ศิลาวรรณนาและธรณีเคมีของหินอัคนีแทรกซอน บริเวณบ้านโพธิ์สวรรค์ อำเภอบึงสามพัน จังหวัดเพชรบูรณ์

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PETROGRAPHY AND GEOCHEMISTRY OF INTRUSIVE ROCKS AT BAN PHO-SAWAN AREA, AMPHOE BUNG SAMPHAN, CHANGWAT PHETCHABUN

Mr. Prayath Nantasin

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การศึกษาครั้งนี้มีวัตถุประสงค์ในการหาความสัมพันธ์ระหว่างกันของหินอัคนีแทรกซอนบริเวณบ้านโพธิ์สวรรค์ ที่มีความแตกต่างที่สังเกตได้ในภาคสนาม พื้นที่ศึกษาครอบคลุมประมาณ 176 ตารางกิโลเมตร ตั้งอยู่ในส่วนที่เรียกว่าแนวหินแกรนิตตะวันออกของประเทศไทย พื้นที่ประกอบด้วยหินอัคนีพุและหินอัคนีแทรกซอน จากผลการศึกษาด้านศิลาวรรณนา องค์ประกอบของหิน องค์ประกอบของแร่ หินอัคนีแทรกซอนในพื้นที่สามารถจำแนกได้ 4 ชนิด คือ หินแกบโบร ไดออไรต์ ควอรตซ์ ไดออไรต์ และหินฮอร์นเบรนด์-ไบโอไทต์ แกรโนไดออไรต์ ทั้งหมดมีองค์ประกอบเป็นแบบเมฟิกถึงเฟลสิก ตามลำดับ หินทั้งหมดจัดเป็นชนิด I-type และชุด calc-alkaline series ตามปริมาณธาตุองค์ประกอบหลัก.

ปริมาณธาตุร่องรอยชี้บ่งว่าหินเหล่านี้เกิดจากการหลอมละลายบางส่วนของเปลือกสมุทรแล้วแทรกตัวขึ้นมาผ่านเปลือกโลกบริเวณที่เป็นแนวภูเขาไฟคดโค้ง โดยมีกระบวนการตกผลึกแยกส่วนของแร่ไพรอกซีนและแพลจิโอเคลสเป็นปัจจัยที่มีผลต่อองค์ประกอบของหิน ลักษณะกราฟของกลุ่มธาตุหายากบ่งบอกว่าหินทั้งหมดมาจากหินหลอมเหลวแหล่งเดียวกัน การคำนวณหาความดันขณะตกผลึกโดยอาศัยปริมาณธาตุอะลูมีนัมในแร่ฮอร์นเบรนด์ และการคำนวณหาอุณหภูมิขณะตกผลึกจากธาตุองค์ประกอบของแร่ฮอร์นเบรนด์กับแพลจิโอเคลส พบว่าหินในพื้นที่ตกผลึกที่ความดัน 2.5 ถึง 2.8 kbar, และอูณหภูมิ 609 ถึง 671°C ตามลำดับ

การหาอายุหินจากปริมาณไอโซโทปของยูเรเนียมและตะกั่วจากแร่เซอร์คอนสองผลึกในหินแกบโบร โดยเครื่อง Laser ablation – ICP MS ได้อายุประมาณ 230 ± 4 ล้านปีซึ่งจัดอยู่ในยุคไทรแอสซิกตอนกลาง

จากผลการศึกษาทั้งหมดข้างต้นสรุปว่าหินอัคนีแทรกซอนทั้งสี่ชนิดในพื้นที่ศึกษาน่าจะมีความสัมพันธ์กันในลักษณะของมวลหินอัคนีแบบมีโซน ซึ่งดันตัวขึ้นมาเป็นมวลเดียวกัน เกิดการตกผลึกที่ผนังกะเปาะก่อนแล้วการตกผลึกจึงค่อยๆเคลื่อนเข้าสู่ตอนกลางของมวลหิน

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สาขาวิชา..............ธรณีวิทยา.............................. ลายมือชื่ออาจารย์ที่ปรึกษา..............................
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PRAYATH NANTASIN : PETROGRAPHY AND GEOCHEMISTRY OF INTRUSIVE ROCKS AT BAN PHOSAWAN AREA, AMPHOE BUNG SAMPHAN, CHANGWAT PETCHABUN. THESIS ADVISOR : ASSISTANT PROFESSOR SOMCHAI NAKAPADUNGRAT, THESIS COADVISOR : MALATEE TAIYAQUPT, 121 pp. ISBN.974-53-1510-9

The main objective of thesis is to find out a relationship among intrusive rocks occur in Ban Phosawan area, Amphoe Bung Samphan, Phetchabun province that show several field-notable feathers. The study area cover approximately 176 km^2 and occupy in a position of the so-called "Eastern granite belt" of Thailand. It contains both extrusive and intrusive rocks. Based on petrography, whole-rock chemistry and mineral chemistry, intrusive rocks in study area can be divided into four types namely gabbro, diorite, quartz diorite and hornblende-biotite ganodiorite, with a composition ranging from mafic to felsic respectively. Most of them are I-type affinity and calc-alkaline series. Their trace element characteristics suggest that most of them emplaced in a setting of volcanic arc and their whole-rock compositions may affected by clinopyroxene and plagioclase fractionation. Rare earth spider diagram patterns suggest that most of them originated from the same magma source. The Al-in-hornblende barometry and amphibole-plagioclase thermometry reveal that The most probable ranges of pressure and temperature for those four intrusive rocks are 2.5 to 2.8 kbar, and 609 to 671°C, respectively. The U-Pb age from two *in situ* zircon grains dated by laser ablation – ICP MS technique yield 230 ± 4 Ma, middle Triassic period.

Based on all results above, the four rock types seems to relate to one another as a 'zoned pluton' which emplace as a unique mass of magma, consequently, *in situ* differentiation was took place in the kind of side-wall accretion or inward crystal fractionation.

Department.................Geology.................Student's signature...............................

Field of study...............Geology...................Advisor's signature...............................

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