이동통신망 기상자료에 기초한 도시열섬지도 제작 연구: 서울시 사례

Urban Heat-island Map(UHM) make based on Mobile Communication Network Stations

May 31-June 4, 2016
Lisbon University, Portugal

Hansaem Kim*, **Seunghyun Jung Ph.D, Hyomin Kim Ph.D**

Building and Urban Research Institute of KICT

KICT KOREA INSTITUTE of CIVIL ENGINEERING and BUILDING TECHNOLOGY

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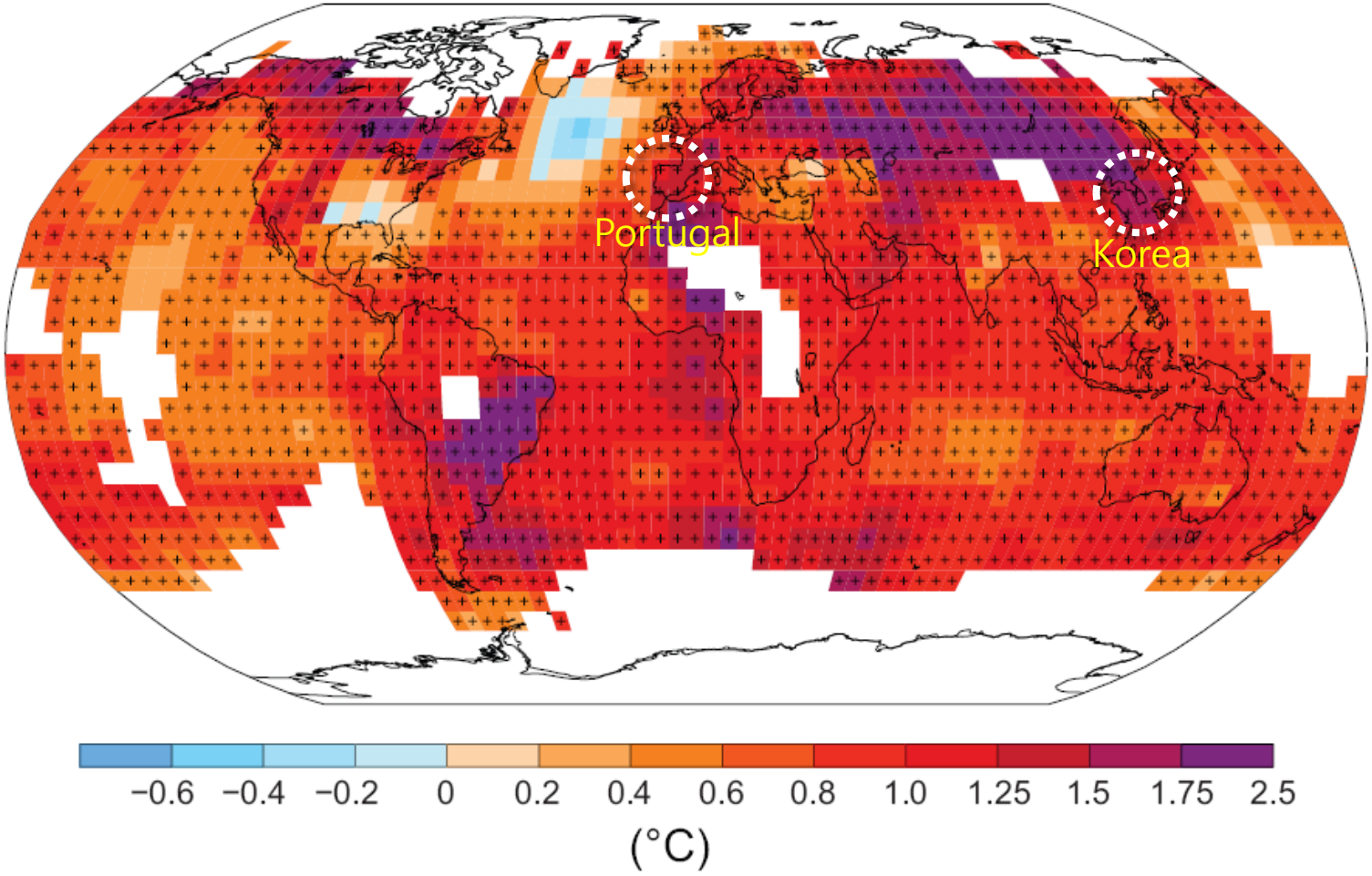
Rising temperatures due to climate change

Change of average temperature (1901~2012)

IPCC, 2013

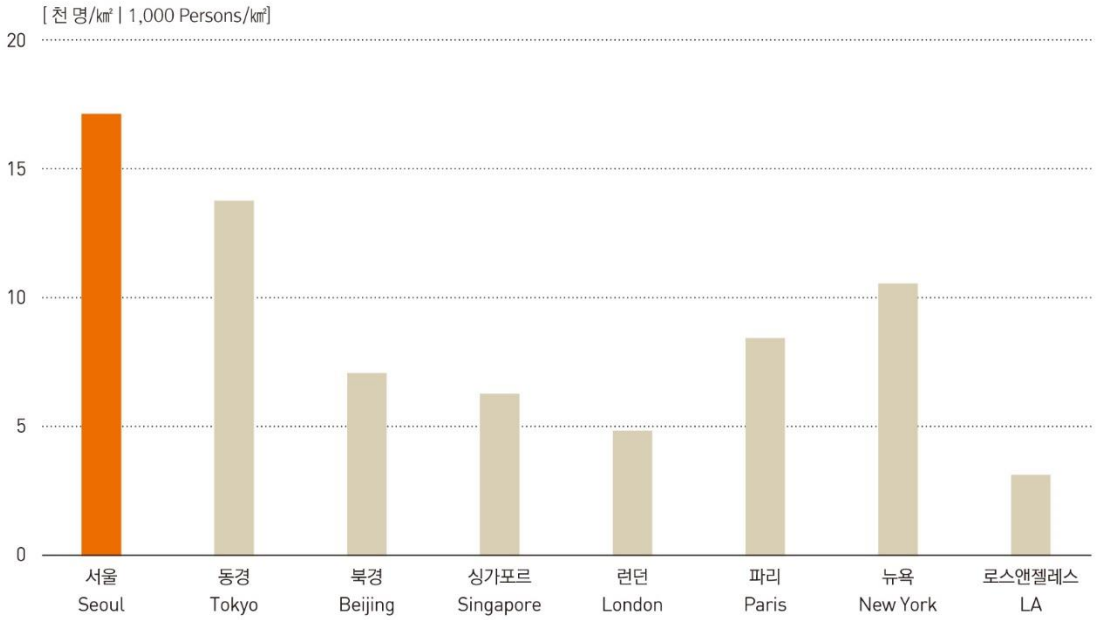


- Temperature + 0.85(0.65~1.06)℃ (1880~2012)
- Sea level + 19(17~21)cm increase (1901~2010)

Rate of increase in population density

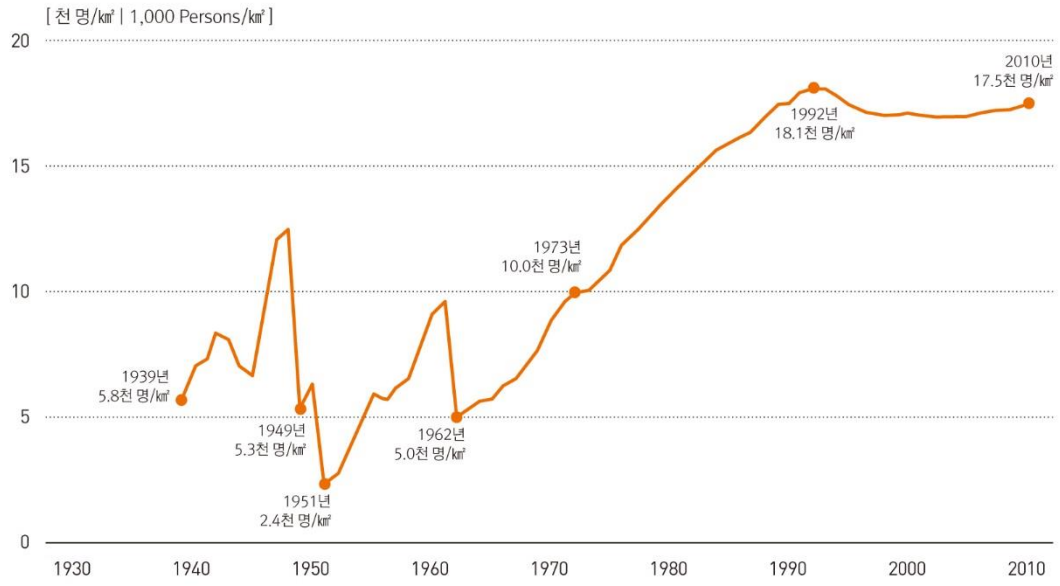
그래프 3-5. 인구밀도 세계 대도시 비교
Graph 3-5. Comparisons in Population Density with World Cities

• 서울, 동경, 북경, 싱가포르, 파리, 뉴욕, 로스앤젤레스 2005년, 런던 2006년 인구 기준



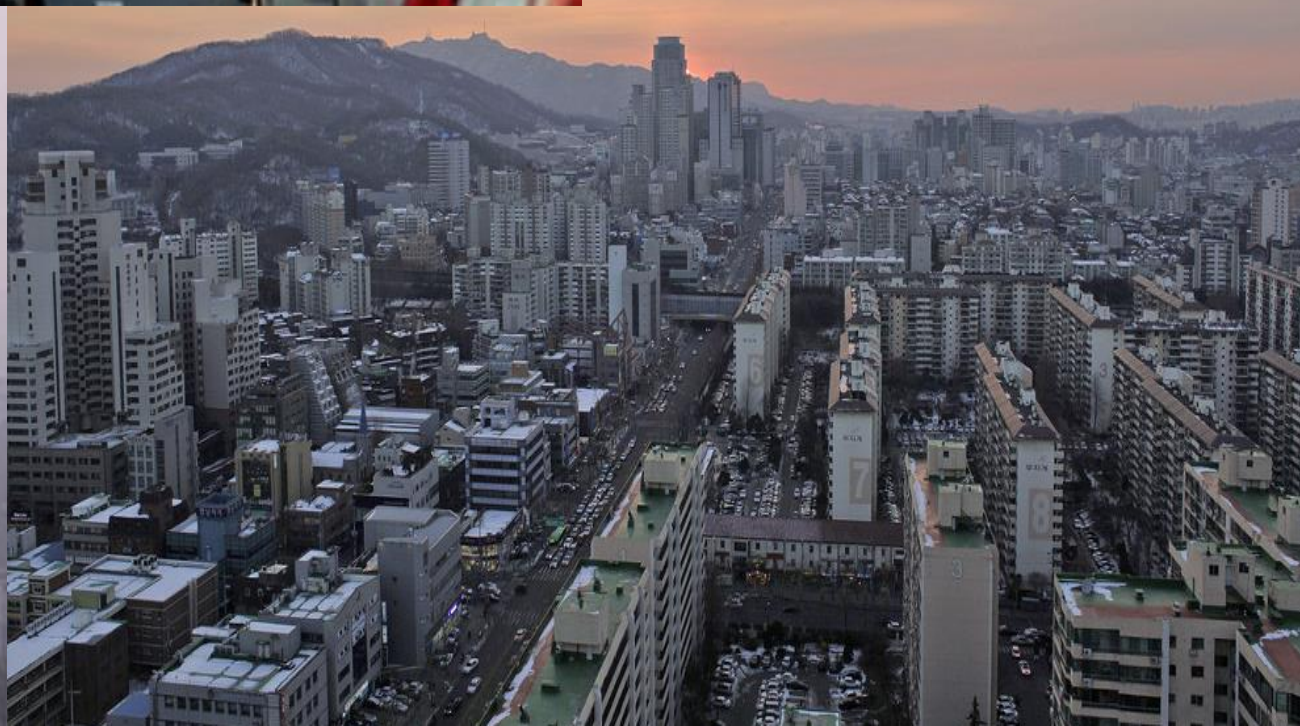
그래프 3-4. 인구밀도 변화추이 1939-2010
Graph 3-4. Trends in Population Density, 1939-2010

• 인구밀도=인구/서울시 면적



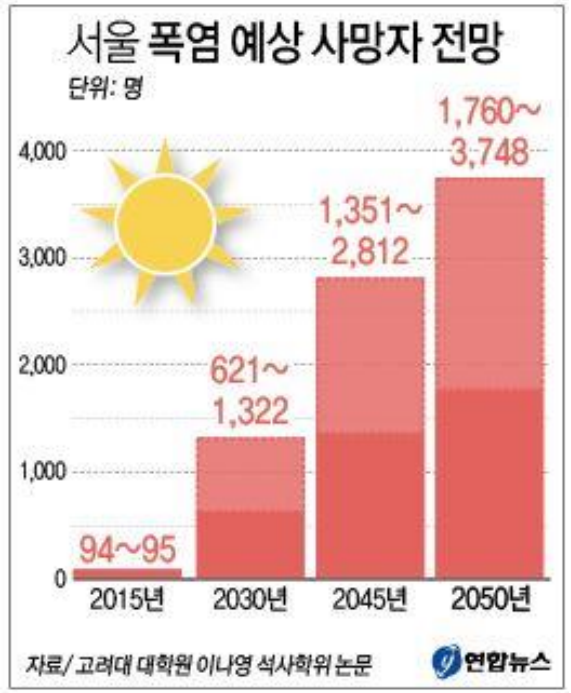
https://seoulsolution.kr/content/statistics?language=en

Concentration of urban development



Background

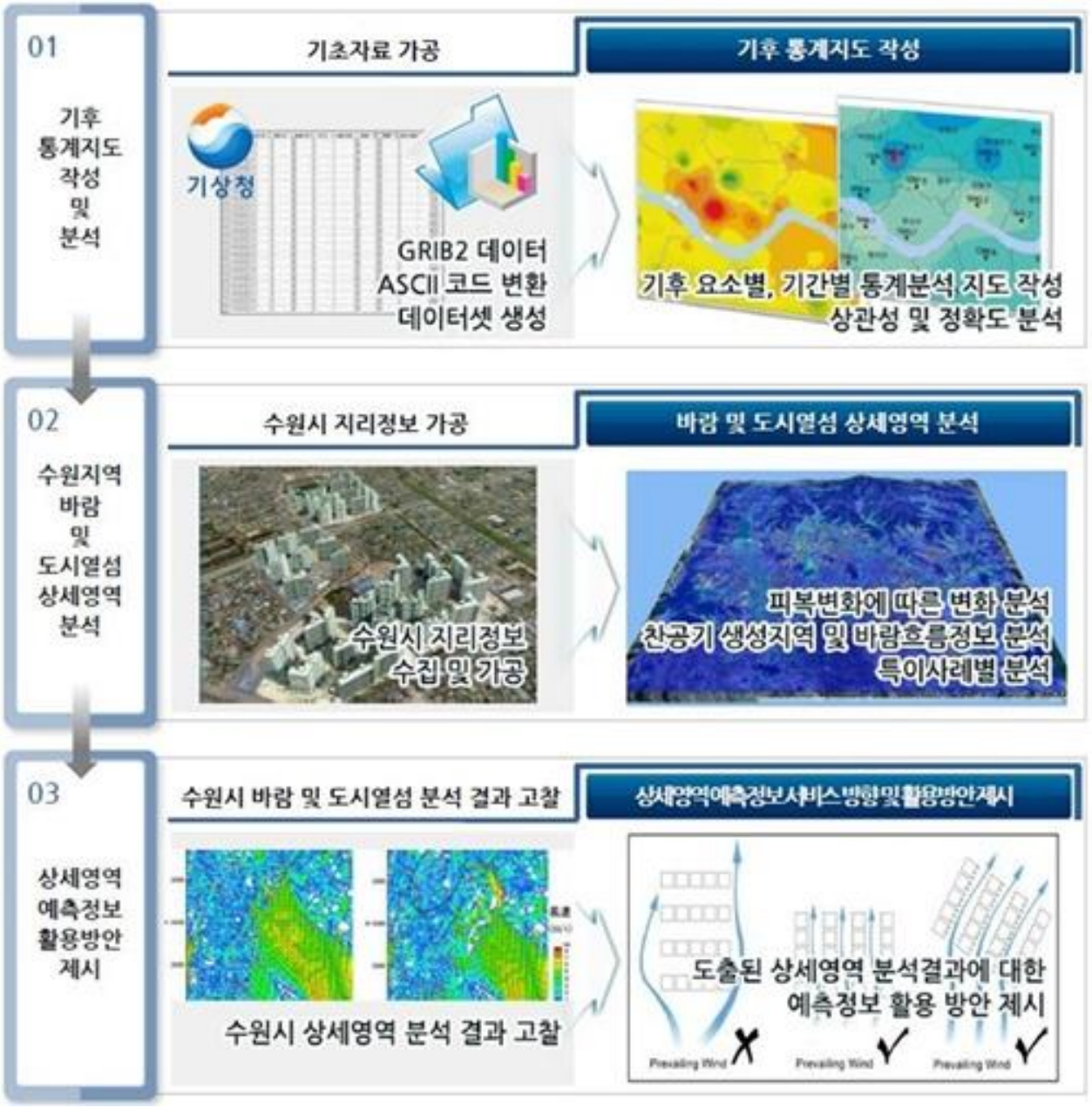
Necessities



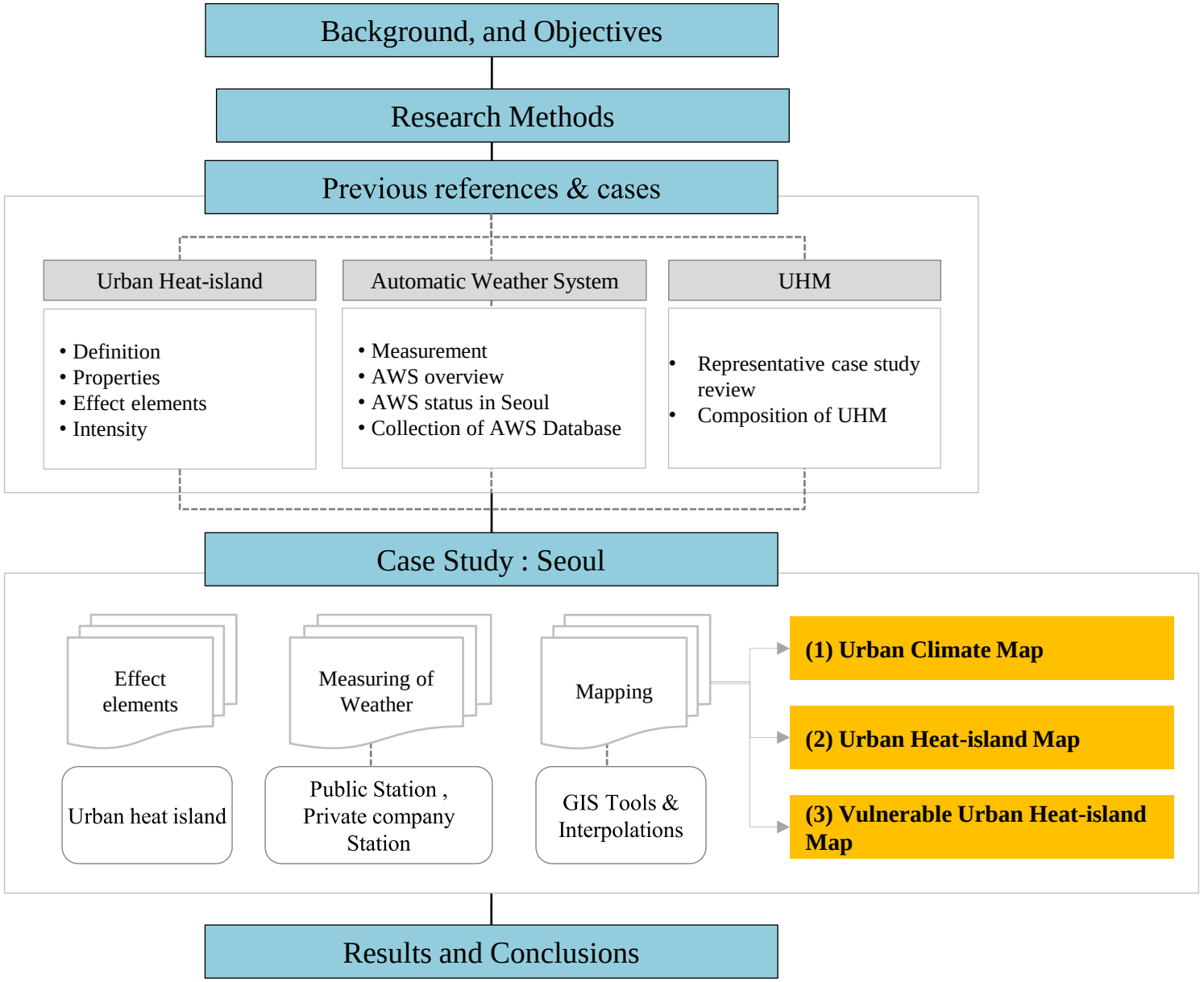
조숙빈 인턴기자 / 20130825
@yonhap_graphics(트위터)

(Picture : http://news.bbsi.co.kr/news/articleView.html?idxno=750594)

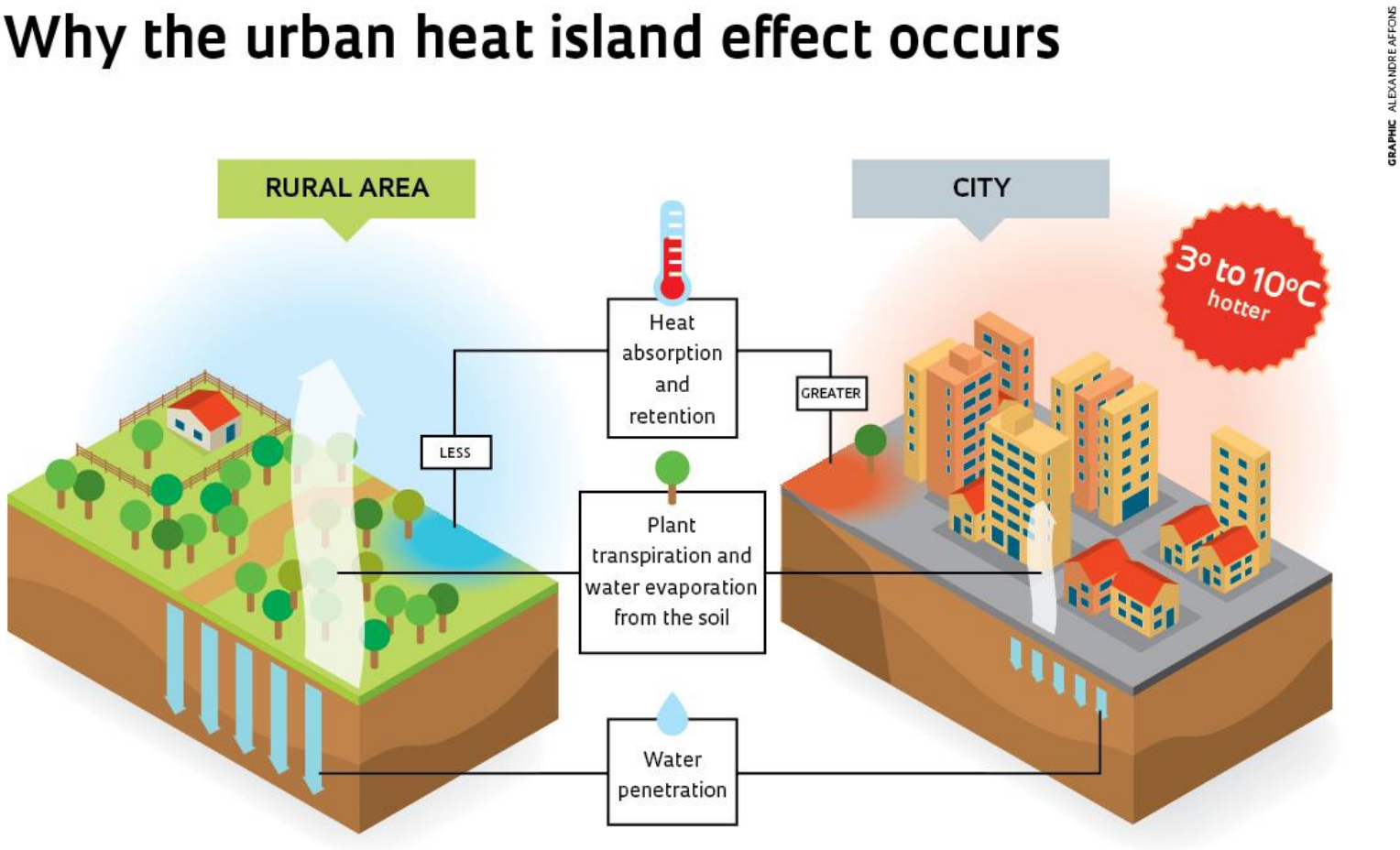
Necessities



Research Process

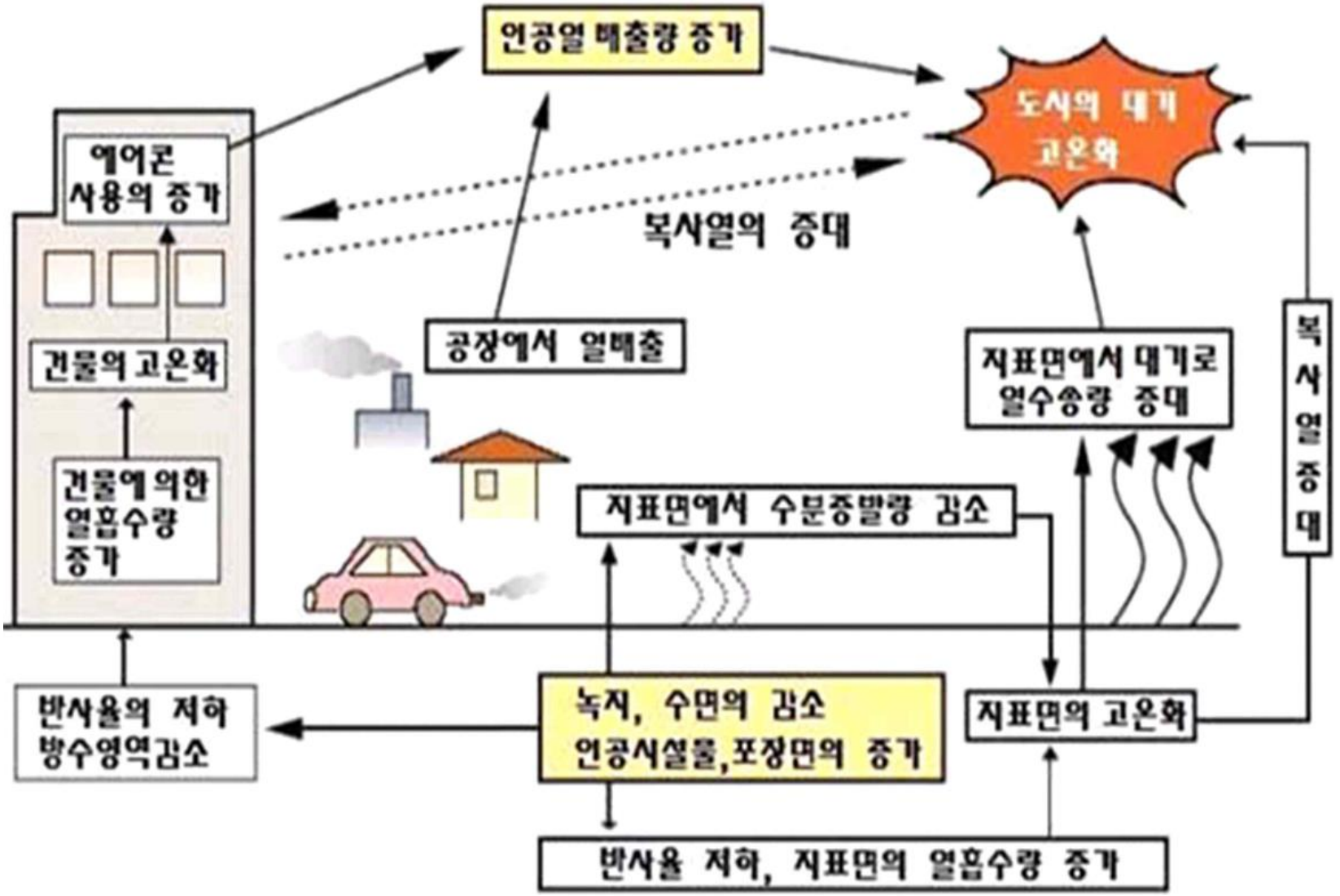


Urban Heat-Island



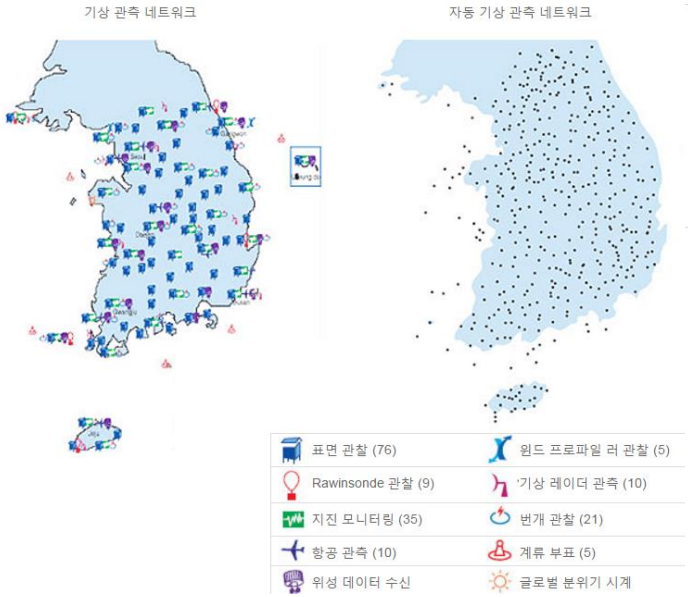
- Luke Howard(1820), Landsberg(1981), Oke(1982), Balchin and Pye(1947) ..etc
- An **urban heat island (UHI)** is a city or metropolitan area that is significantly warmer than its surrounding rural areas due to human activities.
- The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4°F (1–3°C) warmer than its surroundings.

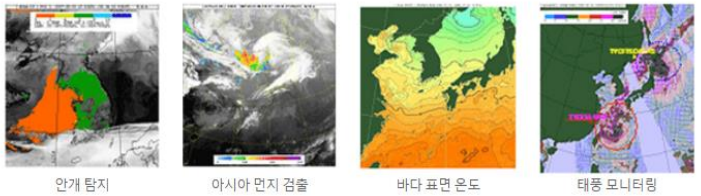
Urban Heat-Island

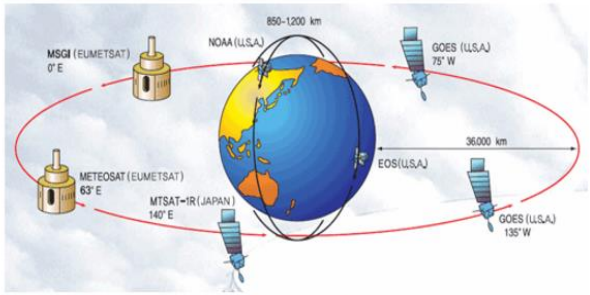


Automatic Weather System/Station (AWS)

Observation network (based on The Korea Meteorological Administration& Seoul Metropolitan Government)



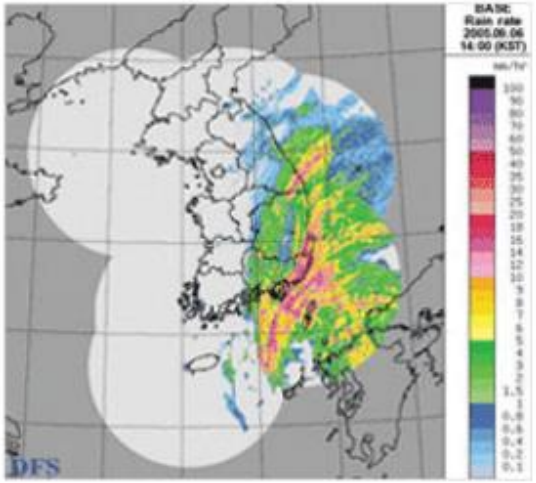




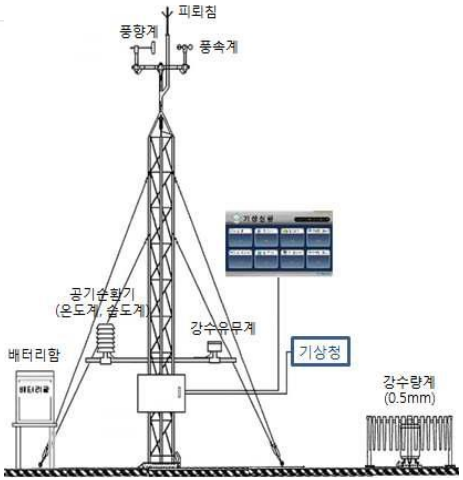
글로벌 위성 관측 네트워크

Rawinconde 관찰

윈드 프로파일 러 관찰



웹에서 모자이크 레이더 이미지

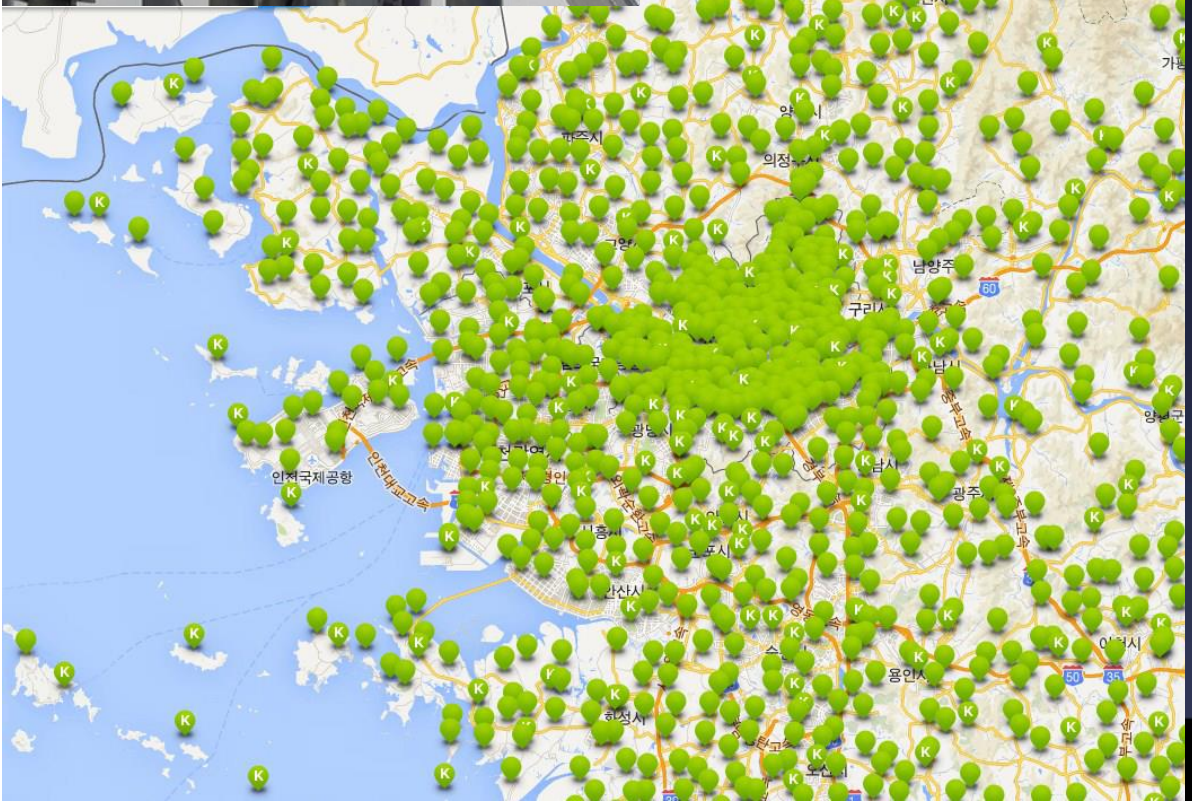


기상자료개방웹포털(http://data.kma.go.kr)

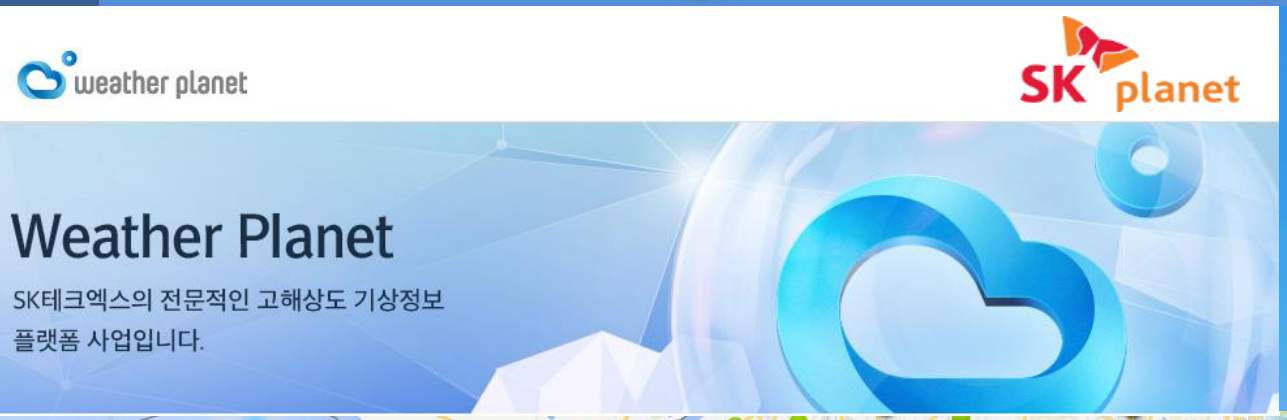
국가기후자료 홈페이지(http://sts.kma.go.kr)

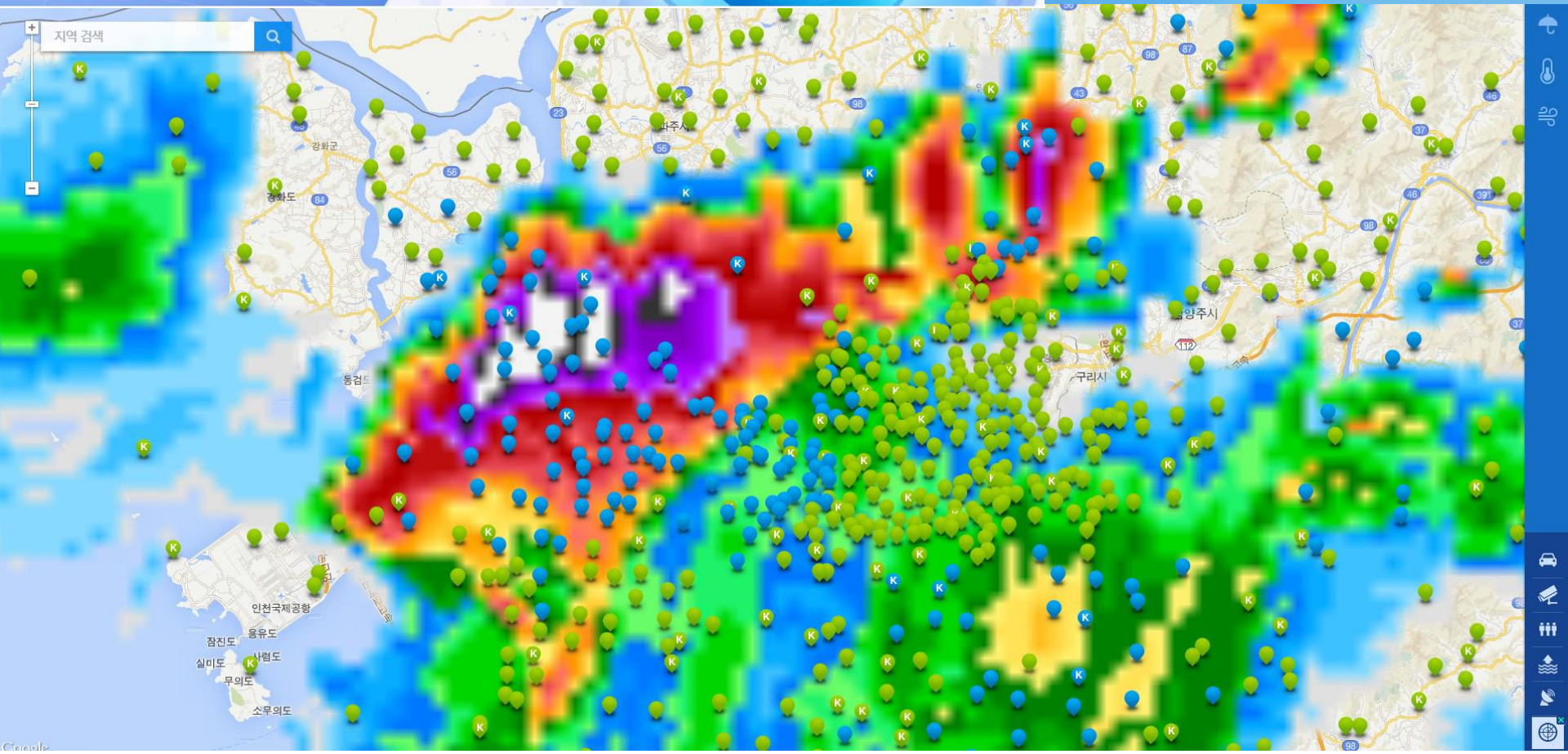
Automatic Weather System/Station (AWS)

Observation network (Private company based on mobile communication network station at SK planet)

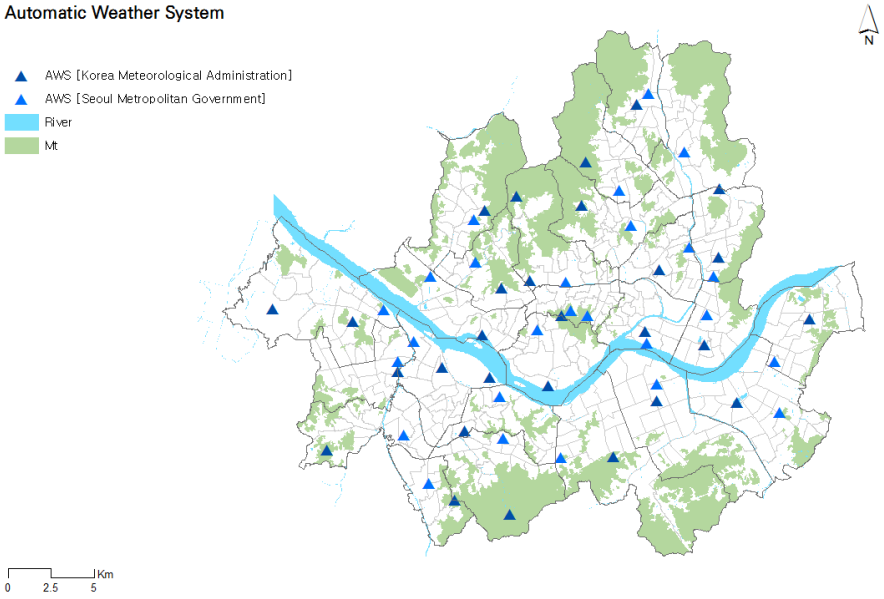


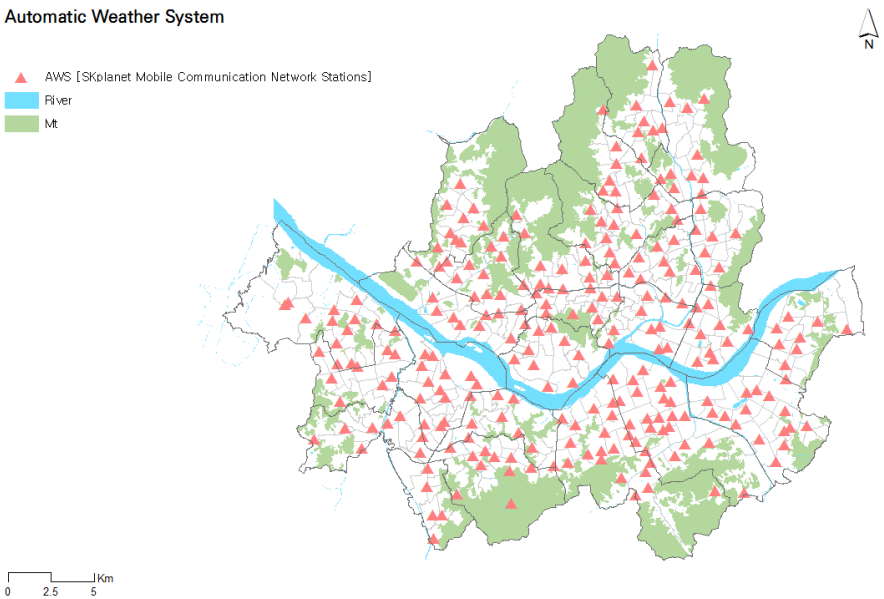
Automatic Weather System/Station (AWS)





Automatic Weather System/Station (AWS)





	Public AWS (KMA, Seoul)	Private company AWS (SKplanet-Mobile communication network station)
Positive	reliability of data Information fee is free	Many measuring points can be measured in living level
Negative	1 point / 7km ~ 10km (too far) Installation spot is top of mountain, center of Green park, or school	Information fee is expensive

Case of Urban Climate map

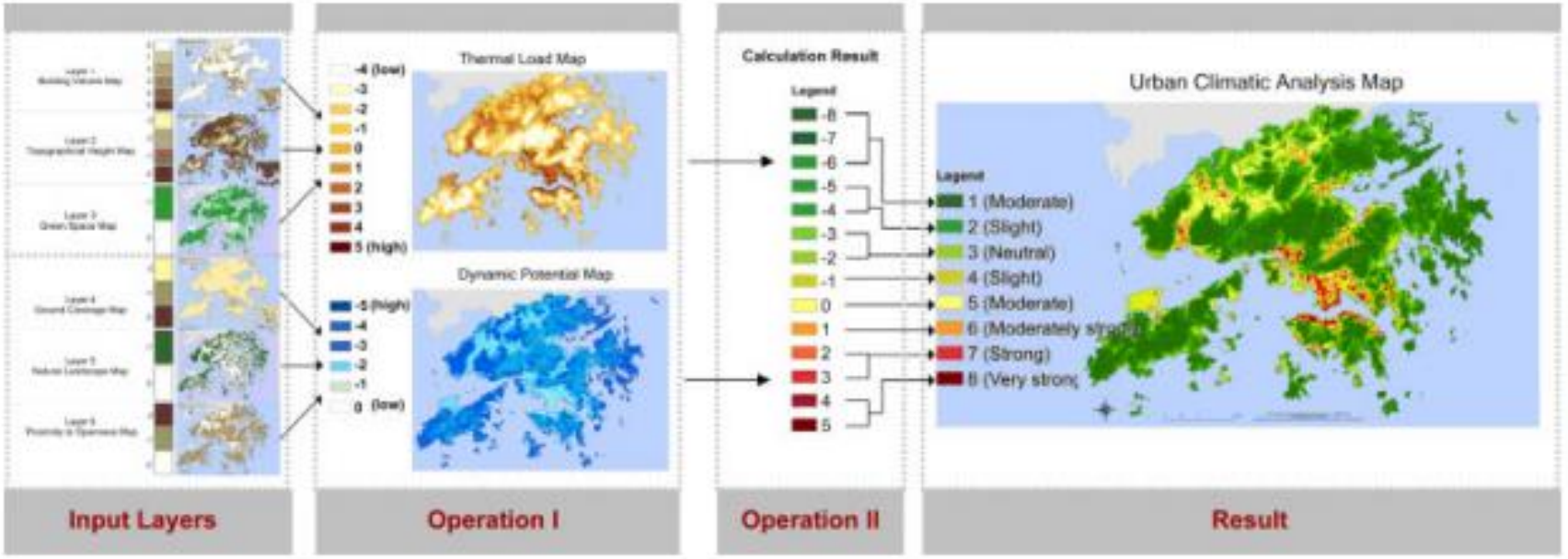
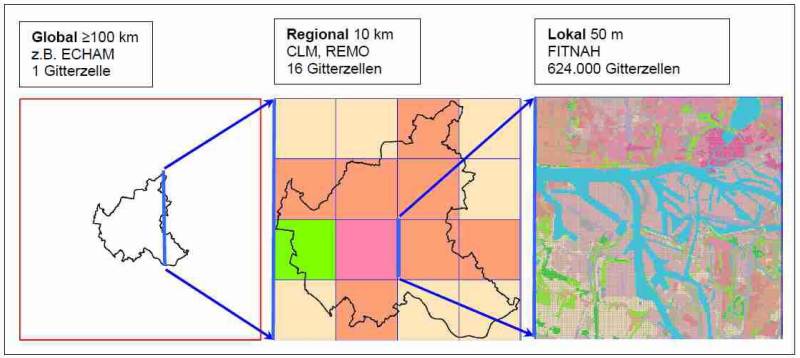
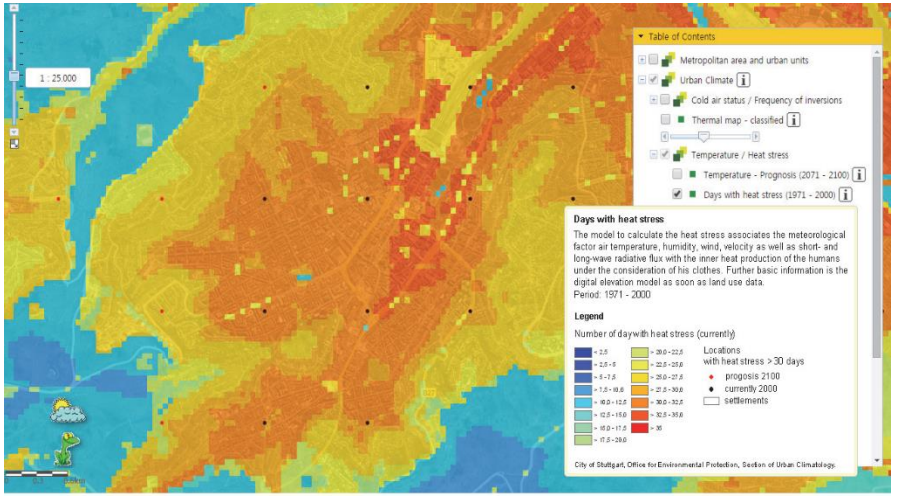
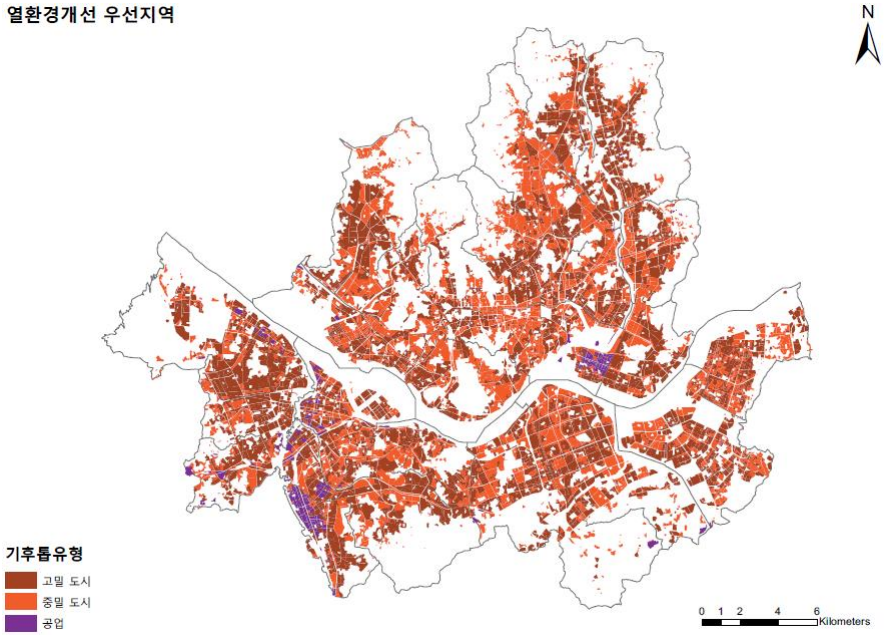


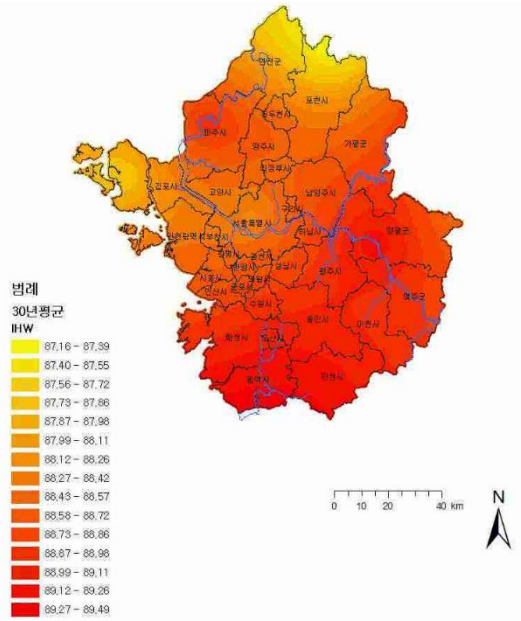
Figure 5. The working process of the UC-AnMap of Hong Kong (Ng *et al.*, 2008a). This figure is available in colour online at wileyonlinelibrary.com/journal/joc

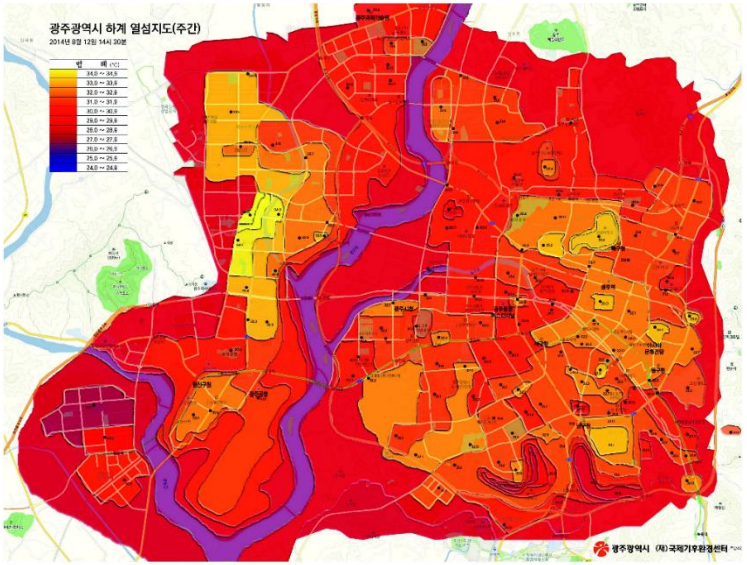


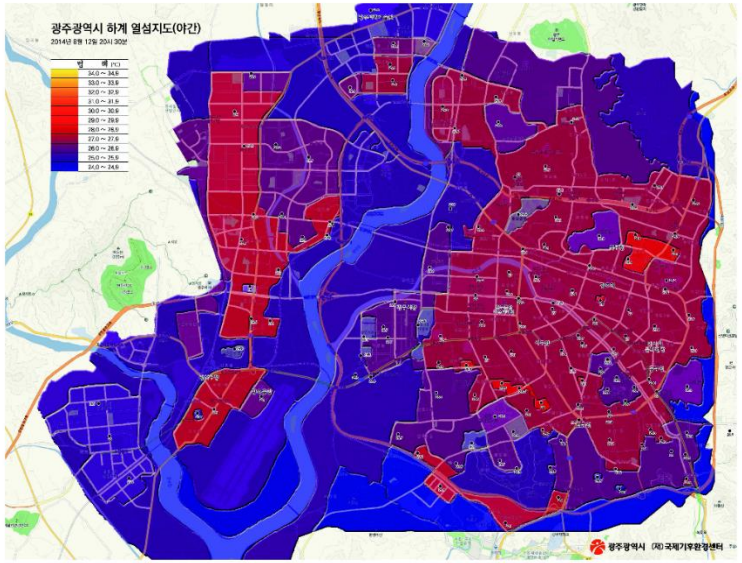


Case of Urban Climate map



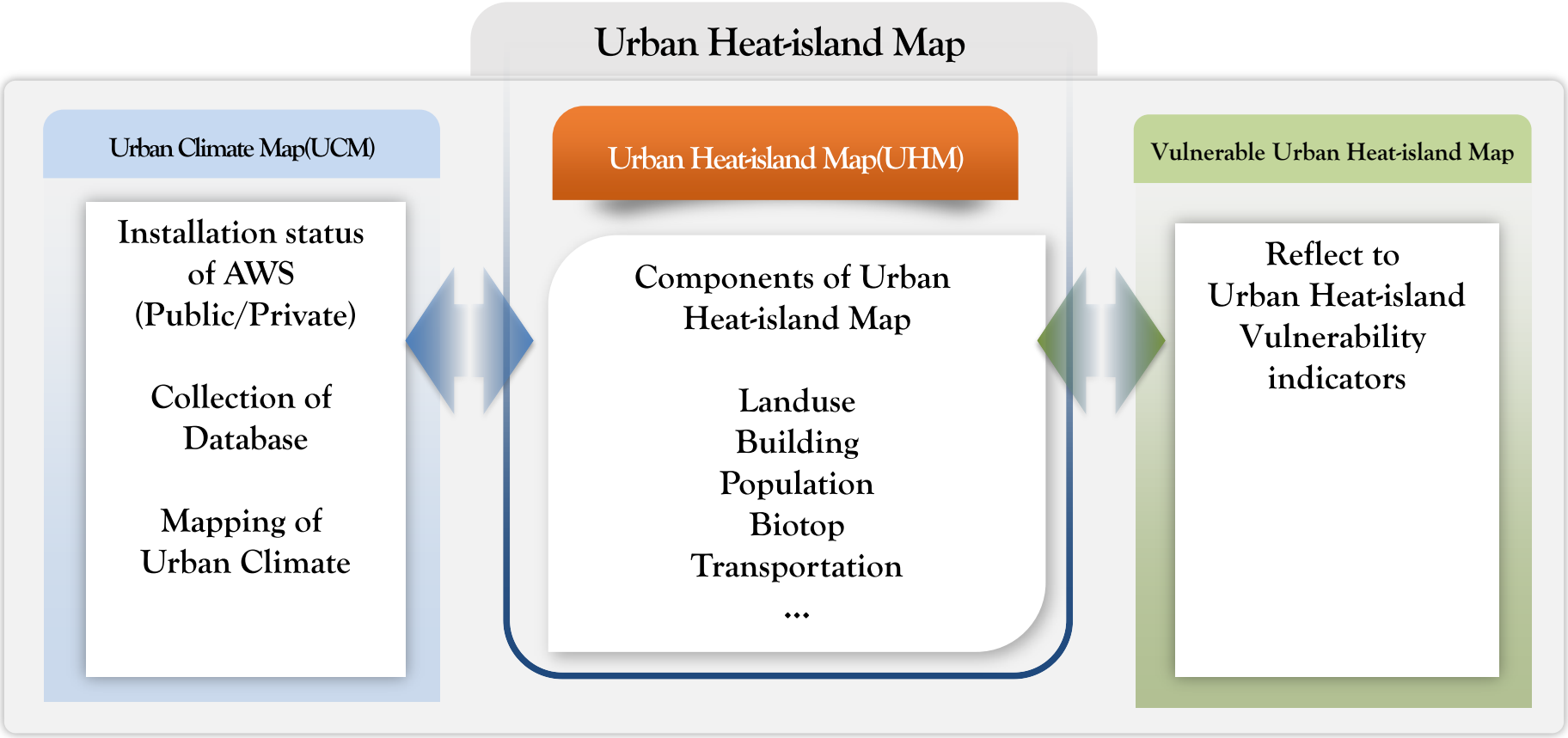




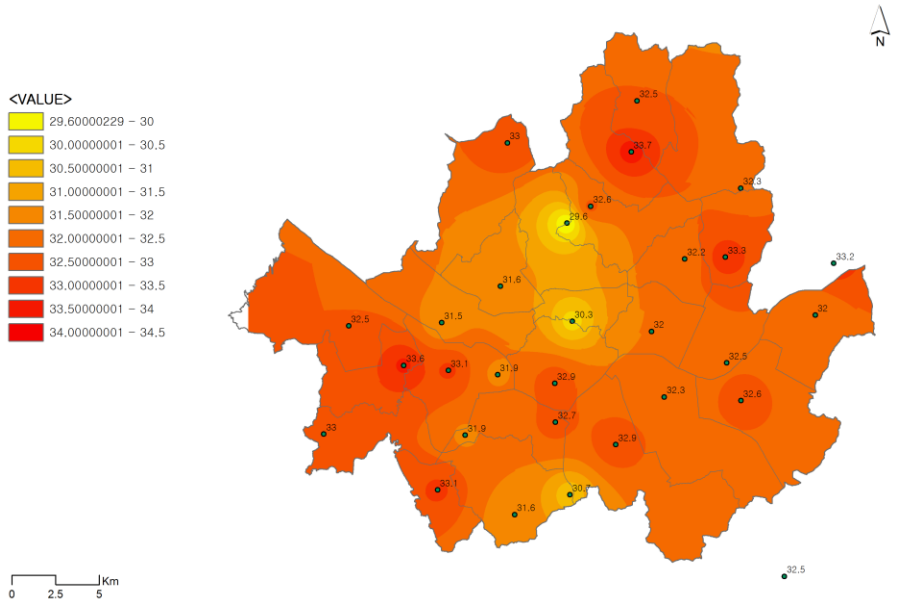


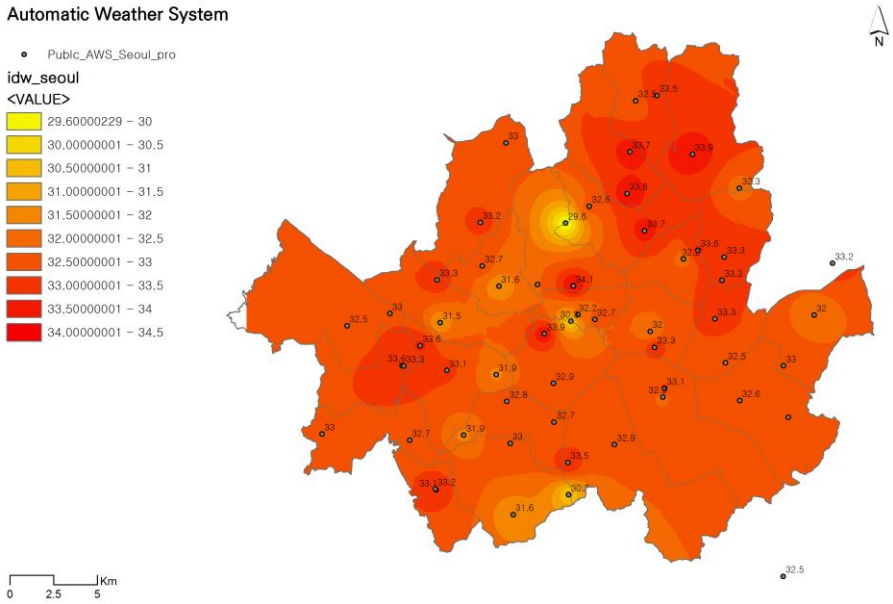
Case Study : Seoul

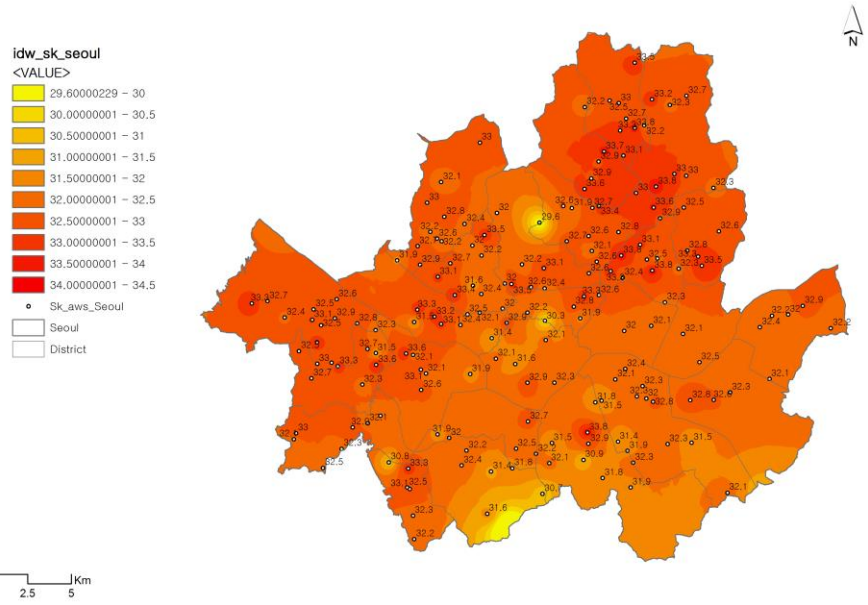
Administration level	Planning level	Urban Climate issue	Climate scale	현재
Region 1:100,000 City 1:25,000	Urban development; master Plan	Heat island effect; ventilation and air paths	Meso-scale	○, △
Neighbourhood 1:5,000	Urban structures	Thermal comfort; air pollution	Meso-scale/Micro-scale	x
Streets, block of houses 1:2,000	Street and Open space design	Thermal comfort	Micro-scale	x
Single building site 1:500	Building design	Radiation and ventilation effects	Micro-scale	x



(1) Urban Climate Map

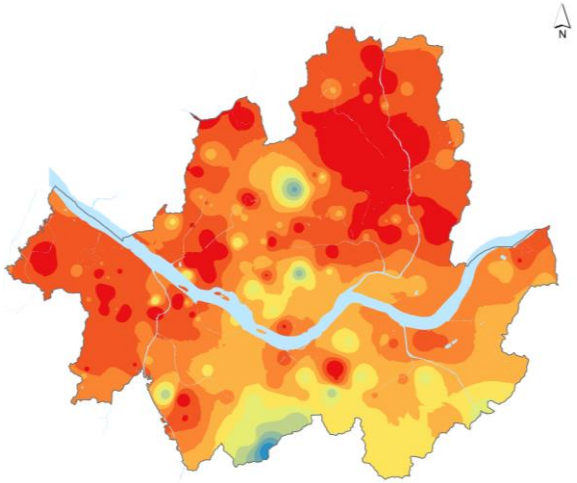




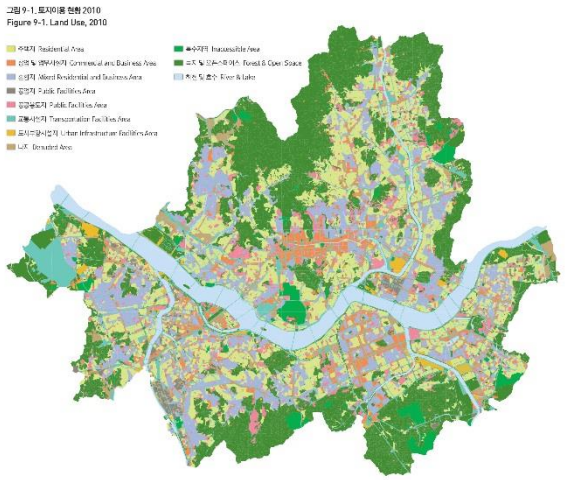


3pm. August 2, 2014.

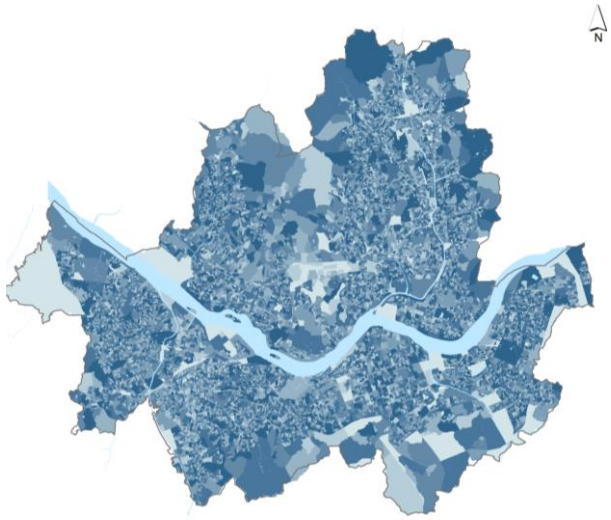
(2) Urban Heat-island Map



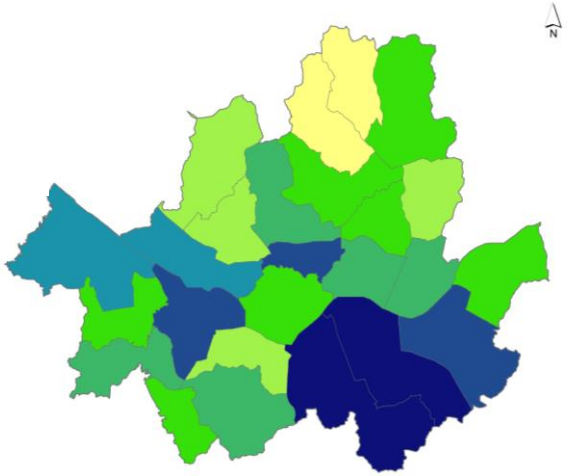
Temperature (SK)



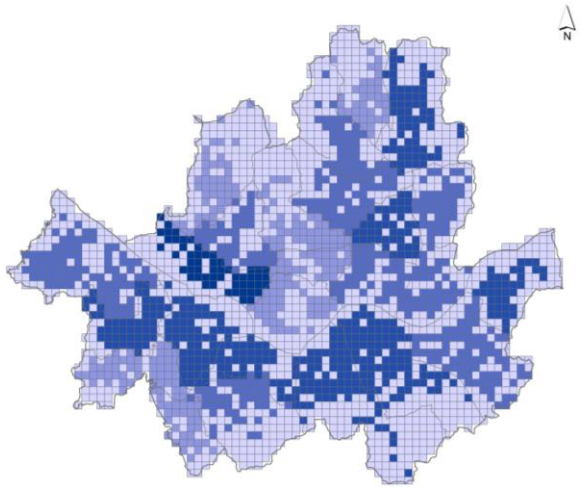
Landuse



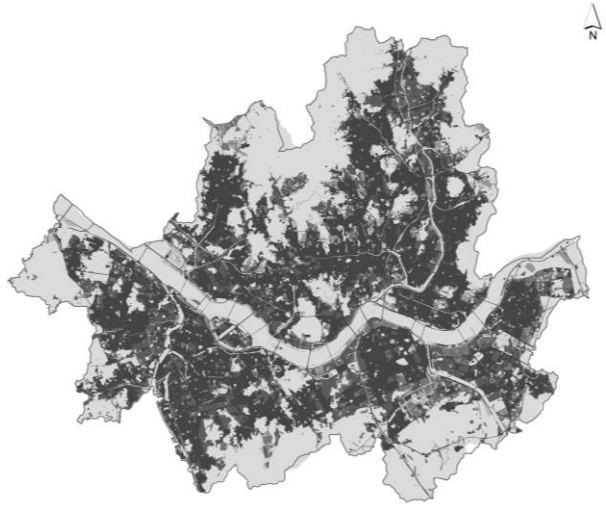
Population



Energy

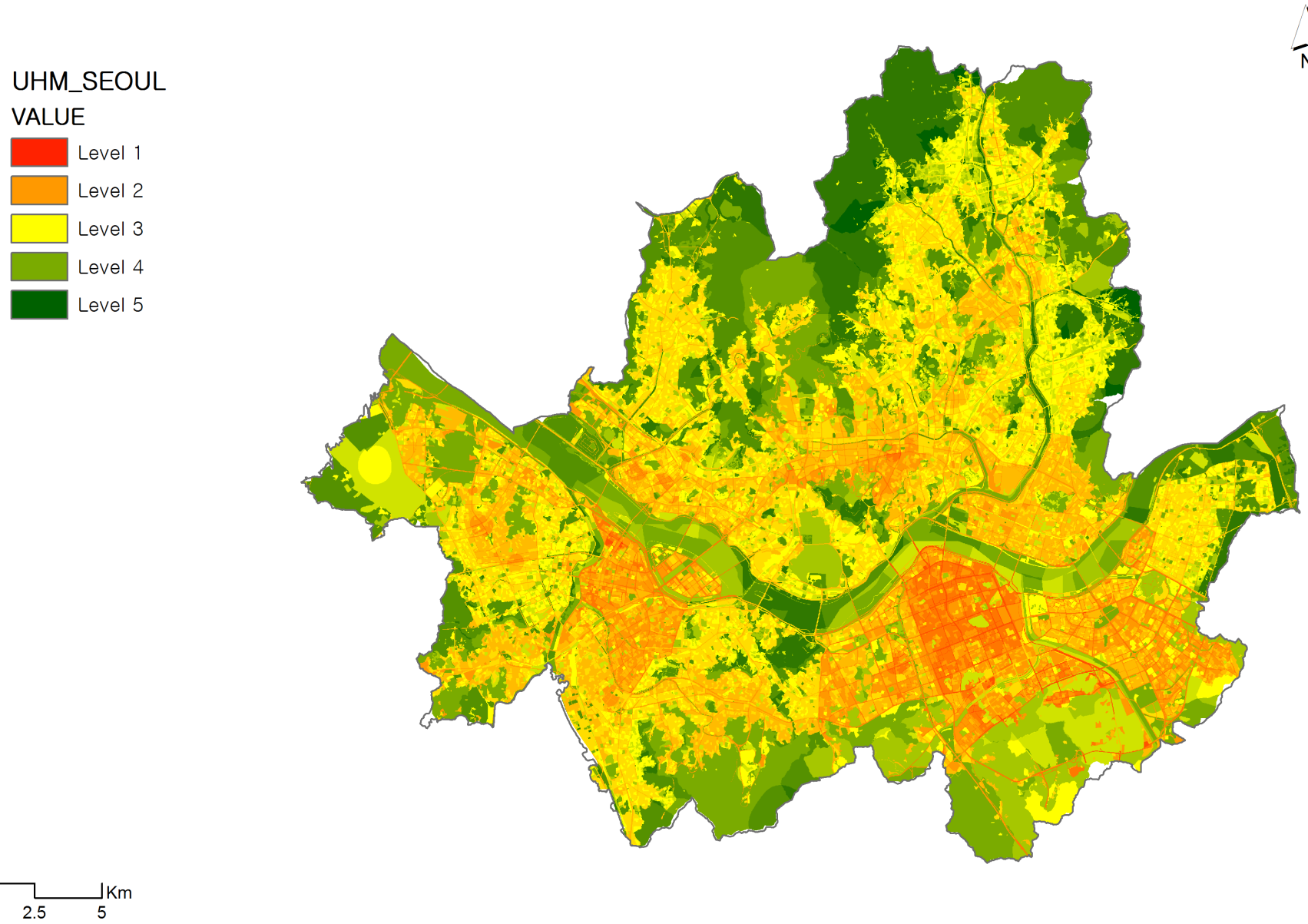


Transportation

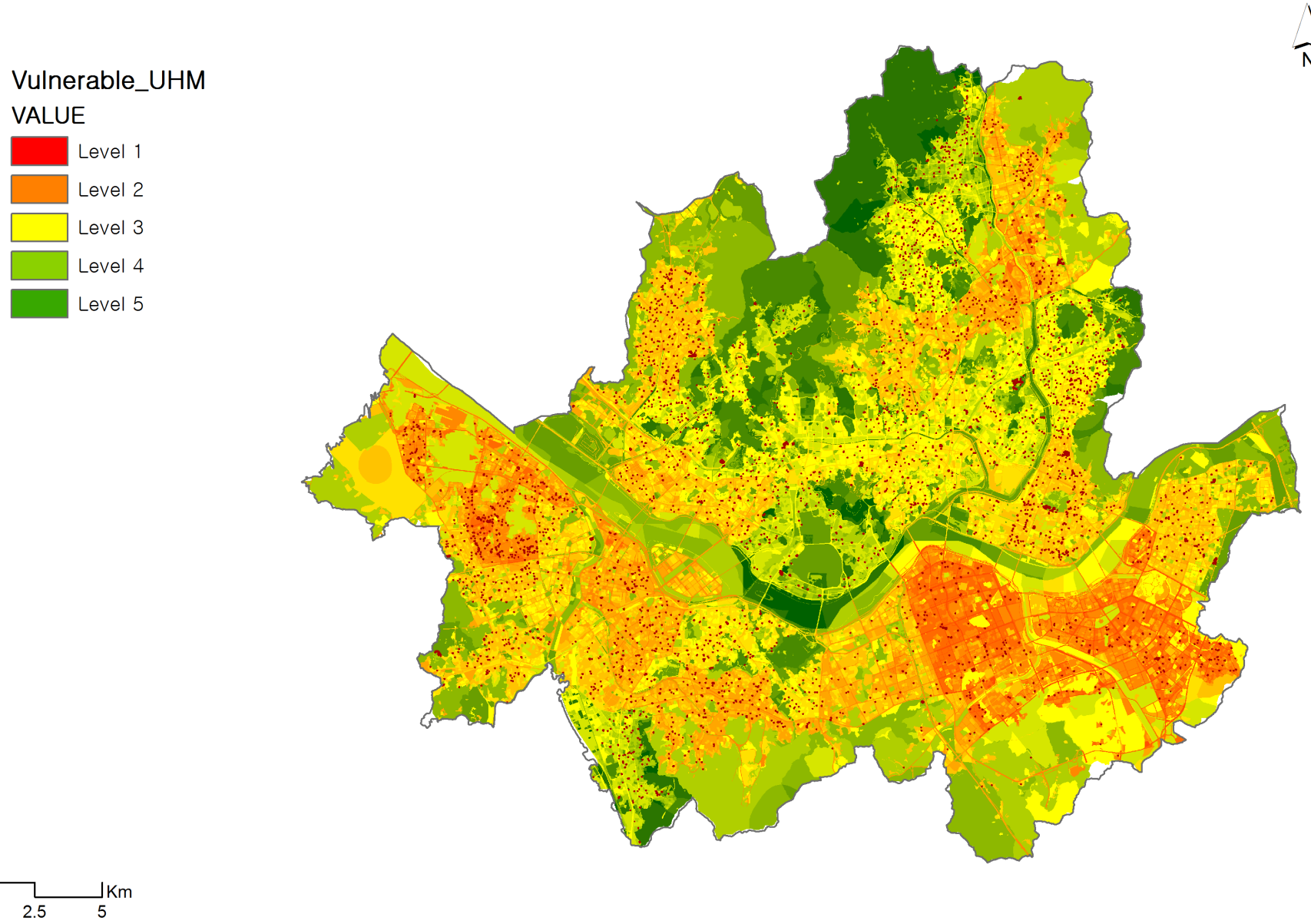


Impermeable layer

(2) Urban Heat-island Map



(3) Vulnerable Urban Heat-island Map



Conclusions

- This study proposed how to make UHM by utilizing meteorological measurement equipment based on mobile communication stations.

- UHM development methodology proposed in this study can solve the problems such as gaps between measured regions and information collection period by utilizing communication stations for measurement and collection of weather information.

- For the future study, the present study should be advanced to be used for division of urban climate regions and planning guidelines in order to improve utilization of the climate maps produced in this study.

LOTTE OUTLETS

전방300m
택 시
서울 33아 6793

Thank you

Q&A : tree@kict.re.kr