

論文 / 著書情報  
Article / Book Information

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Title(English)	Geotectonic Evolution of England made by Pacific-type orogeny from Neoproterozoic to Cambrian
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種別(和文)	論文要旨
Type(English)	Summary

(博士課程)  
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## 論文要旨

THESIS SUMMARY

専攻 : Department of	地球惑星科学	専攻	申請学位 (専攻分野) : Academic Degree Requested	博士 (理学) Doctor of (理学)
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要旨 (英文 800 語程度)

Thesis Summary (approx.800 English Words)

The aim of this thesis is to demonstrate the geotectonic development of England-Wales and summarize research results given through my doctoral course since 2011. This thesis has 2 parts consisting of 6 chapters.

Part 1 is demonstration of the geotectonic development of England-Wales which starts from the general introduction of this Thesis in Chapter 1, and followed by descriptive work of regional geology of the Lleyn Peninsula (Chapter 2). Key works are the reconstruction of Ocean Plate Stratigraphy (OPS) based on the detailed field mapping along the coast of the Lleyn Peninsula. Another key point is the zircon chronology separated from inter-layering tuff layers and sandstones cap rocks of trench-turbidite. As a result, OPS for each individual ACs has been established by zircon chronology, and classified them into three-types, Type 1 is 630-600 Ma ACs (Early Ediacaran), Type 2 600-560Ma (Early Ediacaran) and the Type 3 is 570-540Ma (Middle Ediacaran). The large-scale structure of these three ACs and tectonically interlayered ca.560Ma BS belt clearly indicates the (1) nearly subhorizontal thrusts with downward younger polarity, (2) BS belt is tectonically inserted between Type 2 and 3 with NW-ward vergency, and (3) Late-stage (presumably Late Cambrian or Ordovician) vertical faulting modified the subhorizontal tectonic juxtaposition. The large-scale NS-trending displacement caused the apparent juxtaposition of ACs, ranging over 110 m.y. (630-520Ma).

The Chapter 3 is proposed a stratigraphic framework of geology of Anglesey Island and two metamorphic belts. The Anglesey Island is dominantly composed of accretionary complex (ACs) by geological survey and its metamorphosed portions along the deep Benioff plane at subduction zone. The Central Shear Zone is ACs which suffered the subduction zone metamorphism. The separated zircons from this meta-ACs were measured to be 555Ma as the youngest age, suggesting the origin derived from ACs as same as the Gwna Group Type 3. The New Harbour Group is the youngest among the all ACs in Anglesey, ranging from 539Ma, 520Ma to 510Ma northwards as a depositional age. The New Harbour Group is the structurally lowest ACs, and could be metamorphosed to have penetrative fabrics at deeper subduction zone (depth <15km, T<300°C). The structural bottom is the South Stack Group composed of nearly pure quartzite. Their detrital zircon ages range is remarkably different from those of the Gwna trench turbidites. Origin of the South Stack micro-continent could be deposited in an eastern margin of Laurentia, not a margin of West Africa or Amazonia.

At the last of the Part 1, Chapter 4 demonstrates the geotectonic history of England-Wales based on detailed systematic investigation given in Chapter 2 and 3 with application of new methodology of accretionary complex geology and zircon chronology. First of all, England has grown through the Pacific-type orogeny, since 670 Ma to 500 Ma over 170 million years with three peaks of the culminations of episodic exhumation of regional metamorphic belts from mantle depth to the surface. Namely three sets of Pacific-type orogens are preserved in Wales to Anglesey Island. The final subduction of TTG crust of South Stack caused buoyant stacking under the leading edge of Gondwana margin (West Africa), and the slab-breakoff

triggered the jack-up of the exhumed New Harbour Group at mid-crustal level by doming of all sandwiched units to the surface. During the collision-type subduction of South Stack micro-continent, apparent over-thrusting of deep-seated TTG and related high-grade units under the volcanic front in Snowdonia occurred NW-ward over 100 km essentially due to the subduction of TTG materials. After the slab-breakoff, the jack-up events obliterated the overthrusting TTG crust to generate a huge scale of submarine landslide.

Part 2 is study results derived through application of zircon chronology, which contains 2 chapters. Chapter 5 discusses the discovery of deep-sea sediments that record deep-sea anoxia, the “Marinoan Superanoxia”, during 670-635 Ma in the accretionary complex in Llyn Peninsula, Wales, UK. The sedimentological change of deep-sea sediments during the travel from mid-oceanic ridge to the trench in the Iapetus Ocean suggests the environmental change from red or gray bedded chert through 7 m-thick black mudstone to red or white bedded chert again, reflecting redox change in the deep-sea environment through time; firstly oxic before 655 Ma, secondly anoxic until 635 Ma, and finally oxic after that. The center of the anoxia is characterized by FeS-enriched rather massive black mudstone with less developed layering.

Chapter 6 describes to unfold the surface environment around the Cambrian explosion based on zircon chronological analysis, using samples from the Three Gorges in Weng’an and Chengjian areas in South China. Geographical area is totally different from England-Wales of British Isles as titled as this thesis, however, I include this chapter as remarkable result based on zircon chronology through my research in the doctoral course.

備考：論文要旨は、和文 2000 字と英文 300 語を 1 部ずつ提出するか、もしくは英文 800 語を 1 部提出してください。

Note : Thesis Summary should be submitted in either a copy of 2000 Japanese Characters and 300 Words (English) or 1copy of 800 Words (English).