Okhotsk block and Eurasia Plate, whereas the southern part was situated in a forearc setting along the Pacific Plate subduction zone. Sedimentary basins created along the northern strike-slip part were characterized by en echelon-arranged small basins, whereas those along the southern forearc part were characterized by uplifted trench slope break (TSB) on the subduction zone side of the forearc basins and by a bay to fluvial depositional system in the basin infilling sediments. The transition point between the strike-slip and forearc settings was originally located in central Hokkaido in early Paleogene, but it gradually shifted toward the south through the Paleogene. In addition, even in the southern forearc zone, strike-slip tectonics affected the forearc basins to be segmented into subbasins. When the strike-slip motion was the maximum at around mid Oligocene, transpressional uplift occurred along the trench slope break, and regional unconformity was created (Ounc: Oligocene Unconformity). After the formation of Ounc, the southern forearc part started to subside, forming a slope type deep marine forearc basins. During the Early Miocene, the Miocene unconformity (Munc) was created again due to Japan Sea opening-related NE Japan arc uplift, which was induced by eastward migration of the NE Japan arc. After this event, westward migration of the forearc sliver of the Kuril arc induced the collision of the Hidaka block, resulting in the formation of foreland basins along this zone in central Hokkaido, in which strike-slip faults were converted to a thrust belt. The thrust block on the Hidaka side provided a large amount of clastics into the basin to form a thick pile of turbidite successions in the foreland basins. Geohistory diagrams showing basin subsidence history after this collision event demonstrate a completely different pattern between the forearc and foreland territories.

キーワード: 三陸沖, 道央, 新生代前期, 前弧堆積盆, 横ずれ堆積盆, 前縁堆積盆
Keywords: Sanriku-oki, central Hokkaido, Early Cenozoic, forearc basin, strike-slip basin, foreland basin

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福島県沖阿武隈リッジ南部の断層形態とその特性
Fault geometry and its characteristics in the southern part of Abukuma ridge, offshore Fukushima Prefecture, Japan

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The Abukuma ridge extends for more than 100 km from off the Soma to off the Kashima city along Japan Trench where the Pacific Plate is being subducted beneath the North American Plate. 3D seismic survey and its observations were carried out in this area off the Iwaki city, Fukushima prefecture, northeastern Japan by METI (JOGMEC, 2011). We referred to boreholes MITI Jhoban Oki (JAPT. 1993) in order to connect our seismic interpretation and stratigraphic data. As a result, nine seismic horizon (reflectors) were assigned upper limit of Santonian, upper limit of Campanian, upper limit of Maastrichitian, upper limit of Paleocene, upper limit of Oligocene, upper limit of Lower Miocene, upper limit of Middle Miocene, upper limit of Upper Miocene, and upper limit of Pliocene respectively. Abukuma ridge are distributed in north-northeast (NNE) to south-southwest (SSW) trending anticline recognized within pre-Middle Miocene strata. A number of lineaments, normal faults, bunch perpendicular within Abukuma ridge, most of which were initiated in the Cretaceous and had been active through the Paleogene, Miocene, and Pliocene. Fault morphology is classified into west-dipping north-south trending faults and north dipping east-west trending faults. They displaced by several hundreds to tens of meters. The most remarkable feature is the Abukuma ridge structure divided by large faults across the seismic section. It is apparent that there are dividing four areas where large faults and these faults are concentrated. Some of the large faults have significant strike-slip component. Subsurface structures delineated by reflection 3D seismic data suggest a different phase of activities of Abukuma ridge. Fault geometry is reflecting a complicated slip history in this area.

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ボーリングデータベースから得られた海成粘土層分布による大阪盆地北部の地下構造
Subsurface structure of northern Osaka basin based on borehole database

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大阪盆地は周囲を活断層に囲まれた，未固結堆積物が花崗岩基盤を埋める堆積盆地である．盆地内には大阪や神戸などの都市も発達しており，防災の観点からもこれらの活断層の詳細な分布や性状についての調査・研究が行われている．盆地内にもいくつか活断層が確認されているが，多くは伏在断層となっている．大阪平野中央を南北走向に走る上町断層における表層付近の詳細な変形構造に関しては，反射法地震探査や活動性評価のためのボーリング調査のほか，関西圏地盤情報活用協議会が保有する膨大な量のボーリングデータを用いて検討されてきた．大阪平野において，連続性の良い十数枚ある海成粘土層は (上位から Ma13，Ma12，...，Ma-1)，地層対比の鍵層として利用されている．

大阪平野には，地盤沈下の研究や 1995 年兵庫県南部地震以降の調査等で得られた地質層序が明らかな理学ボーリングが多数ある．特徴は長尺のものが多く，各種分析調査が実施されて，海成粘土層のナンバーが明らかになっている．一方，関西圏地盤情報活用協議会保有のボーリングデータの大部分を占める一般の施工管理のために実施される工学ボーリングは，土質試験や N 値情報が主となり，粘土層のナンバーや堆積環境や時期はわからない．しかしながら，稠密に分布するボーリングの中に理学ボーリングがあれば，近接する工学ボーリングにも対比可能である．上町断層における重点調査により，活動性評価のために実施されたボーリング調査成果のほか，大阪市内北部の海成粘土層の分布や海成粘土層基底面の傾斜分布等が取りまとめられている．

これらのデータを用いて，大阪中心部付近の Ma9, 10, 12 等の分布から各粘土層の分布，形状，傾斜を検討した．また，これらの海成粘土は酸素同位対比との対比により，およその形成時期も明らかになっているので，平均沈降速度も検討した．古い（深い）海成粘土になるほど，ボーリングデータが少なくなるため，得られる面的な情報が制限されるが，Ma13-Ma12 における平均沈降速度の差異から，上町断層周辺の分岐断層を含む小ブロック領域を読み取ることが出来る．平均沈降速度では上町断層本体より前面にみられる桜川撓曲近傍における差異が顕著で，反射法地震断面で検討されている平均変位速度とも調和的である．また Ma9 や Ma10 などより古い海成粘土では上町台地の東側で東傾斜が顕著に認められる．

本研究は, 平成 22 から 23 年度における文部科学省科学技術基礎調査等委託事業「上町断層帯における重点的な調査観測」によって行われた成果の一部を引用した. ここに記して謝意を示します.

キーワード: 大阪盆地, 上町断層, ボーリングデータベース
Keywords: Osaka basin, Uemachi fault, borehole database