

ACKNOWLEDGEMENTS

Sincerely, I profoundly thank my advisors, Assoc. Prof. Weerachai Siripunvaraporn and Prof. Hisashi Utada, for their advice, encouragement and patience throughout my study.

Also, I am thankful to members of the Geophysics Research Group, Mahidol University, members of Optical & Quantum Physics (OQP) Laboratory, Mahidol University, particularly Dr. Sujin Suwanna and Mr. Ekkarat Pongophas, and administrative staff of Dept. of Physics, Faculty of Science, Mahidol University, particularly Miss Nipaporn Suwannawong. Most importantly, I am very grateful to my family for their strong support.

This study was supported by the Researching Assistant scholarship by the Thailand Center of Excellence in Physics (ThEP) and the internship program by the Earthquake Research Institute, the University of Tokyo, Japan.

I would like to acknowledge Dr. Michael Allen for his MU thesis LaTeX template. Most of figures were produced using the Generic Mapping Tools (GMT) software.

Tawat Rung-Arunwan