

## 研究 成 果 報 告 書

研究テーマ (和文)	都市における CO2 排出の動態と時空間的排出パターンの検出		
研究テーマ (英文)	Spatio-temporal analysis of patterns and dynamics of CO2 emissions in cities		
研究期間	2020 年 ~ 2023 年		研究機関名 広島大学
研究代表者	氏名	(漢字)	シャリフィ アユーブ
		(カタカナ)	シャリフィ アユーブ
		(英文)	SHARIFI Ayyoob
	所属機関・職名		広島大学大学院人間社会科学研究科 教授
共同研究者 ( 1 名をこえる 場合は、別紙追 加用紙へ)	氏名	(漢字)	
		(カタカナ)	
		(英文)	
	所属機関・職名		
<p>概要 (600 字~800 字程度にまとめてください。)</p> <p>The proposed research had three main stages: 1- Creating Local Climate Zone maps for the selected cities; 2- Estimating CO2 emissions for each LCZ in the selected cities; and 3- Conducting statistical analyses to understand patterns and behaviors of CO2 emissions. Understanding the correlation between urban structure and CO2 emissions is crucial for formulating effective mitigation strategies. However, previous research has mainly focused on analyzing urban form at a broad level, resulting in limitations such as lack of detail and standardized methods, as well as a narrow scope of urban form indicators. To overcome these challenges, in this research we utilized the Local Climate Zones (LCZ) framework to examine the relationship between urban structure and CO2 emissions at a smaller scale in three American cities: Baltimore, Indianapolis, and Los Angeles. We created LCZ maps following the WUDAPT protocol and estimated the emissions using data from the HESTIA project. The findings demonstrate that LCZ provides an effective approach for mapping emissions at both building and street levels while comprehending emission patterns across different urban structures. The results reveal that compact areas with minimal tree coverage and limited green space exhibit emission intensity up to 3.5 times higher than open layouts with scattered trees and ample plant cover. Moreover, per capita emissions in compact areas are approximately twice those observed in more open layouts. Furthermore, it was observed that during daytime hours particularly in Baltimore and Indianapolis high-rise or mid-rise compact areas without trees/greenery (LCZ1 and 2) experience elevated emission levels compared to other LCZs within their respective cities indicated by this investigation highlighted potential for utilizing the LCZ framework not only to understand how urban layout impacts carbon footprints but also for incorporating low-carbon considerations into city planning efforts targeted towards climate change adaptation measures significantly</p>			

発表文献（この研究を発表した雑誌・図書について記入してください。）						
雑誌	論文課題	Analysis of the Associations Between Urban Form and CO2 emissions Based on the Local Climate Zones Classification System				
	著者名	Ayyoob Sharifi, Masoud Javadpoor	雑誌名	International Conference on Applied Energy 2021		
	ページ	1～6	発行年	2021	巻号	N/A
雑誌	論文課題	Urban carbon accounting: An overview				
	著者名	Yin, Sharifi, et. al.	雑誌名	Urban Climate		
	ページ	101195	発行年	2022	巻号	44
雑誌	論文課題					
	著者名		雑誌名			
	ページ		発行年		巻号	
図書	書名					
	著者名					
	出版社		発行年		総ページ	
図書	書名					
	著者名					
	出版社		発行年		総ページ	

英文抄録（100語～200語程度にまとめてください。）

Understanding the relationship between urban structure and CO2 emissions is important for developing effective mitigation strategies. In this research, we used the Local Climate Zones (LCZ) framework to examine the relationship between urban structure and CO2 emissions at a smaller scale in three American cities: Baltimore, Indianapolis, and Los Angeles. We created LCZ maps following the WUDAPT protocol and estimated emissions using data from the HESTIA project. The findings demonstrate that LCZ framework provides an effective approach for mapping emissions at both building and street levels while understanding emission patterns across different types of urban structures. The results reveal that compact areas with minimal tree coverage exhibit emission intensity up to 3.5 times higher than open layouts with scattered trees and ample plant cover. Moreover, per capita emissions in compact areas are approximately twice those observed in more open layouts. These observations highlight potential for utilizing the LCZ framework not only to understand how urban layout impacts carbon footprints but also for incorporating low-carbon considerations into city planning efforts targeted towards climate change adaptation measures significantly

共同研究者	氏名	(漢字)	ジャヴァドプール マスード	
		(カタカナ)	ジャヴァドプール マスード	
		(英文)	JAVADPOOR Masoud	
	所属機関・職名		Shiraz University, Researcher	
	氏名	(漢字)	龍 吟	
		(カタカナ)	ロン イン	
		(英文)	LONG YIN	
	所属機関・職名		The University of Tokyo, Associate Professor	
	氏名	(漢字)		
		(カタカナ)		
		(英文)		
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