低温領域の熱年代学とthermo-kinematicモデルに基づいた赤石山脈北部の隆起・削剥史
Uplift and denudation history of the Akaishi Range based on low-temperature thermochronology and thermo-kinematic model

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赤石山脈は，東北日本弧と西南日本弧の会合部付近に形成された日本アルプスの一部であるとともに，伊豆-ボニン弧と本州弧の衝突帯である南部フォッサ・マグナ地域にも含まれ，その隆起過程の解明は島弧会合部のテクトニクスの理解に有用である．本研究では，赤石山脈北部の熱年代を基に，thermo-kinematicモデル（Pecube ver. 3; Braun et al., 2012）を用いて以下を検討した：1）赤石山脈北部の隆起と糸静線断層帯南部の活動の関係，2）糸静線断層帯南部の地下形状や変位速度，3）赤石山脈北部の隆起・削剥史．

利用した熱年代データはSueoka et al. (2012, abst. AGU) が報告したもので，山地横断方向（東西方向）にアパタイトフィッション・トラック（AFT）年代，ジルコン(U-Th)/He（ZHe）年代，ジルコンフィッション・トラック（ZFT）年代，ジルコンU-Pb年代が得られている．AFT年代，ZHe年代，ZFT年代には，概して山地の東側で若くなる傾向が見られた．すなわち，山地東部でより多くの削剥が生じており，山地全体は西に傾動隆起していると考えられる．また，最も若いAFT年代とZHe年代は約3Maだが，これは曙礫岩層の堆積開始年代から推定された赤石山脈の隆起開始時期（約3.3Ma；狩野，2002）と一致する．ただし，最も若い年代は白州～鳳凰山断層の西側で得られており，その東側から下円井～市之瀬断層の間では，岩体の形成年代である約16Maより有意に若い年代は得られなかった．すなわち，赤石山脈北部を隆起させたのは主に白州～鳳凰山断層で，それ以東の山地では，約16Ma以降の削剥量は2～3km未満となる．下円井～市之瀬断層は赤石山脈と甲府盆地の現地形境界をなすが，赤石山脈の隆起開始以降に活発化した断層群と考えれば，上記の結果と矛盾しない．この考えは，更新世に逆断層frontの盆地側へのmigrationが起こったとする田力（2002）の推測とも一致する．

以上の年代測定結果・解釈を踏まえ，白州～鳳凰山断層の活動で赤石山脈北部の隆起を説明できるか，thermo-kinematicモデルによる検証を試みた．すなわち，単純なflat-ramp構造（2枚の矩形の断層面からなる純粋な逆断層）で近似した白州～鳳凰山断層の活動で山地が隆起した時に，地表で見られる熱年代の理論値を求め，実測値と比較した．その結果，変位速度が5～10mm/yr，rampの傾斜が27～45°，デコルマの深度が20～25kmの時，実測値と最も良く一致した．また，変位速度とrampの傾斜から，赤石山脈北部の基盤隆起速度は約4mm/yrと計算できるが，基盤隆起速度と削剥速度の動的平衡を仮定すれば，削剥速度も約4mm/yrとなる．この値は，ダムの堆砂速度や宇宙線生成核種法から推定された，より短期間の削剥速度（例えば，藤原ほか，1999; Korup et al., 2014）とほぼ一致しており，動的平衡の仮定共々妥当と考えられる．また，上記で推定した断層パラメータも，地下構造探査や地球物理学的観測などの結果（例えば，Ikeda et al., 2009; Panayotopoulos et al., 2010; 浅野ほか，2010）と矛盾しない．以上から，上記のパラメータを有した白州～鳳凰山断層の約3.3Ma以降の活動により，赤石山脈北部は隆起したと結論付けられる．

これらの結果に基づけば，赤石山脈北部の隆起・削剥様式は，Sueoka et al. (2012) のモデルのう

ち，simple tilted upliftモデルで良く説明できる．すなわち，片側の断層（ここでは白州～鳳凰山断層）の活動で傾動隆起した非対称な山地横断面形を持ち，断層側に向かって基盤隆起速度・削剥速度ともに増加する．ただし，同じモデルが赤石山脈の南部にも当てはまるかどうかは議論の余地がある．Yamagiwa (1998MS) が報告したAFT年代は約1Maを示すなど，北部とは異なる熱年代の分布を示す．また，南部では山地側に隆起をもたらす活断層の分布が不明瞭であるうえ，山地の幅が広く，断層運動による短波長の変形で説明できるかどうかは不明である．赤石山脈南部の隆起の原因については，約1Ma以降の伊豆ブロックの衝突なども考慮する必要がある（例えば，Hashima et al., 2016）．なお，FT年代やHe年代が若返るにはkmオーダーの削剥が必要なため，赤石山脈で見られる侵食小起伏面や山頂の定高性は，隆起前の準平原地形の遺物というよりは，山体重力変形や周氷河作用などの隆起開始後のプロセスで形成されたと考えられる．

キーワード：赤石山脈、糸魚川-静岡構造線断層帯、低温領域の熱年代学、thermo-kinematicモデル、arc-arc衝突帯
Keywords: Akaishi Range, Itoigawa-Shizuoka Tectonic Line fault zone, low-temperature thermochronology, thermo-kinematic modeling, arc-arc collision zone

「名倉玄武岩層」中の火山岩類の地球化学的性質
Geochemical characteristics of Miocene volcanic rocks in “Nagura Basalt formation”

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南部フォッサマグナ地域、丹沢北部に分布する「名倉玄武岩層」に存在する玄武岩質火山岩類(以下名倉玄武岩)14試料について、地球化学的な視点から、成因の検討を行い、また調査地域周辺の新第三紀中新世火山岩類(日向安山岩, 大島塩基性火山岩体)や、現在の伊豆-小笠原弧の火山岩類、東北日本弧の火山岩類との比較を行った。

その結果、名倉玄武岩は現在の伊豆-小笠原弧や調査地域周辺の火山岩類と同様にLow K tholeiiteに分類され、また東北日本弧の火山岩類と異なる化学組成であること、現在の伊豆小笠原弧の火山岩類や周辺の火山岩類と比べて高いFeO*/MgO, を持つことが分かった。

名倉玄武岩は、現在の伊豆-小笠原弧の火山岩類のようなバイモーダルな組成を示さず、分化した組成であることから、圧縮場における火山活動の産物である可能性がある。

キーワード：玄武岩、化学組成、伊豆-小笠原弧
Keywords: Basalt, chemical composition, Izu-Bonin arc

上越沖-北部フォッサマグナ地域における後期新生界の褶曲-断層帯の構造と形成史

Late Cenozoic structure and evolution of fold and thrust belts, Off-Joetsu and Northern Fossa Magna, central Japan

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東北日本と西南日本の境界部に位置する上越沖-北部フォッサマグナ地域は，日本海の拡大によってリフト盆地が形成され，その後，大規模な短縮変形を被った地域である．リフト盆地においては厚い堆積物が複雑な褶曲-断層帯を形成しているが、震源断層を含め褶曲-断層帯の形成を幾何学的な合理性のもとに説明したモデルは提案されていない．また，北米/ユーラシアプレート境界とされる糸魚川-静岡構造線の意味づけについても不明な点が多い．このような背景から，地質・地球物理学的データを用いて，この地域の三次元的な地質構造形成プロセスモデルを構築することを目的として，研究を行った．

地質構造の解析にあたって，地表地質データ・反射法地震探査データ・坑井データ・重力異常データ・地震波速度構造データを取りまとめ，調査地域における地質構造図を作成し，調査地域を網羅する五本の断面線において地質断面図を作成した．構造解釈の妥当性の検討と短縮変形の定量化にはバランス断面法を用いた．

解析の結果，複雑な断層関連褶曲の形成プロセスを説明することができる三次元断層モデルを構築することに成功した．この地域においては，リフトの縁辺部と，リフト内の大陸性地殻が想定される地域に震源断層の存在を推定した．リフト下の下部地殻のP波速度構造は，リフト軸の方向で高速度帯を形成していることから，大量の苦鉄質岩が上昇していると判断され（佐藤，2013），この苦鉄質岩が卓越する領域と大陸性地殻との物質境界が震源断層となっていると考えられる．これらの震源断層は盆地内では四つの断層系を構成しており，鮮新世以降の北西-南東方向の短縮変形により，分岐し・折れ曲がり・交差しながら，ウェッジ構造・ポップアップ構造・thrust-front-migrationによって複雑な褶曲帯を形成している．短縮変形は，リフトの縁辺部からリフト内の大陸性地殻が想定される地域に乗り上げる紫雲谷断層と妙高断層に集中したのち，リフト内の大陸性地殻が想定される地域を震源断層とする「西頸城断層系」および中央隆起帯近辺の断層へと分散した．バランス断面法から，総短縮量は約35 km，平均歪速度は約10 mm/年と算出された．

キーワード：断層関連褶曲、北部フォッサマグナ、バランス断面図、中絶リフト盆地、地質構造形成プロセスモデル
Keywords: Fault-related-fold, Northern Fossa Magna, Balanced cross section, Failed rift basin, Kinematic model of the formation of the geological structure

富山トラフおよび周辺海域の構造発達史
Geotectonic evolution in and around Toyama Trough, Japan Sea

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日本海盆南東部・大和海盆東部・富山トラフを含む日本海東縁海域における，海底地形観測，資源探査ならびに地殻構造探査の成果をコンパイルした。結果，両海盆における２段階の背弧拡大過程を裏付ける新しい知見が得られた。

1）当該海域では，活動を停止した正断層，反転構造をもつ逆断層，および活断層など，断層の時空分布に明瞭な区域性がみられる。

2）富山トラフの断層群のうち，南北走向の断層群は，大和海盆および大和海嶺の東縁まで追跡され，早期に形成された大規模な右ずれ剪断帯をなす。

3）大和海盆では前段の東西系拡大軸とそれ以降のNE-SW系拡大軸の２段階で拡大が行われた。このとき狭長な南北剪断帯はNW-SE系左ずれ断層を伴う開口変位を生じ，富山トラフを形成した。

現在の中央日本で，東西日本にまたがるひずみ集中帯が観測されることは，西南日本弧と東北日本弧が合体し，本州弧が復活した状態と見做せる。

キーワード：日本海、富山トラフ、アムールプレート、ネオテクトニクス、反転テクトニクス
Keywords: Japan Sea, Toyama Trough, Amur Plate, neotectonics, tectonic inversion

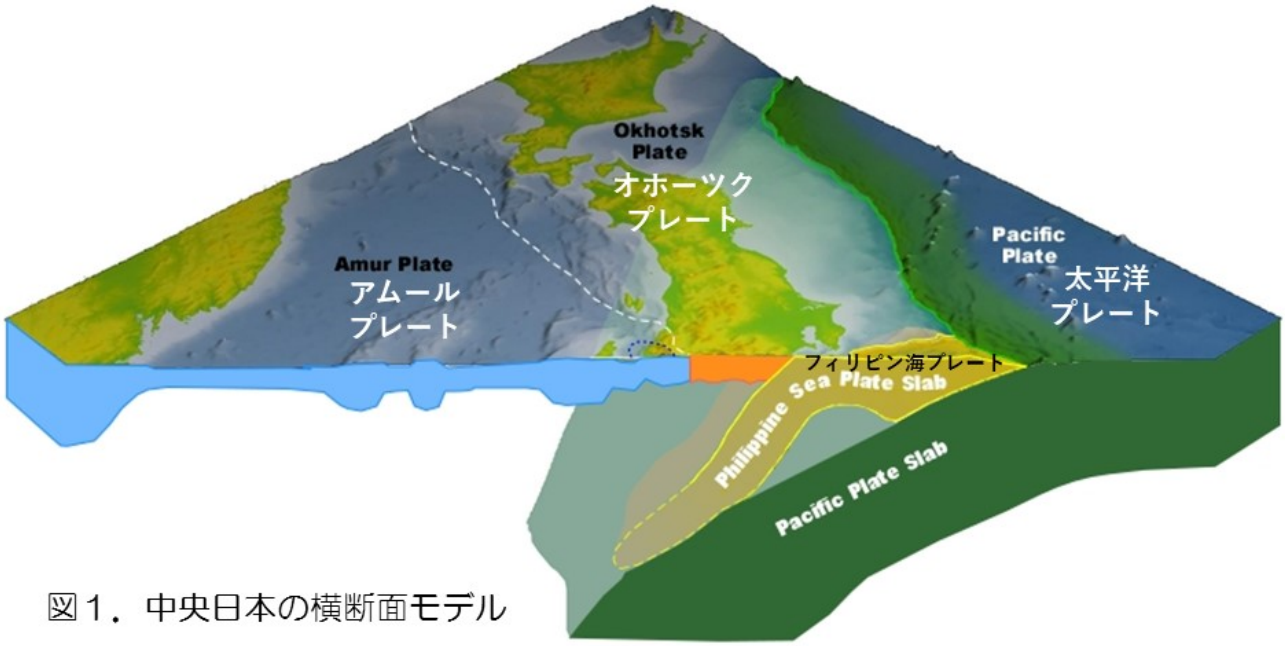

図１．中央日本の横断面モデル

Stratigraphy and geological structure of Goto Group in the Narujima Island, Goto Islands, Nagasaki Prefecture, West Japan

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The Narushima Island, central part of Goto Islands, contains early Middle Miocene Goto Group with several intrusion and 2 type deformations. Goto Group is sediment of expansion time of Japan sea. In the Narushima Island, There may be the evidence of the times change of the lift zone. This study settles a geological feature of the Narushima Island as a stage before finding out the evidence. In this study area strikes NW in the south part and NE in the north part and dips 0-60˚N. Northern area is well preserved drag fold which down to northwest (Type1). Northwest to southeast faults are well exposed 3 places with brecca zone (Type2). The Narushima Island is divided into 4 blocks by NNW-SSE trend extensional strike-slip fault with thick brecciated zone.
Stratigraphy of this sequence is divided 3 formations in ascending order, as follows: A formation (40m thick) is characterized by alternating beds of pyroclastic rock and tuffaceous sandstone. Pyroclastic rock in A formation contains 1-3 cm elongated lapilli oriented with their long axes parallel to bedding. B formation (350m thick) is composed of mudstone-dominant alternating beds of sandstone and mudstone, and subdivided 3 members. Lower Member (90m thick) is characterized by mudstone-dominant alternating beds of sandstone and mudstone, Middle Member (140m thick) by sandstone-dominant alternating beds sandstone and mudstone, and Upper Member (110m thick) by mudstone-dominant alternating beds of sandstone and mudstone. Sandstones of B formation exhibit a variety of depositional structures. Sandstones of Lower Member are normally graded and of Middle Member sometimes show internally climbing ripple lamination and trough and planar cross bedding. Fossils of mud snails occur in Middle Member. C formation (500m + thick) consists of thick sandstone and thin mudstone. Sandstone of C formation exhibits internally thick cross bedding.
It is thought that pyroclastic rocks of A formation are deposited as volcanogenic mud flow sediments, normal graded sandstones of the B formation are turbidity current deposits, and thick sandstones which exhibit cross bedding in the C formation are sediments near estuary. And In B formation, limnetic fossils occur. Therefore this stratigraphic change indicates rifted volcanic event, lake sediment and river-delta sequence at the rift zone of Japan sea. Type 1 deformation may be related by opening face of Japan sea. Northwest to southeast trend Type 2 deformation might be related rifting of north Okinawa Trough.

白亜紀期前期の日本弧における後背地の経年変化：西南日本の上部ジュラ–下部白亜系前弧砂岩の砕屑性ジルコン年代

Secular change in provenance of Early Cretaceous Japan arc: detrital zircon geochronology of fore-arc sandstones

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弧-海溝系で形成される造山帯産物（付加体、高圧変成岩、弧花崗岩など）は古期のものほど断片化され、残存しにくいが、現在の日本には、領家花崗岩（火成弧）や三波川変成岩（沈み込み帯深部）など白亜紀の構成要素が比較的よく残されている。当時の弧–海溝系の表層における砕屑物の移動／分配パタンを解明するため、演者らは西南日本のジュラ-白亜系砂岩中の砕屑性ジルコンU-Pb年代測定を進めており、検出した砕屑性ジルコンの流入パタンの違いに基づき白亜紀当時の前弧／弧内／背弧盆地の分化過程が明らかにされつつある（中畑ほか, 2015, 2016a, 2016b）。さらに九州西部球磨山地、四国中部、および紀伊半島の秩父累帯に産する前弧盆地に堆積したジュラ紀後期ー白亜紀前期の浅海／汽水性砂岩について、砕屑性ジルコンのU-Pb年代をLA-ICPMSを用いて測定した結果、いずれの試料も化石が示す堆積年代と調和的な年代スペクトルが得られ、以下のことがらが考察される。ジュラ紀後期ー白亜紀前期の西南日本の地殻表層には、現在の日本には極めて稀な古生代末から中生代の花崗岩、とくにジュラ紀前期のものが広範に露出していた。大陸由来あるいはリサイクルされた先カンブリア時代の砕屑粒子も少量ながら定常的に前弧域に運ばれていたが、白亜紀前期Hauterivian以降には、前弧域に到達しなくなった。このような砕屑性ジルコン年代スペクトルの経年変化は、白亜紀前期のアジア東縁における活動的な弧ー海溝系で、弧地殻が大きく成長したことを反映している。新しい花崗岩類が大量に火山弧の地下で定置されると、表層では隆起がおきて、古期花崗岩の露出／浸食、および大陸由来砕屑物の流入を阻止する明瞭な地形的障壁が出現したと推定される。

キーワード：白亜紀、弧-海溝系、砕屑性ジルコン、ウランー鉛年代、西南日本、後背地
Keywords: Creataceous, arc-trench system, detrital zircon, U-Pb age, SW Japan, provenance

中新世における西南日本の時計回り回転：レビュー
Miocene clockwise rotation of Southwest Japan: a review

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中新世の日本海拡大時，西南日本と東北日本はそれぞれ時計回り，反時計回りに回転した。30年ほど前に提案された15 Ma高速回転モデルは現在も日本列島の地質学研究に大きな影響を与えている。今回筆者は，西南日本の時計回り回転に焦点を絞り，この四半世紀に報告された古地磁気と年代のデータをレビューする。このレビューで得られる重要な結論は，西南日本の回転時期が25年前に考えられていたよりも200万年ほど前の18〜16 Maであったということだ。西南日本が東西縁辺部を除き剛体的に回転したと仮定すると，その時計回り回転量は41.7 ±5.4°と見積もられる。

キーワード：日本海拡大、中新世、古地磁気、回転運動、西南日本
Keywords: Japan Sea opening, Miocene, paleomagnetism, rotation, Southwest Japan

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2006年に脇田ほかによって，20万分の1日本シームレス地質図(全国版)が公開された．この地質図は1992年に刊行された100万分の1日本地質図第三版の凡例を基本にしており，凡例数が基本版で194で，岩相区分を加えた詳細版では凡例数386である．

今回，著者らが中心となって，新凡例を用い，既存の20万分の1地質図幅をベースとして新たに完全に再編纂した20万分の1日本シームレス地質図V2版を作成し，2017年5月10日(地質の日)に公開した．この編集のために，岩石の種類と岩相による区分と，時代による区分を組み合わせた約2500の凡例を作成した．この凡例は構造化されており，より簡素化された区分を用いた凡例を簡単に作ることができることが特徴である．

キーワード：地質図、デジタル、シームレス
Keywords: geological map, digital, seamless

The new tectonic division of basin in Eastern Shandong and its ajacent South Yellow Sea, China

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The new discovered Offshore rift basin in Eastern Shandong according to the field inverstigation is one of Mesozoic and Cenozoic rift basin in Eastern North China, which break traditional view for tectonic framework of basin in Eastern Shandong and its ajacent South Yellow Sea. Therefore, the tectonic framework and units of basin in the study area were redivided through the method of wavelet multi-scale decomposition of gravity anomaly, which has important meaning for the study of Mesozoic basin evolution in Eastern North China. In this paper, the method of wavelet multi-scale decomposition is used to separate bouguer gravity anomaly data, extracting first to forth order wavelet transform detail, which reflects gravity anomalies produced by anomalous density bodies varying from surface to Moho. The results showed that the faults in the study area developed, with different tendencies intermeshed and crossed mutually, indicating that there was multi-stage tectonic activity. The distribution of deep faults has a significant effect on the positive and negative gravity anomaly zones corresponding the uplift and depression. With obvious division characteristics of gravity field, the study area is divided into four subregions under boundary of the Tanlu fault zone, Wulian-Qingdao fault and Jimo-Muping fault zone, Qianliyan fault, the southern margin fault of Qianliyan uplift, from north to south, which is Jiaolai Basin, Offshore rift basin, Qianliyan uplift and South yellow sea basin, respectively. Combined with the seismic data, the tectonic units in Offshore rift basin is mostly analyzed. It is a NE-SW trending strip-shaped feature,with alternative depression and uplift. And for the first time, the subsidence center of Offshore rift basin is discovered.

Keywords: framework, Gravity Anomaly, Wavelet Multi-Scale Decomposition, Eastern Shandong

Late Paleozoic to Early Mesozoic magmatism in Linxi area, Inner Mongolia: Implications for the tectonic evolution of the Xing'an–Mongolia Orogenic Belt

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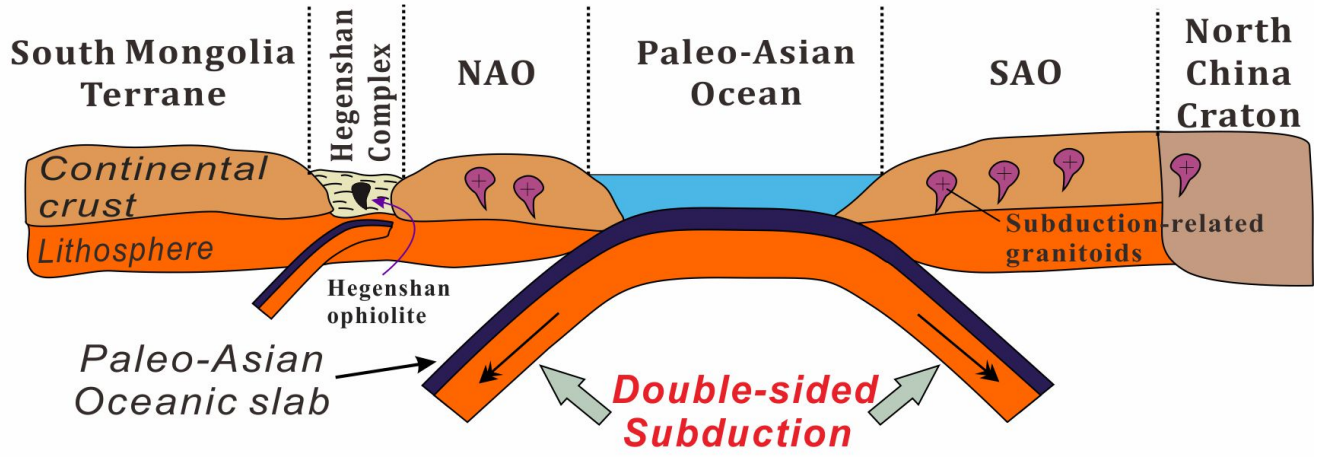
The Central Asian Orogenic Belt (CAOB) is one of the world's largest site of juvenile crustal growth in the Phanerozoic era (Sengor et al., 1993). The southeastern segment of the CAOB is called Xing'an–Mongolia orogenic belt (XMOB, Ren et al., 1980). Numerous fundamental problems are still unsettled, especially when it comes to the tectonic evolution of the XMOB during Late Paleozoic to Early Mesozoic (e.g. Jian et al., 2010; Tong et al., 2015; Xiao et al., 2003; Zhou et al., 2015). The study area (Linxi area, Inner Mongolia), located in the core region of the Solonker–Xra Moron suture (Han et al., 2012; Pei et al., 2017), is undoubtedly the significant region to investigate the tectonic evolution of the XMOB. Here we present new zircon U–Pb ages, whole-rock major and trace element compositions and coupled with Hf isotopes of the representative samples in Linxi area of the XMOB. This work evaluates their petrogenesis and tectonic implications and also provides new constraints on the tectonic evolution of the XMOB.
The representative rock samples analyzed in detail during this study were collected from four plutons in the midwest of the Linxi area, namely the BS, BSFZ, HD and XNG plutons. The BSFZ and XNG plutons consist mainly of granodiorite, granodiorite porphyry and monzogranite, which are belong to I-type granitoids. The BS and HD plutons are mainly composed of granite and monzogranite, which are classified as typical A-type granites. Zircon U–Pb age dating indicates the intrusions were emplaced in two stages: (1) during Late Permian to Early Triassic (the BSFZ and XNG plutons, 252 ±3–246.3 ±3.3 Ma); (2) Late Triassic (the BS and HD plutons, 220.8 ±2.7–211.4 ±2.6 Ma). According to their geochemical characteristics and Hf isotope compositions, as well as Nd isotope published recently in this region, we argue that the investigated granitoids share the similar magma sources which were derived from the partial melting of juvenile lower crust materials. It is notable that the BS and HD A-type granites experienced higher degree of magmatic differentiation compared to the BSFZ and XNG I-type granitoids.
Crustal growth and tectonic evolution of orogenic belts could be deciphered by the accompanied magmatism (Wu et al., 2011). In order to get a more comprehensive understanding of magmatism, here we integrated 95 recently-published single-zircon U–Pb ages of granitoids in adjacent areas. According to these precise geochronological data, four main periods of granitic magmatic activity can be distinguished in this area: Late Carboniferous (330–300 Ma), Early Permian (290–270 Ma), Late Permian–Late Triassic (260–220 Ma) and Late Jurassic-Early Cretaceous (150–110 Ma). The occurrence of the youngest age group is triggered by the Pacific plate subduction (e.g., Ouyang et al., 2013; Wilde, 2015). Other age groups are most likely controlled by the subduction–collision processes driven by the closure of the Paleo-Asian Ocean (e.g., Eizenhöfer et al., 2014; Li et al., 2016). There is a broad consensus that the final closure of the Paleo-Asian Ocean took place along the Solonker–Xra Moron suture zone, which was marked by melanges, blueschists and the Solonker–Sonidyouqi–Kedanshan–Xingshuwa ophiolite belts.
Based on these new data and previous studies, we predict three stages of tectonic evolution during the Late Paleozoic–Early Mesozoic in the XMOB: (1) Late Carboniferous–Early Permian (330–270 Ma): double-sided subduction of the Paleo-Asian Ocean; (2) Middle Permian–Middle Triassic (270–237 Ma): the closure of the Paleo-Asian Ocean and subsequent continent–continent collision between the North China Craton and the South Mongolia Terrane. (3) Late Triassic (237–211 Ma): post-collisional extension.

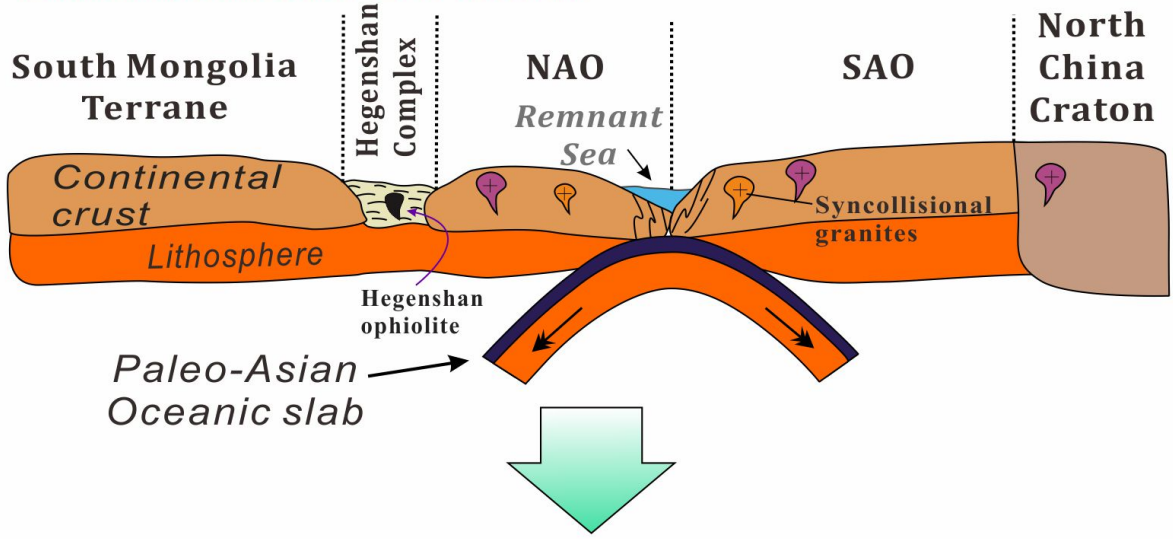
Keywords: tectonic evolution, CAOB, U–Pb–Hf isotopes, magmatism, Linxi

(1) Subduction of the PAO (330–270 Ma)

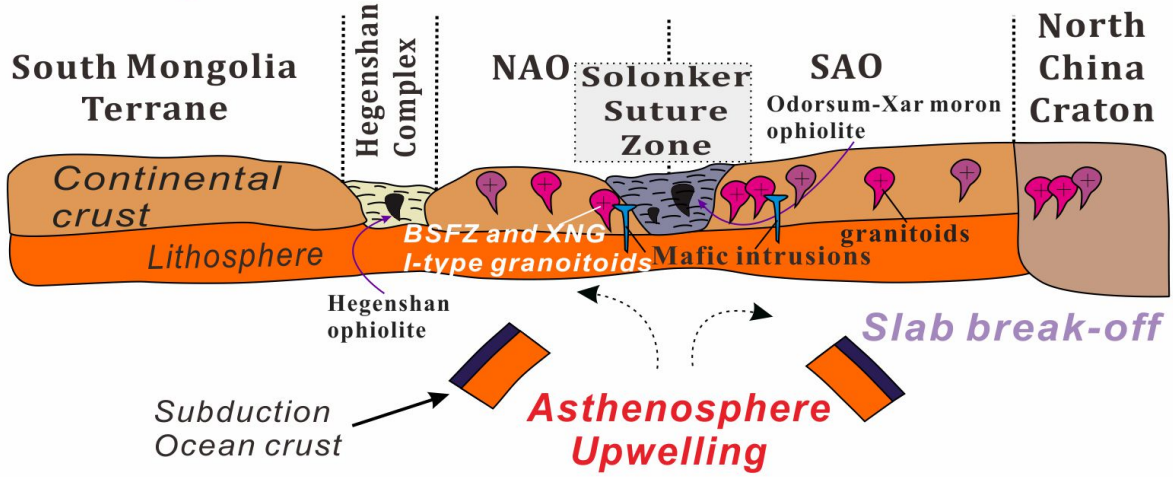


(2) Collisional orogeny (270–237 Ma)

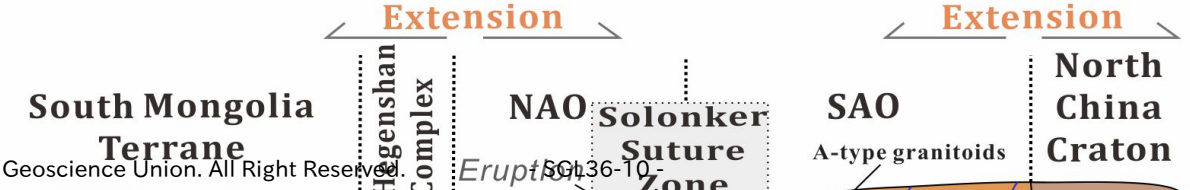
a. Initial collision: 270–260 Ma



b. Subsequent continent–continent collision: 260–237 Ma



(3) Post-collisional extension (237–211 Ma)



INTEGRATED INTERPRETATION OF HIGH SENSITIVITY MARINE MAGNETIC DATA AND MARINE SEISMIC DATA IN IZMIT BAY, TURKEY

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In this study, we have compared high resolution marine magnetometer data and marine seismic data. In this way, we have aimed to create the model map of active tectonic structures in Izmit Bay that located in the east of the Marmara Sea. Izmit Gulf, has attracted the attention of local and international researchers after the earthquake of 17 August 1999. From that time until today, there have been several geological and geophysical studies. Mainly shallow marine seismic studies have been carried out in the region. However, there is no high resolution marine magnetic data history of national or international literature. After the earthquake in Golcuk, the deep seismic reflection data on a total of 64 lines were collected by research vessel MTA Seismic 1 in September, 1999. In this study, only 10 of these lines that NS direction have been used. Air gun was used as the energy source. Seismic lines has 1 ms sampling interval and 1,5 s record length. About 1000 km in length data has been collected with SeaSpy Marine Magnetometer which belongs to Istanbul University Institute of Marine Sciences and Management in Izmit Bay. The collected raw data has been converted to Excel format. Firstly, noise generated by human-induced structure are fixed as observational. Then, the daily change occurring in the magnetic field is corrected. Daily data has been taken on the basis of minutes from Iznik station which belonging to Bogazici University Kandilli Observatory and Earthquake Research Institute. Correction of the measured values has been performed by application that we made. Modeling has been performed by Geosoft Oasis Montaj application by using this data. Two fault map is created by using high resolution marine seismic data and marine magnetic data. These two maps are verifying each other greatly. North Anatolian Fault; passing within 750 m of the Hersek nose at West of Izmit Bay. In middle of Izmit Bay, NAF protect distance from shoreline from offshore of Karamursel to offshore of Degirmendere. In the East of Izmit Bay; NAF passing through Golcuk and Derince and lies on the eastern basin.

Keywords: Izmit Bay, High Resolution Marine Magnetics, North Anatolian Fault

Late Pleistocene and Holocene stratigraphy of the Gulf of Saros; new Chirp seismic data

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The Gulf of Saros is located at the eastern margin of the North Aegean Trough (NAT), which is a right-stepping horsetail structure developed at the western termination of the North Anatolian Fault (NAF). Its evolution started in the Middle to Late Miocene, under the NW–SE compression caused by the counterclockwise movement of the Thrace and Biga peninsulas along the Thrace Fault Zone. This presentation presents the stratigraphic setting in this active gulf region, depending on the available seismic data sets and as well as new 300 km-line high-resolution shallow chirp data collected at the eastern margin of the gulf. The shear deformations confirmed that the right-lateral North NAT fault zone (NNAT) and left-lateral South NAT fault zone (SNAT) are the most significant structural elements controlling the NW–SE compression deformation. The Neogene sediments overlie the pre-Early Miocene basement on land. The erosion unconformity between these formations forms a characteristic key surface area on all of the marine seismic records, implying a long hiatus from Miocene to Pleistocene, and with some local erosions.

The deposits above the acoustic basement are divided into four distinctive seismic units. The bottommost unit U1d overlies the pre-Early Miocene basement, and accumulated from the onset of coastal transgression until the time of maximum transgression of the coast, with sediments onlap the underlying erosional truncation surface. The unit U1c comprises fluvial sigmoidal reflections with sediments downlap the underlying unit and show highstand - lowstand period. The unit U1b comprises marginal marine and fluvial sediments deposited during the lowstand period. Finally, the topmost unit U1a and its parallel inner reflections represent the last transgression.

Two different depositional characteristics have been defined in the gulf, as they are separated by an actual fault system. On the southern margin, the transgressive deposits of unit U1a lie directly above the pre-Early Miocene basement while fluvial sigmoidal deposits of the unit U1c and marginal marine and fluvial deposits of the unit U1b can be seen on the northern margin, and they form 30-ms (twt) thick sedimentation deposited under the control of northerly riverine inputs during highstand to lowstand periods. The stratigraphic setting in the gulf supports a dextral movement along the NNAT. The unit U1c is widely distributed in the middle of the studied area. Some buried channel geometries of the rivers, which transported the sediments of unit U1c, have been outlined at the northern sector. In addition, some characteristic sand deposits, equivalent with the unit U1d, were defined at the northern sector of the gulf. All these findings show that the northern margin is under the influence of river aggradation whilst the southern margin was an erosional platform during the last glacial maximum.

Keywords: seismic stratigraphy, Chirp seismic, Aegean Sea

A new tectonic model and fault segmentation controlling the evolution of the inner margin of the Gulf of Saros, NE Aegean Sea

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This study is focused on the definition of tectonic elements in the Gulf of Saros, a highly active seismic region within the North Anatolian Fault Zone. The previous reflection seismic studies trying to characterize the structural setting of the gulf were not presenting sufficient and efficient seismic data at the inner part of the gulf, so we studied this part in detail. For this purpose, we have collected more than 350 km-line high-resolution seismic data by a small research vessel at the inner side in May 2016. All of the obtained seismic profiles were interpreted on a workstation using the commercial software packages known as Kogeo and Kingdom. The Ganos fault, that generated the 9 August 1912 earthquake (Mw=7.2) in western Turkey, enters into the Gulf of Saros from the east, cuts the southern margin of the gulf forming a valley which is deepening westward. The deepest part of this valley cuts into the basement surface and divides the gulf into two. The seismic data revealed that the fault was not a single segment or a pair of border faults bordering the valley. According to the seismic images of the fault segments, the emanating earthquake energy will possibly be carried by two different fractures; the Ganos and Saros segments. The Ganos segment controls the northern margin of the valley while the recently defined Saros segment will control the centre of the valley. This segment causes the development of a new active basin and forms the deep canyon structure through the main valley structure. The new fault map defined using the new seismic data confirms a tectonic escape model for the gulf, which was also proposed by some of the previous geophysical researches. The Saros fault, which is a more active one if compared to the Ganos Fault, developed due to southwest movement of the gulf block. Such a kinematical model causes the deepening canyon structure.

Keywords: Gulf of Saros, Ganos fault, NE Aegean Sea

