

論文 / 著書情報
Article / Book Information

題目(和文)	沈み込みを伴う後期原生代・前期太古代造山帯の構造発達史
Title(English)	The tectonic history of Neoproterozoic and Paleoproterozoic subduction-related orogen
著者(和文)	浅沼 尚
Author(English)	Hisashi Asanuma
出典(和文)	学位:博士(理学), 学位授与機関:東京工業大学, 報告番号:甲第10729号, 授与年月日:2018年3月26日, 学位の種類:課程博士, 審査員:横山 哲也,中島 淳一,上野 雄一郎,野村 英子,佐藤 文衛
Citation(English)	Degree:Doctor (Science), Conferring organization: Tokyo Institute of Technology, Report number:甲第10729号, Conferred date:2018/3/26, Degree Type:Course doctor, Examiner:,,,,
学位種別(和文)	博士論文
Category(English)	Doctoral Thesis
種別(和文)	論文要旨
Type(English)	Summary

(博士課程)
Doctoral Program

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) : 博士 Academic Degree Requested	博士 (理学)
学生氏名 : Student's Name	浅沼尚		指導教員 (主) : Academic Supervisor(main)	横山哲也
			指導教員 (副) : Academic Supervisor(sub)	野村英子

要旨 (英文 800 語程度)

Thesis Summary (approx.800 English Words)

The subduction-related orogeny on a convergent plate margin is key to understand the evolution of the Earth system including mantle dynamics, atmosphere, hydrosphere, and biospheres. The orogenic process principally forms three tectonic units; a batholith belt, a regional metamorphic belt, and an accretionary complex. At present, identification of orogens in ancient geological assemblages requires earnest geological, petrological, and geochronological studies. Unfortunately, instances of Precambrian subduction-related orogens are limited. In particular, the presence of accretionary complex before the Cambrian remains debatable due to the difficulty in constraining the age. The unavailability of such geochronological data has hampered the comprehension of a subduction-related orogeny during the Precambrian time. In this thesis, we focused on two famous regions of Anglesey-Lleyn (Neoproterozoic) and North Pole Dome (Paleoarchean). The objective of this study is to establish geotectonic frameworks of ancient subduction-related orogeny.

The Gwna Group in Anglesey-Lleyn area, Wales consists of a latest Proterozoic volcano-sedimentary trench mélangé, which has a complicated accretionary structure, and is poorly constrained by isotopic ages. Here, we reconstruct twelve columns of oceanic plate stratigraphies (OPs) by conducting a fieldwork. OPs accretionary timings are dated with the youngest U-Pb ages of detrital zircons. Our lithological description and chronological data means that there are two Gwna Groups that formed between the late Neoproterozoic and the Middle Cambrian. These Gwna Group formations are contemporaneous with a calc-alkaline arc magmatism and a regional metamorphism in the Anglesey-Lleyn complex, which leads to a conclusion that the Gwna Group is a geological assemblage of imbricated OPs that developed as an accretionary complex on the Avalonian suprasubduction zone.

For the better understanding of the Avalonian subduction-accretion system, we added the following geochronological data; U-Pb ages of detrital zircons in the Monian Supergroup, and K-Ar ages of phengites, and U-Pb ages of detrital zircons in the Blueschist unit, the Central Shear Zone (CSZ), and the New Harbour Group. Integration of new isotopic data with previously published ages enables a new interpretation of the accretionary history and tectonic evolution of the Anglesey-Lleyn orogen in terms of the subduction-related orogeny. Subduction of an oceanic plate already drove arc-related magmatism along the Avalonian margin by 711 Ma, and continued to 519 Ma. Formation of the Gwna Group had already begun by at least 578 Ma, and likely finished by 530Ma. Exhumations of the metamorphic units occurred at 578-530 Ma and 474 Ma. In a larger perspective, the Avalonian orogens in NW Wales and Central England formed by successive eastward subduction from 711 to 474 Ma.

In the Paleoarchean complex (Warrawoona Group) around the North Pole Dome area, age constraints are mainly based on zircon U-Pb geochronology. However, their age interpretation remains controversial due to metamictization of zircons, and contamination of the common Pb. In order to obviate such negative effects, we newly develop the LA-ICP-MS U-Pb zircon dating combined with a pre-ablation technique. This technique is a useful approach to in finding less-metamictized areas within a zircon grain. We succeeded in acquiring some concordant U-Pb data from radiation-damaged zircons. Two analyzed adamellites represent intrusive ages of 3454-3445 Ma, which constrains the minimum depositional age of the Warrawoona Group. The pre-ablation technique has potentials to yield more precise and accurate geochronological data from metamict zircons.

A geotectonic framework of the Warrawoona sequence provides a valuable finding in terms of the Archean plate tectonics. We tried to obtain new geochronological data based on the LA-ICP-MS U-Pb zircon dating combined with the pre-ablation technique, and quantitative geochemical data of the greenstones and felsic rocks. By integrating the previous data, we found that greenstone complex of the Warrawoona sequence intermittently formed at 3525-3434 Ma, and its chronostratigraphic data have an upward-younging trend. Based on our geochemical fingerprinting, a suprasubduction zone is most likely appropriate as the tectonic setting, which implies development of a subduction system before 3525 Ma. Moreover, the onset of plate tectonics dates back to pre-3752 Ma age.

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).

注意 : 論文要旨は、東工大リサーチリポジトリ(T2R2)にてインターネット公表されますので、公表可能な範囲の内容で作成してください。

Attention: Thesis Summary will be published on Tokyo Tech Research Repository Website (T2R2).