

ห้องสมุดงานวิจัย สำนักงานคณะกรรมการวิจัยแห่งชาติ



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**AN INVESTIGATION OF SEA LEVEL IN THE GULF OF THAILAND AND  
THE SOUTH CHINA SEA BY USING NUMERICAL OCEAN MODELS**

**MISS CHORTIP SIWAPORNANAN**

**A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR  
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Miss Chortip Siwapornanan M.Sc.(Applied Mathematics)

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.....  
(Assoc.Prof. Suwon Tangmanee, Ph.D.)

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.....  
(Assoc.Prof. Usa Wannasingha Humphries, Ph.D.)

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## บทคัดย่อ

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วิทยานิพนธ์ฉบับนี้ได้ทำการศึกษาระดับน้ำทะเลบริเวณอ่าวไทยและทะเลจีนใต้ โดยพื้นที่ศึกษาอยู่ระหว่างลองจิจูดที่เก้าสิบองศาตะวันออกถึงหนึ่งร้อยสามสิบองศาตะวันออก และละติจูดที่ห้าองศาใต้ถึงสามสิบองศาเหนือ ซึ่งใช้ข้อมูลระดับน้ำทะเลที่ได้จากการตรวจวัดในช่วงปี 1977 ถึง 2007 และข้อมูลที่ได้จากแบบจำลองเชิงตัวเลขทางสมุทรศาสตร์ในช่วงปี 1985 ถึง 2004 การศึกษานี้ใช้วิธีการถดถอยเชิงเส้นกำลังสองน้อยสุด การประมาณค่าในช่วงด้วยสไปลน์ชนิดคาบกำลังสาม ฟังก์ชันตั้งฉากเชิงประจักษ์ การวิเคราะห์เวฟเล็ต และเวฟเล็ตอาพันธ์ ผลจากการศึกษาพบว่าระดับน้ำทะเลในบริเวณอ่าวไทยและทะเลจีนใต้สูงขึ้นโดยเฉพาะในบริเวณอ่าวไทยตอนบน ซึ่งอัตราการเพิ่มขึ้นของระดับน้ำทะเลที่สูงที่สุดสองอันดับแรกคือ 19.02 มิลลิเมตรต่อปีและ 15.36 มิลลิเมตรต่อปี ผลจากการศึกษาฟังก์ชันตั้งฉากเชิงประจักษ์พบว่า สองโหมดแรกและสามโหมดแรกของข้อมูลจากการตรวจวัดและข้อมูลที่ได้จากแบบจำลองเชิงตัวเลขทางสมุทรศาสตร์ สามารถอธิบายความแปรปรวนของระดับน้ำทะเลได้มากกว่า 89% และมากกว่า 71% ของความแปรปรวนทั้งหมดในอ่าวไทยและทะเลจีนใต้ตามลำดับ ความสัมพันธ์ของข้อมูลที่ได้จากการตรวจวัดและข้อมูลที่ได้จากแบบจำลองเชิงตัวเลขทางสมุทรศาสตร์มีความสัมพันธ์สูงในบางช่วงเวลาและบางพื้นที่ ซึ่งความสัมพันธ์ดังกล่าวเกิดขึ้นในช่วงที่มีปรากฏการณ์รุนแรง

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Candidate	Miss Chortip Siwapornanan
Thesis Advisor	Assoc.Prof.Dr. Usa Wannasingha Humphries Assoc.Prof.Dr. Prungchan Wongwises
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Department	Mathematics
Faculty	Science
B.E.	2554

### Abstract

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In this study, the sea levels in the Gulf of Thailand (GoT) and the South China Sea (SCS) covering  $90^{\circ}\text{E}$  to  $130^{\circ}\text{E}$  and  $5^{\circ}\text{S}$  to  $30^{\circ}\text{N}$  are investigated. The data used in this study are sea level from observation during 1977 to 2007 and results from numerical ocean models during 1985 to 2004. Many methods are used in this study: least square linear regression, periodic cubic spline approximation, empirical orthogonal function (EOF), wavelet analysis and wavelet coherence. The results show that the sea level has risen in the GoT and the SCS, especially in the upper part of the GoT. The two highest rising rates of sea level are 19.02 mm/yr and 15.36 mm/yr. Results of EOF reveal that the first two modes and the first three modes of observations and results from numerical ocean models explain more than 89% and 71% of total variance in the GoT and the SCS, respectively. The relationships of observation and results from numerical ocean models have high correlation in some periods and some areas. The highly coherent from both date occur during the extreme events.

Keywords : Sea Level / Gulf of Thailand / South China Sea / Empirical Orthogonal Function / Wavelet Coherence

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