

การประยุกต์ข้อมูลธรณีฟิสิกส์ทางอากาศและข้อมูล โทรสัมผัสเพื่อศึกษาธรณีวิทยา โครงสร้าง  
และสภาพการแปรสัณฐานในพื้นที่จังหวัดเลย ภาคตะวันออกเฉียงเหนือ ประเทศไทย



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APPLICATION OF AIRBORNE GEOPHYSICAL AND REMOTE SENSING DATA  
TO STRUCTURAL GEOLOGY AND TECTONIC SETTING  
IN LOEI AREA, NORTHEASTERN THAILAND




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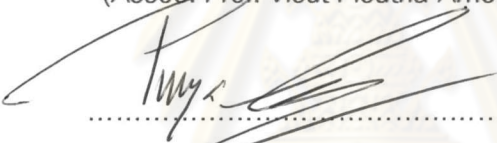
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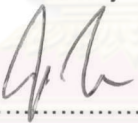
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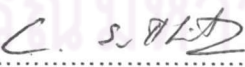
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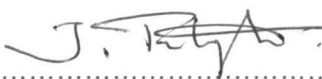
  
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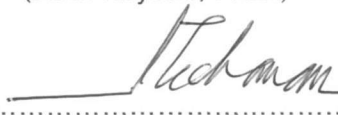
  
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คเชนทร์ เหนี่ยวสุภาพ : ชื่อวิทยานิพนธ์ APPLICATION OF AIRBORNE GEOPHYSICAL AND REMOTE SENSING DATA TO STRUCTURAL GEOLOGY AND TECTONIC SETTING IN LOEI AREA, NORTHEASTERN THAILAND อ. ที่ปรึกษา : รศ. ดร. ปัญญา จารุศิริ, อ.ที่ปรึกษาร่วม : Assoc. Prof. Jayson Meyers, 175 หน้า. ISBN 974-53-1503-6.

ในการศึกษาค้นคว้าครั้งนี้ได้ใช้ผลการประมวลข้อมูลสำรวจธรณีฟิสิกส์ทางอากาศใหม่ เพื่อการแปลความหมายหาความต่อเนื่องของหน่วยหินและโครงสร้างทางธรณีวิทยา โดยที่หน่วยหินก่อนมหายุคซีโนโซอิกในพื้นที่ส่วนใหญ่ถูกปกคลุมด้วยตะกอนดินปัจจุบันและตะกอนทางน้ำ

ข้อมูลความเข้มสนามแม่เหล็กทางอากาศสามารถเพิ่มประสิทธิภาพ (enhancement) โดยการกรองสัญญาณซึ่งได้แก่ reduction to the pole, analytic signal, vertical derivative, directional cosine filter และ upward continuation การแปลความหมายข้อมูลแม่เหล็กทางอากาศกระทำร่วมกันกับ ข้อมูลแม่เหล็กไฟฟ้า ข้อมูลกัมมันตรังสี ข้อมูลดาวเทียม และข้อมูลธรณีวิทยาโดยใช้วิธีการสารสนเทศทางภูมิศาสตร์ (GIS)

จากข้อมูลธรณีฟิสิกส์ สามารถแบ่งพื้นที่ออกได้เป็น 3 พื้นที่ ได้แก่ พื้นที่ตะวันออก พื้นที่ตอนกลางและพื้นที่ตะวันตก โดยอาศัยความแตกต่างของค่าความเข้มสนามแม่เหล็กและรูปแบบโครงสร้างแม่เหล็ก พื้นที่ทั้งสามถูกแบ่งโดยรอยเลื่อนย้อนกลับมุมต่ำ (thrust fault) นอกจากนั้นข้อมูลความเข้มแม่เหล็กใช้ทำรูปแบบจำลอง การวางตัวของหินอัคนีสีเข้มใต้ดินและหินแกรนิต

ผลการแปลความหมายพบว่าลักษณะของหินอัคนีสีเข้มในตะเข็บธรณีเลยวางตัวเฉียงไปทางทิศตะวันออก หน่วยแม่เหล็กสูงวางตัวตลอดแนวขอบพื้นที่ตะวันออกของแนวตะเข็บธรณีเลย ซึ่งสอดคล้องกับแนวหินโค้งงอ (fold) และรอยเลื่อนย้อนกลับมุมต่ำของหินบะซอลต์ในยุคดีโวเนียน หินแกรนิตแทรกซอนในยุคเพอร์เมียนถึงไทรแอสสิกมีลักษณะเป็นกลุ่มรูปวงกลม โดยในระดับลึกแสดงการแทรกซอนของหินเหล่านี้มาจากหินหนืดตำแหน่งเดียวกัน หินภูเขาไฟสีอ่อนแสดงลักษณะรูปแบบแม่เหล็กเป็นกลุ่มเล็กๆกระจาย (hummocky texture) แนวรอยเลื่อนในทิศทางตะวันออกเฉียงเหนือที่พบจากข้อมูลความเข้มแม่เหล็กแสดงลักษณะการแทรกดันหินแกรนิตแทรกซอนในยุคไทรแอสสิกและหินตะกอนในยุคช่วงก่อนจูแรสสิกและแสดงลักษณะการเลื่อนไปทางซ้ายมือ (sinistral movement) เป็นส่วนใหญ่ประมาณ 0.5 กิโลเมตร

ผลการแปลความหมายข้อมูลธรณีฟิสิกส์ใหม่นี้มีความสอดคล้องกับแผนที่ธรณีวิทยาที่มีอยู่ แต่มีความต่อเนื่องของลักษณะทางธรณีวิทยา รวมทั้งการพบหินอัคนีแทรกซอน และโครงสร้างทางธรณีวิทยาใหม่โดยเฉพาะโครงสร้างในเชิงลึก ผลการศึกษาเหล่านี้นำไปสู่การศึกษาตำแหน่งและการพัฒนาการทางด้านธรณีแปรสัณฐานของพื้นที่จังหวัดเลยและใกล้เคียงได้ชัดเจนขึ้น

ภาควิชา ธรณีวิทยา  
สาขาวิชา ธรณีวิทยา  
ปีการศึกษา 2547

ลายมือชื่อนิสิต.....  
ลายมือชื่ออาจารย์ที่ปรึกษา.....  
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....



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KEY WORD: AIRBORNE GEOPHYSICS / TECTONIC / LINEAMENT / STRUCTURAL GEOLOGY / LOEI  
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 SENSING DATA TO STRUCTURAL GEOLOGY AND TECTONIC SETTING IN LOEI AREA,  
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Re-processed and modeling of detailed geophysical data are used for interpreting the continuity of geological units and structures, particularly where most of the pre-Cenozoic rock units are overlain by regolith, recent soils, and alluvial deposits.

Aeromagnetic data were run through a series of filter routines including reduction to the pole, analytic signal, vertical derivative, directional cosine filtering, and upward continuation. Interpretation of all the processed aeromagnetic data has been carried out by integrating with electromagnetic data, radiometric data, enhanced Landsat images and GIS geological information.

Three geological domains (eastern, central, and western) were interpreted from the enhanced geophysical data corresponding assemblages of contrasting magnetic intensities, as well as different regional magnetic structures. The magnetic data were also used to model the geometry of mafic units and granitic intrusions in 3 dimensions. Magnetic mafic bodies in the Loei Suture Zone were found to display their dip direction mainly to the east. High magnetic intensity units running along the eastern side of the Loei Suture Zone correspond fairly well to folded and thrust faulted basalt lava flows of Devonian age. A few Permo-Triassic felsic to intermediate lava flows are identified by their hummocky magnetic textures. Northeast-trending faults observed in the magnetic data cross-cut Triassic granite intrusions and northwest-trending, mostly producing more than 0.5 km of sinistral offsets.

The new interpretation from this study agrees with the existing geological bedrock mapping in a broad sense, but shows differences in the continuity of geological features and extent of granitoid intrusions. The geophysical interpretation also contains more large-scale structural detail, particularly at depth. These new results and other relevant previous work lead to the clarification of tectonic setting and its evolution of the Loei study and nearby areas.

Department            Geology  
 Field of study        Geology  
 Academic year        2004

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