

# Challenges in CO<sub>2</sub> Monitoring around the Seoul Metropolitan Area

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Chaerin Park, Ha Young Park, Su-Jong Jeong



Graduate School of Environmental Studies  
Seoul National University, Seoul, Korea

# The Importance of Seoul

10 Largest Cities in the World: 2015

Rank	Urban Area	Population Estimate	Land Area: Square Miles	Density	Land Area: Km2	Density
1	Tokyo-Yokohama	37,843,000	3,300	11,500	8,547	4,400
2	Jakarta	30,539,000	1,245	24,500	3,225	9,500
3	Delhi, DL-UP-HR	24,998,000	800	31,200	2,072	12,100
4	Manila	24,123,000	610	39,500	1,580	15,300
5	Seoul-Incheon	23,480,000	875	26,800	2,266	10,400
6	Shanghai, SHG-JS-ZJ	23,416,000	1,475	15,900	3,820	6,100
7	Karachi	22,123,000	365	60,600	945	23,400
8	Beijing	21,009,000	1,475	14,200	3,820	5,500
9	New York, NY-NJ-CT	20,630,000	4,495	4,500	11,642	1,800
10	Guangzhou-Foshan	20,597,000	1,325	15,500	3,432	6,000

Urban Areas, from *Demographia World Urban Areas*

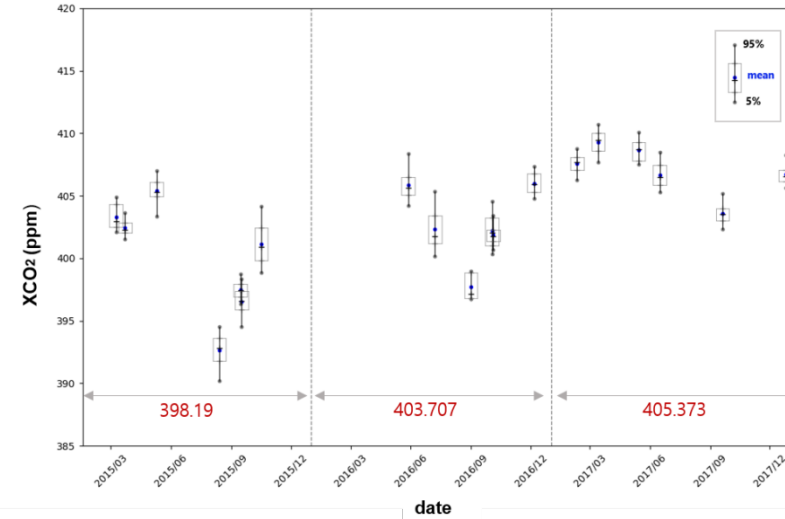
Top 10 cities with Carbon dioxide emissions

Urban Cluster	Country	Footprint/cap (t CO2)	Population	Footprint (Mt CO2)	Global ranking	Domestic ranking
Seoul	South Korea	13.0 ±2.4	21,254,000	276.1 ±51.8	1	1
Guangzhou	China	6.1 ±1.0	44,309,000	272.0 ±46.2	2	1
New York	USA	17.1 ±5.5	13,648,000	233.5 ±75.4	3	1
Hong Kong SAR	China	34.6 ±6.3	6,029,000	208.5 ±37.8	4	1
Los Angeles	USA	14.6 ±3.2	13,482,000	196.4 ±43.7	5	2
Shanghai	China	7.6 ±1.9	23,804,000	181.0 ±44.6	6	2
Country of Singapore	Singapore	30.8 ±6.5	5,235,000	161.1 ±34.1	7	1
Chicago	USA	21.1 ±5.1	7,260,000	152.9 ±37.2	8	3
Tokyo/Yokohama	Japan	4.0 ±0.6	32,999,000	132.8 ±21.4	9	1
Riyadh	Saudi Arabia	20.7 ±4.6	5,747,000	118.8 ±26.4	10	1

[NTNU research team, 2018]

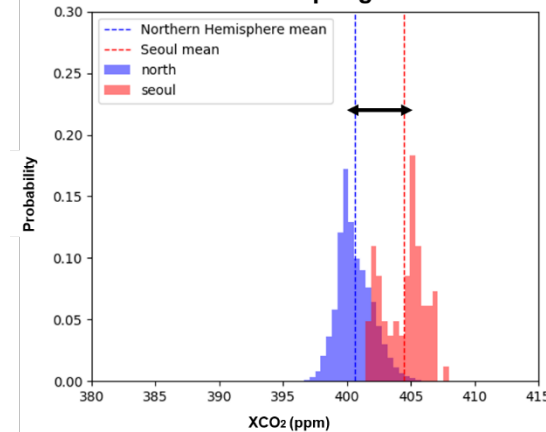
- Seoul has become a significant part of the world's total carbon dioxide emissions
- Essential to study the distribution of carbon dioxide concentration in Seoul

Seoul XCO<sub>2</sub> Variation

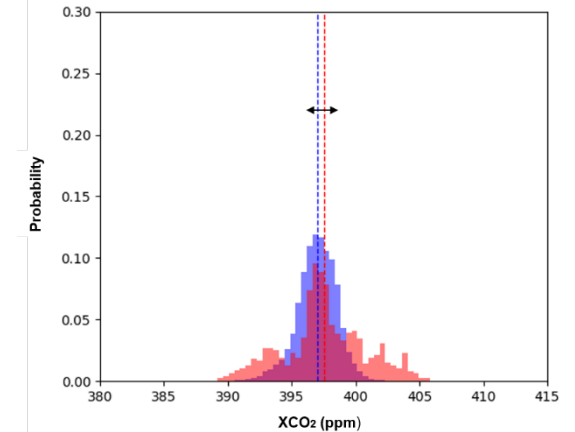


- Seoul's XCO<sub>2</sub> is growing faster than the average increase on Earth

2015 Spring

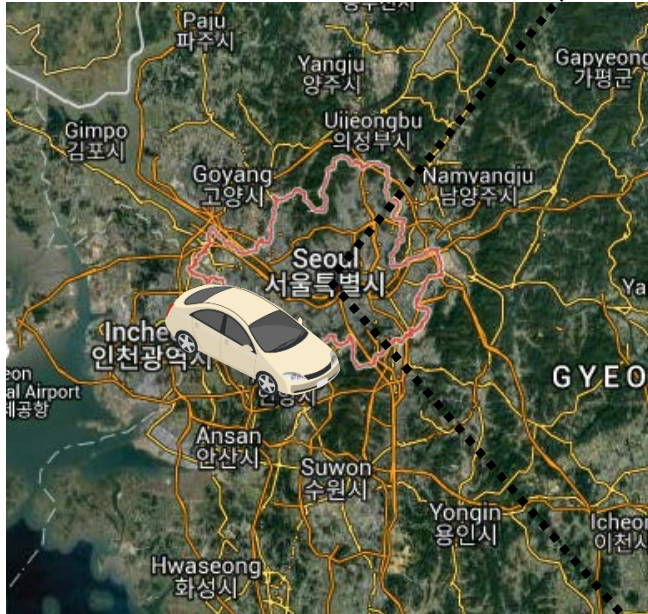


2015 Summer



- Concentration of carbon dioxide was **both increasing** from 2015 to 2017
- Seoul has shown higher concentrations** for three years compared to the Northern Hemisphere

# Discussion



LG building



LI-850

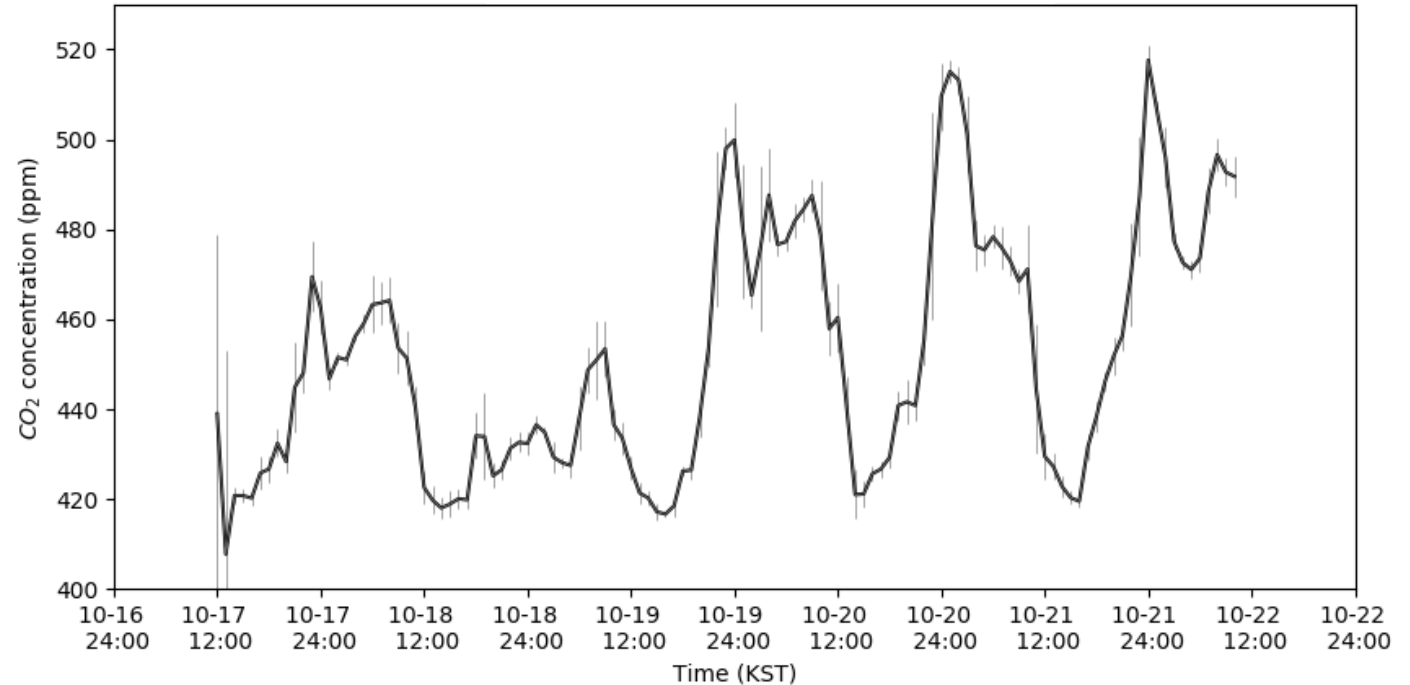
- Despite the importance of Seoul in terms of carbon dioxide emissions, continuous **monitoring of CO<sub>2</sub> concentration is not carried out in the Seoul Metropolitan Area.**
- Our research team has just installed a **carbon dioxide observation equipment on the roof of the LG company building** and will operate a **Mobile Lab** across Seoul.

# Discussion



**LG building**

**CO2 Variation\_ LG building**



- Our ultimate purpose is to make **three-dimensional maps of carbon dioxide concentrations** using surface data obtained by our measurement project and satellite data.