

**EFFECTS OF LAND SURFACE TEMPERATURE ON PM10
LOCAL VARIATIONS USING LANDSAT 8-TIRS
AND GWR APPROACH**

NORZIANA BINTI AB.LLAH

2014566045



**Thesis submitted to the Universiti Teknologi MARA Malaysia
in partial fulfillment of award of the degree of the
Bachelor of Surveying Science and Geomatics (Honours)**


JULY 2017

AUTHOR'S DECLARATION

I declare that the work in this thesis/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Under Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

Name of Student : Norziana Ab.Ilah
Student I.D. No. : 2014566045
Programme : Bachelor of Surveying Science and Geomatics – AP220
Faculty : Architecture, Planning & Surveying
Thesis/Dissertation Title : Effects of Land Surface Temperature on PM10 Local Variations using Landsat8-TIRS and GWR Approach

Signature of Student : 

Date : July 2017

ABSTRACT

Air pollution is one the environmental issues that brings global warming. The main factors that lead to the deterioration of air quality are the development and industrial growth and increasing energy consumption. The conventional regression approach such as Ordinary Least Square (OLS) is not possible to represent the effects of temperature to pollutant parameter at local level. The aim of this study is to determine the effects of land surface temperature (LST) on PM10 local variations using Landsat 8- Thermal Infrared Sensor (TIRS) and Geographically Weighted Regression (GWR) approach in 2015 at Penang. The objectives of this study are to generate land surface temperature of study area, to extract value of LST and PM10 on virtual stations, and to determine the relationship between LST and PM10. The concentrations of PM10 were taken based on CAQM stations at Universiti Sains Malaysia (USM), and two stations at Prai while land surface temperature was derived from a thermal band of Landsat 8-TIRS. By using kriging interpolation on virtual stations, there were 565 locations utilized to extract the values of LST and PM10. The strong relationship between LST and PM10 is found based on the local regression analysis of the GWR, ($r^2=0.606$). The result also improved the global regression analysis ($r^2= 0.026$) in the relationship between both variables. In the local variation of the relationship between LST and PM10, there were 70 locations found statistically significant. In conclusion, the regression between satellite remote sensing and local regression approach such as Landsat 8-TIRS and GWR is possible to be used to determine the effect of land surface temperature towards air pollution.

TABLE OF CONTENTS

	Pages
CONFIRMATION BY PANEL OF EXAMINERS	iv
AUTHOR'S DECLARATION	v
ABSTRACT	vi
ACKNOWLEDGEMENT	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	xi
LIST OF FIGURES	xii
LIST OF SYMBOLS	xiii
LIST OF ABBREVIATIONS / NOMENCLATURE	xiv
CHAPTER ONE: INTRODUCTION	15
1.1 Introduction	15
1.2 Research Background	15
1.3 Problem Statement	16
1.4 Aim & Objectives	17
1.5 Research Questions	18
1.6 Scope Of Work	18
1.6.1 Study Area	18
1.6.2 Data Acquisition	18
1.6.3 Software	19
1.7 Overall Methodology	19
1.8 Significance Of Work	20
1.9 Structure Of Thesis	20
1.9.1 Chapter 1	20
1.9.2 Chapter 2	20
1.9.3 Chapter 3	21
1.9.4 Chapter 4	21

3.5.2	Derivation of Land Surface Temperature	42
3.5.3	Spatial Interpolation	45
3.5.4	Relationship between Land Surface Temperature and PM10	46
3.6	Summary	47
CHAPTER FOUR: RESULT AND ANALYSIS		48
4.1	Introduction	48
4.2	Results & Analysis	48
4.2.1	Land Surface Temperature of Penang	48
4.2.2	Kriging Interpolation	50
4.2.3	Regression Analysis	50
4.3	Summary	55
CHAPTER FIVE: CONCLUSION		56
5.1	Introduction	56
5.2	Conclusion	56
5.3	Recommendations	57
REFERENCES		58
APPENDICES		60
APPENDIX A		61
APPENDIX B		64
APPENDIX C		66