行政院國家科學委員會專題研究計畫　期中進度報告

顯生宙亞洲地殼增生及黃土高原的形成(1/3)

計畫類別：個別型計畫
計畫編號：NSC92-2116-M-002-024-
執行期間：92 年 08 月 01 日至 93 年 07 月 31 日
執行單位：國立臺灣大學地質科學系暨研究所

計畫主持人：江博明

計畫參與人員：Sylvain Gallet

報告類型：精簡報告

處理方式：本計畫可公開查詢

中　華　民　國 93 年 5 月 28 日

INTERIM PROGRESS REPORT (May 27, 2004)

Project number: **NSC 92-2116-M-002-024**
Title of project: **Phanerozoic crustal growth in Asia and formation of the loess plateau with paleoclimatic implications**
(Part of an integrated project CREATE III, led by 李通藝。
Principal Investigator: **Bor-ming Jahn**

Description of work progress

(A) Phanerozoic crustal growth (with participation of Dr. Sylvain Gallet)

(1) Geochemical and isotopic study of granitoids from various tectonic units of the Central Asian Orogenic Belt (CAOB) – NE China, Mongolia, northern Xinjiang (Altai and Junggar terranes), Transbaikalia.
Analytical work – elemental analyses done by Q-ICP-MS (Agilent); Sr-Nd isotope analyses remained to be completed.
Results – see attached abstracts. Articles are being prepared.

(2) Similar work expanded to the Neoproterozoic Arabian-Nubian Shield, precisely the Moses' Rock (Katelina Complex) in the Sinai Peninsula. (collaborator – Boris Litvinovsky of Israel)
Result – a paper is being prepared. See attached abstract to the 32nd IGC (Eyal et al.).

(3) Geochemical and isotopic study of granitic rocks showing characteristics of lanthanide tetrad effect. An extensive investigation is conducted on highly differentiated granitic rocks from Japan, supplied by Dr. S. Ishihara of the Geological Survey of Japan. The lanthanide tetrad effect is an important phenomenon only recognized recently. The mechanism responsible for its formation is not yet completely understood. Many of the granites with tetrad REE distribution are found in juvenile terranes of Central Asia (ex., NE China and Mongolia).
Result – Chemical analyses partly done; isotope analyses remained to be completed.

(4) Initiation of a new round of study on a mini-accretionary orogen, the Coastal Range of Taiwan. The accretion of the Cosatal Range represents the initial stage of continental growth. Numerous problems invite further investigation.

Before sample collection, we have performed a complete search of available bibliographic information on the subject. We have also digitalized the geological maps of the Coastal Range in order to know the surface proportion of each geological unit. Using the results of this work and credible major element data in the literature, we were able to propose a major element composition of the Coastal Range. Such a calculation is still highly imprecise because (a) few geological units are well known from a geochemical point of view, and (b) the variability of rock chemical composition is not easy to quantify. Our main motivation is to unravel the erosion-sedimentation history during the formation of the Coastal Range, and to quantify or estimate the proportion of juvenile to recycled components. Isotope geochemistry is well suited to retrieve the source(s) of sedimentary sequences, especially if the sources have widely different trace elements signatures and display a large range in their Sr-Nd isotope composition.

Result – Many fine-grained samples were collected; some have been analyzed for their major element contents by XRF; trace elements and isotope compositions remain to be completed.

(5) Organization of an international workshop on "Accretionary Orogens and Continental Growth" (Abstract volume and field excursion guidebook already sent to the NSC). The workshop was highly successful. See the attached for international appreciation of the workshop.

(6) Initiation of a new international project "ERAS – Earth Accretionary Systems in space and time". This project was submitted to the International Lithosphere Program (ILP) and is pending for approval in the coming IGC meeting in August 2004. (Co-leaders – P. Cawood, A. Kroener, B. Windley, and Bor-ming Jahn). My role in this project should help increase the visibility of the Taiwanese earth science research in the international community.

(B) Loess geochemistry - Geochemical and Sr-Nd-Pb isotopic characterization of loess and paleosols samples from Central Asia: in search of loess protolith(s) and climatic proxies

Dual purposes of geochemical study of loess:

(1) The loess-paleosol sequence of Central Asia is known to be formed by eolian transport of particles from the surrounding deserts. It has also been proven to carry precious information about Quaternary climatic and environmental changes through the use of a variety of proxies, such as magnetic susceptibility, chemical weathering indices, isotopic composition, pedogenetic micromorphology or pollen and snail assemblages.
(2) Loess study also yields one of the two most elegant ways of determining the bulk composition of the upper continental crust. Our previous works (Gallet and Jahn) have been highly cited as reference (Gallet et al., 1996, 1998; Jahn et al., 2001; Peucker-Ehrenbrink and Jahn, 2001).

Principal collaborator: Dr. Ding Zhongli of the Chinese Academy of Sciences (CAS), Beijing. Dr. Ding is an internationally renowned specialist on loess and paleoclimatic study.

Result - Samples from the Luochuan section (China) and from the Chashmanigar section (Tajikistan) were received from Dr. Ding in January 2004. The Luochuan samples are reanalyzed to verify some analytical controversy (Ce anomaly problem). Chemical analyses partially done. Isotope analyses not.

Attachments – abstracts of published articles and conference meetings.

International travel:

July 21-25, 2003, in Budapest, Hungary – European Mineralogical Union, 5th EMU School and Symposium on Ultrahigh-Pressure Metamorphism. Invited lecturer. Lecture given: Geochemistry and isotope tracer study of UHP metamorphic rocks.

September 2-6, 2003, Toyohashi, Japan – Hutton Symposium V on "The Origin of Granites and Related Rocks". + Field Excursion.
Title of talk – Generation of the juvenile crust in the Central Asian Orogenic Belt.

September 7-12, 2003, Kurashiki, Japan – Goldschmidt Conference.
Title of talk – Lanthanide tetrad effect in granites and related rocks from China and Mongolia: a review.

November 21-24, 2003, Hefei, Anhui Province, China – Chemical Geodynamics of Plate Subduction and Exhumation.