



IUPEA - International Urban Planning and Environment Association

이동통신망 기상자료에 기초한 도시열섬지도 제작 연구: 서울시 사례

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

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Lisbon University, Portugal

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Building and Urban Research Institute of KICT



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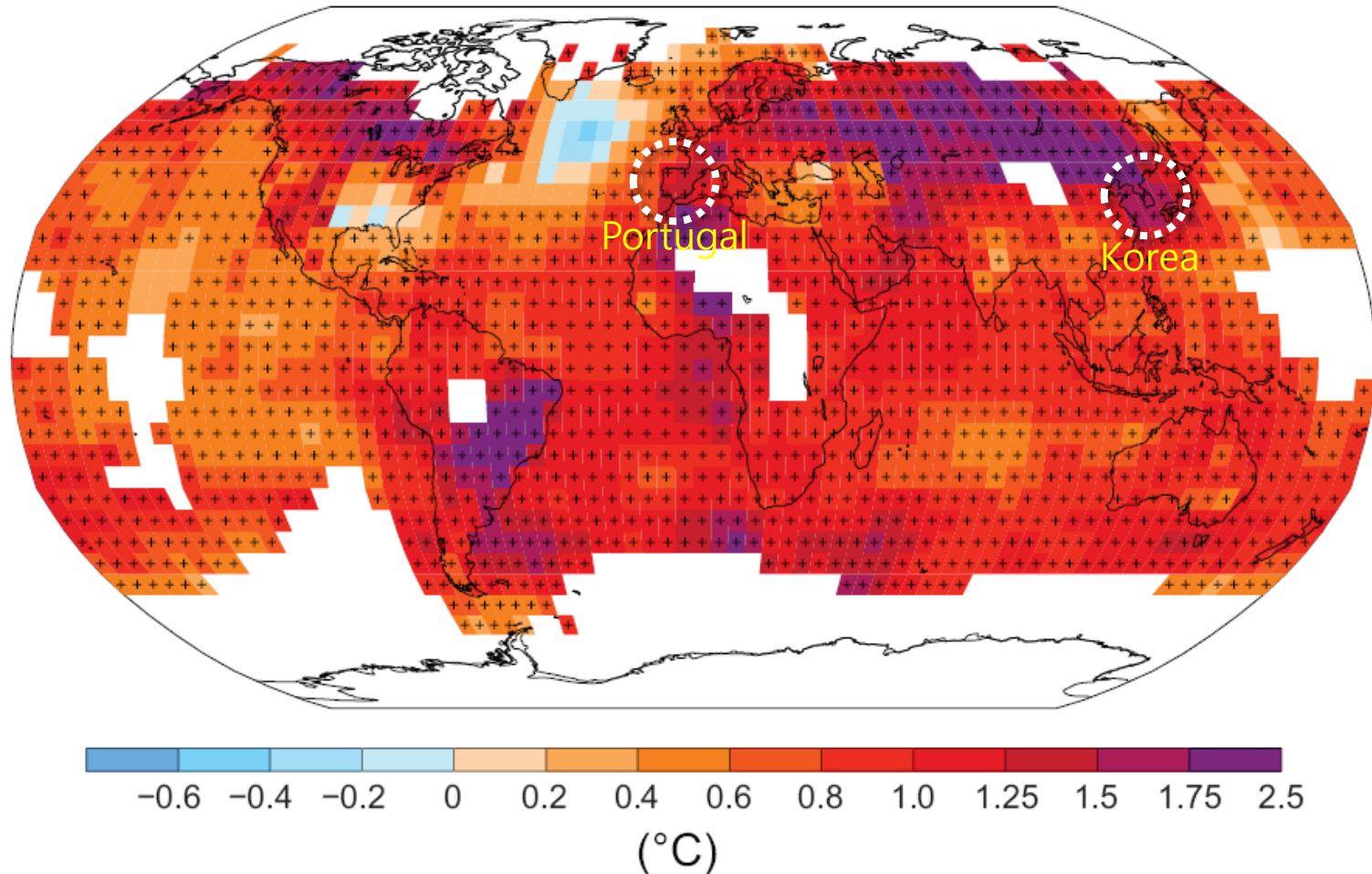
V. Results

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Change of average temperature (1901~2012)

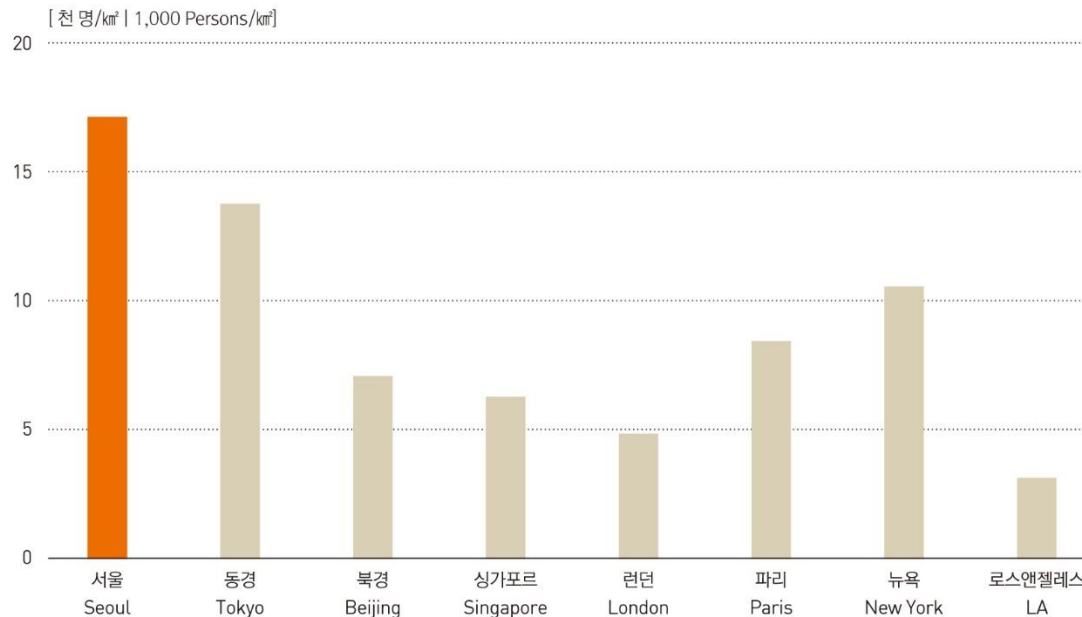
IPCC, 2013



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

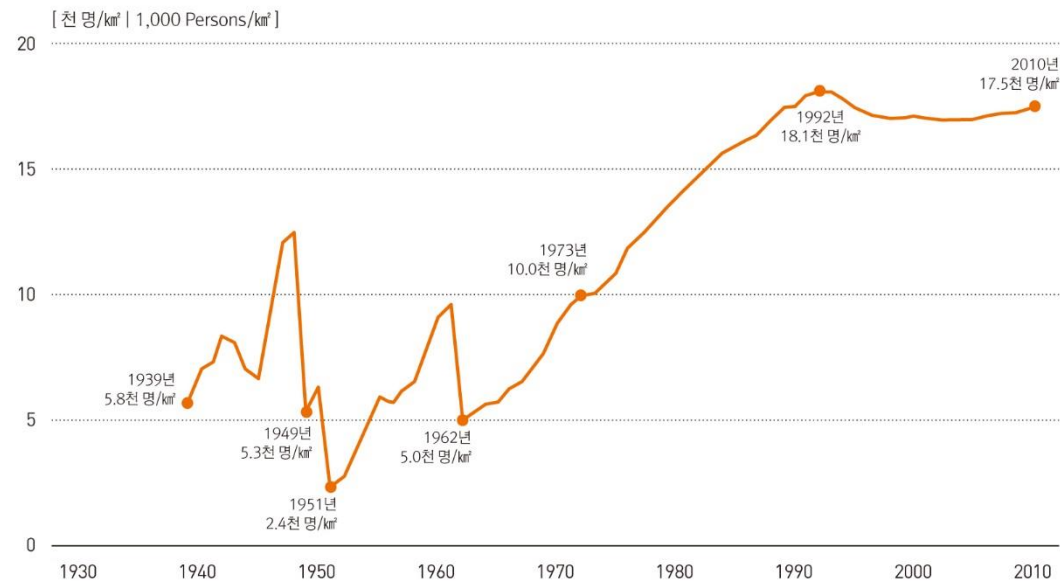
그래프 3-5. 인구밀도 세계 대도시 비교
Graph 3-5. Comparisons in Population Density with World Cities

• 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

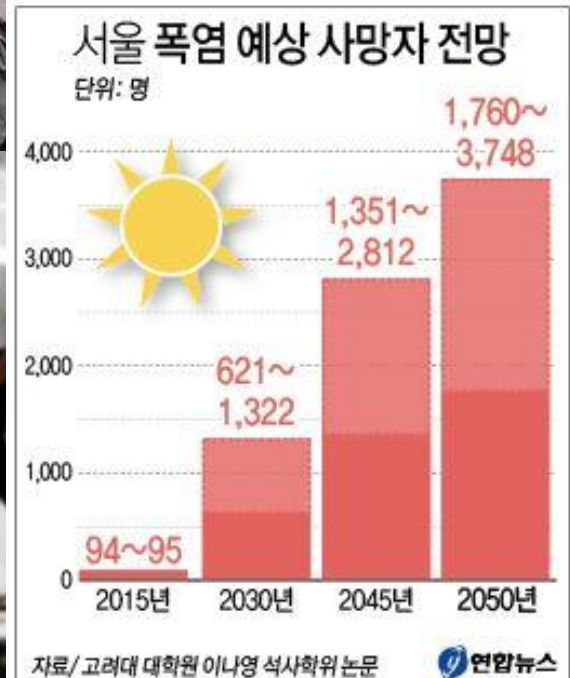


Concentration of urban development





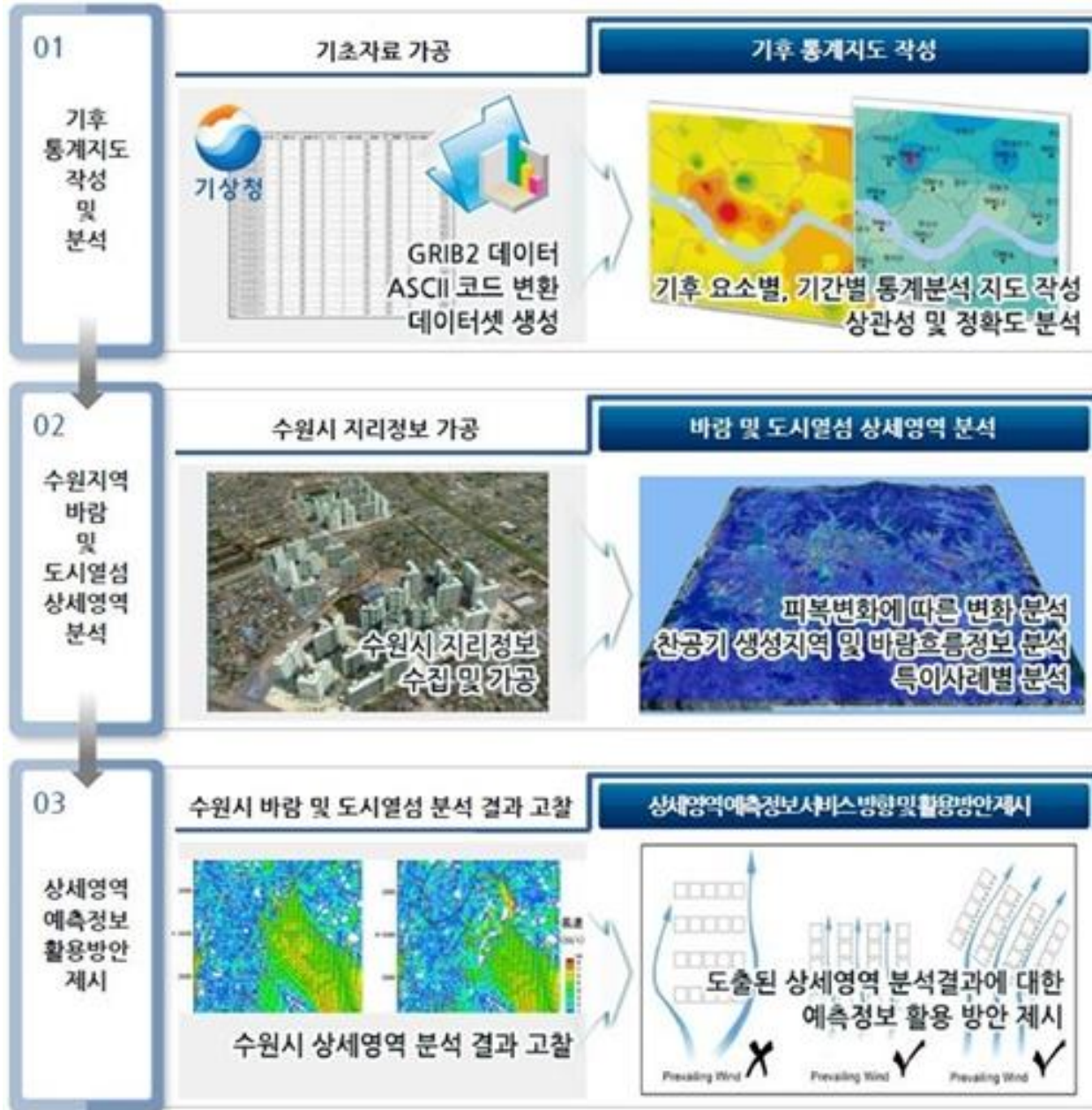
가상청

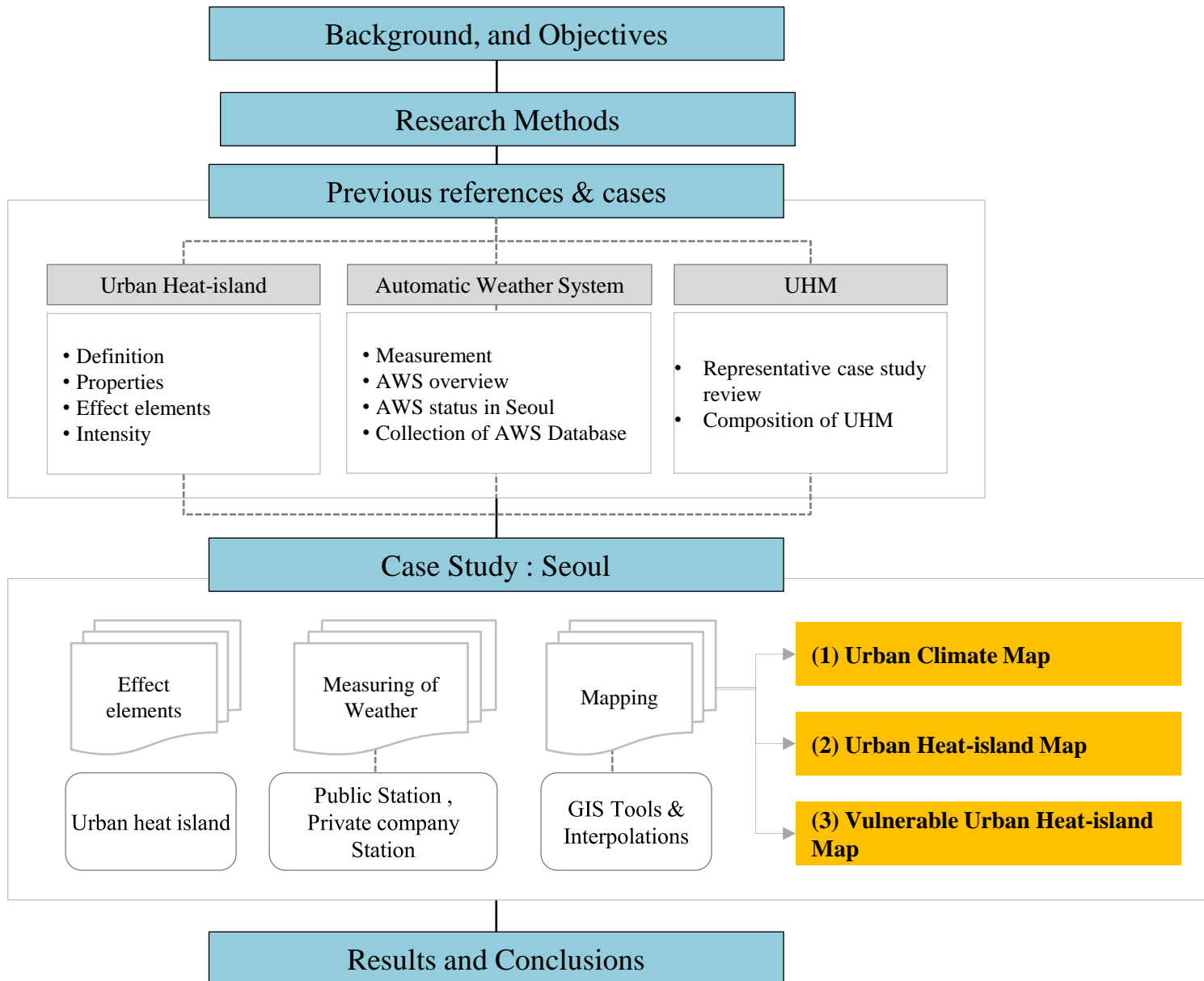


자료/ 고려대 대학원 이나영 석사학위논문 연합뉴스

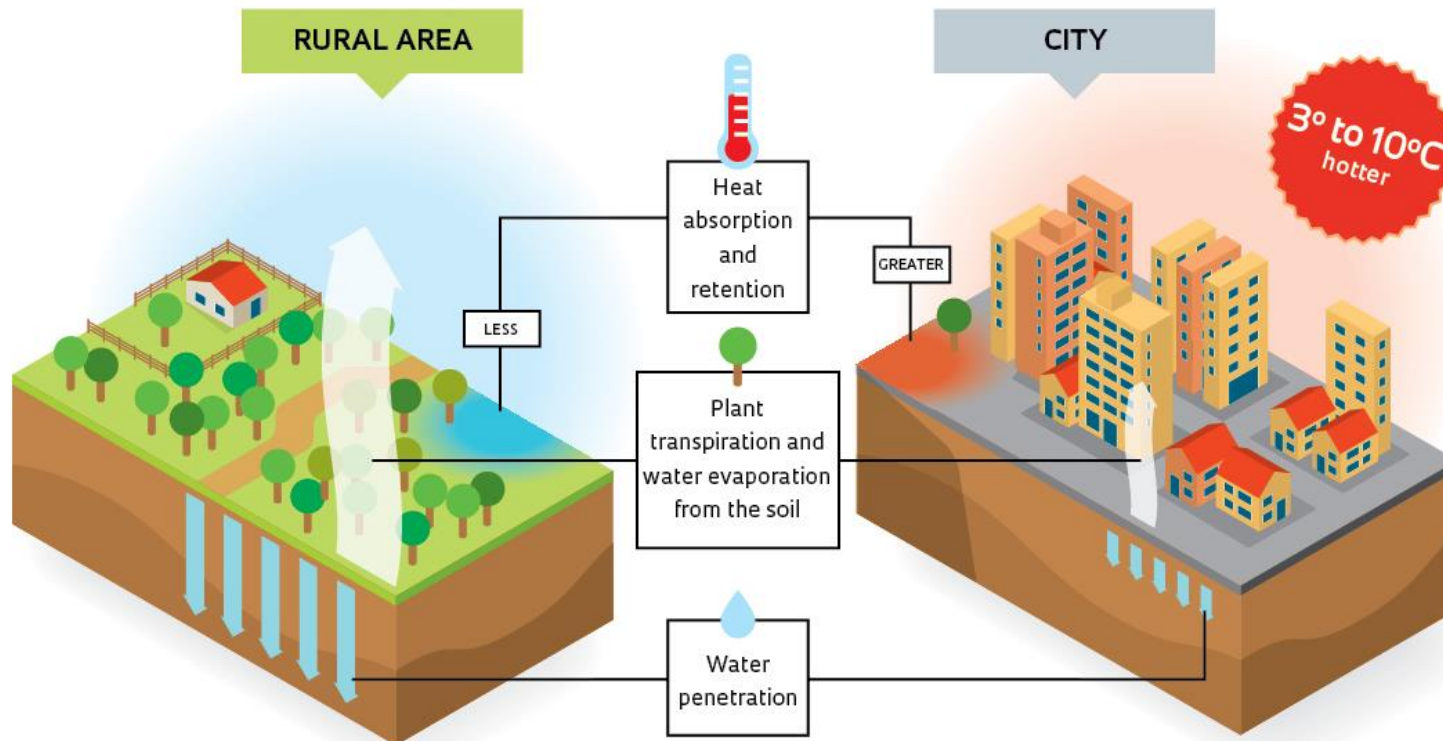
조속빈 인턴기자 / 20130825
@yonhap_graphics(트위터)

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



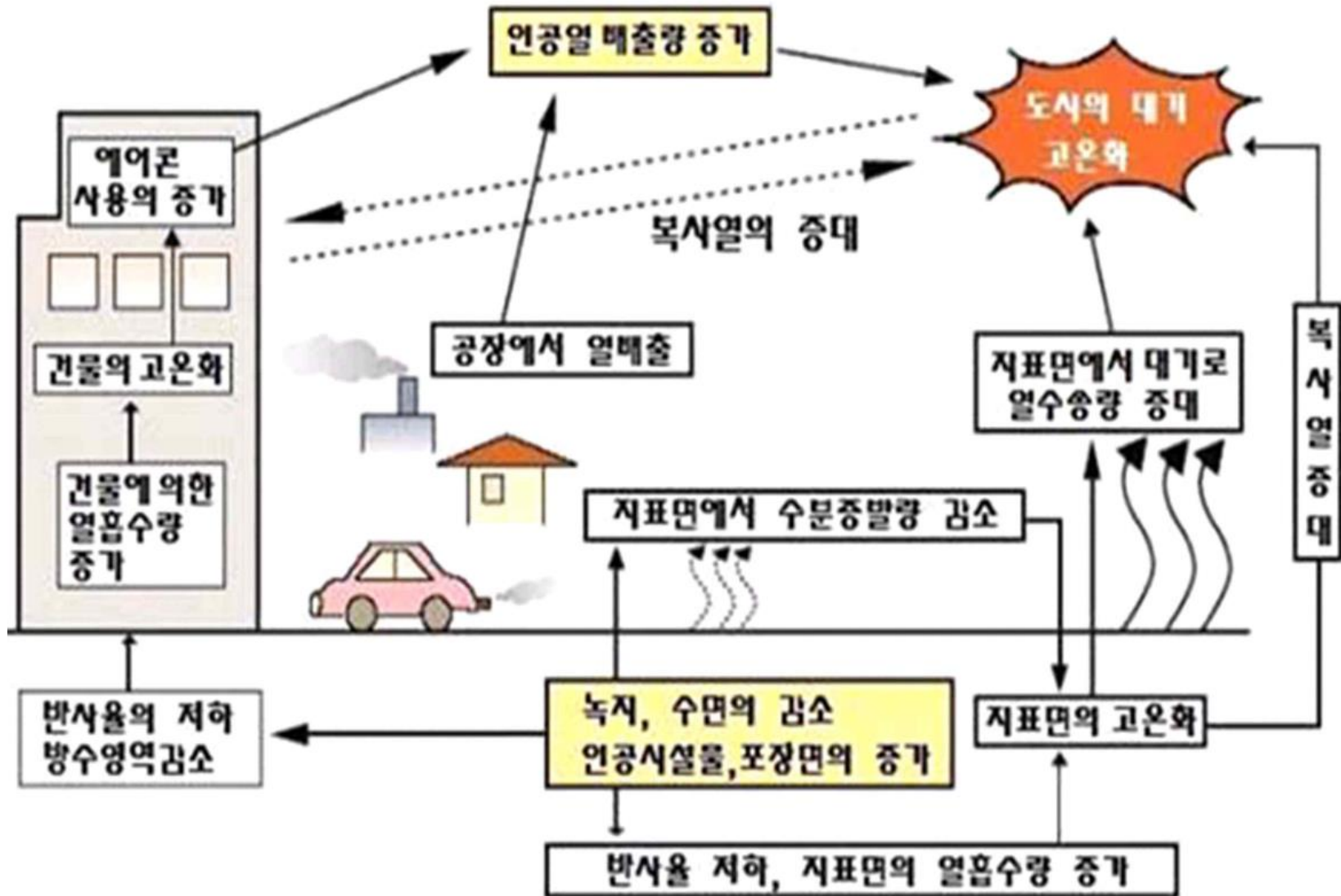


Why the urban heat island effect occurs



GRAPHIC ALEXANDREAFONS

- 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.

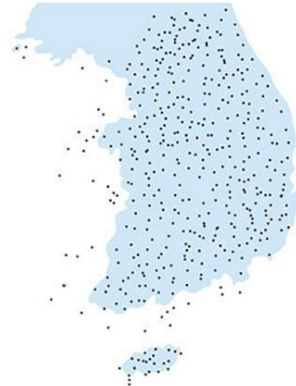


Automatic Weather System/Station (AWS)

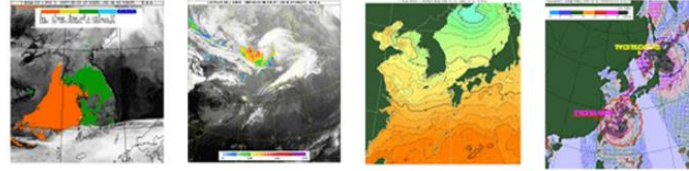
Observation network (based on The Korea Meteorological Administration & Seoul Metropolitan Government)

기상 관측 네트워크

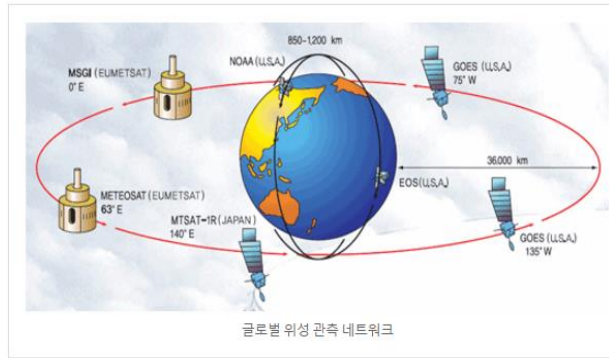
자동 기상 관측 네트워크



- | | |
|-------------------|-----------------|
| 표면 관측 (76) | 윈드 프로파일러 관측 (5) |
| Rawinsonde 관측 (9) | 기상 레이더 관측 (10) |
| 지진 모니터링 (35) | 번개 관측 (21) |
| 항공 관측 (10) | 계류 부표 (5) |
| 위성 데이터 수신 | 글로벌 본위기 시계 |



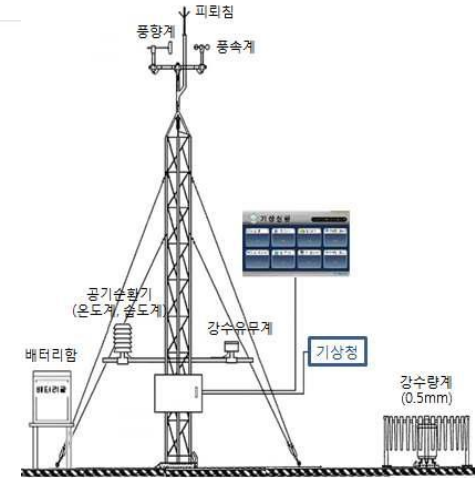
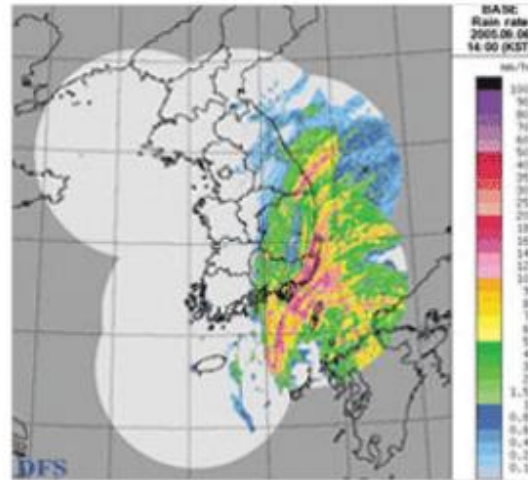
안개 탐지 아시아 먼지 검출 바다 표면 온도 태풍 모니터링



Rawinsonde 관측



윈드 프로파일러 관측



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)



SKT 17% 오후 9:42

관측소까지 거리 7.5km

15°
↑ 25° ↓ 6°
미세먼지 보통 자외선지수 매우 나쁨

0.0mm 52% NE

주변 날씨 지도보기

경주시 (서 8.2km) 토함산 (남동 11.3km)

Pong's Forecast

어제보다 포근해요
자외선 지수가 매우 높습니다.
되도록이면 외출을 삼가해주세요.

3시간 예보 발표시간 20:00

온도 강수 바람 습도

Automatic Weather System/Station (AWS)



Weather Planet

SK테크엑스의 전문적인 고해상도 기상정보 플랫폼 사업입니다.

인천 중구 운서동
2016.05.30 오후 12:33:36



맑음
22°

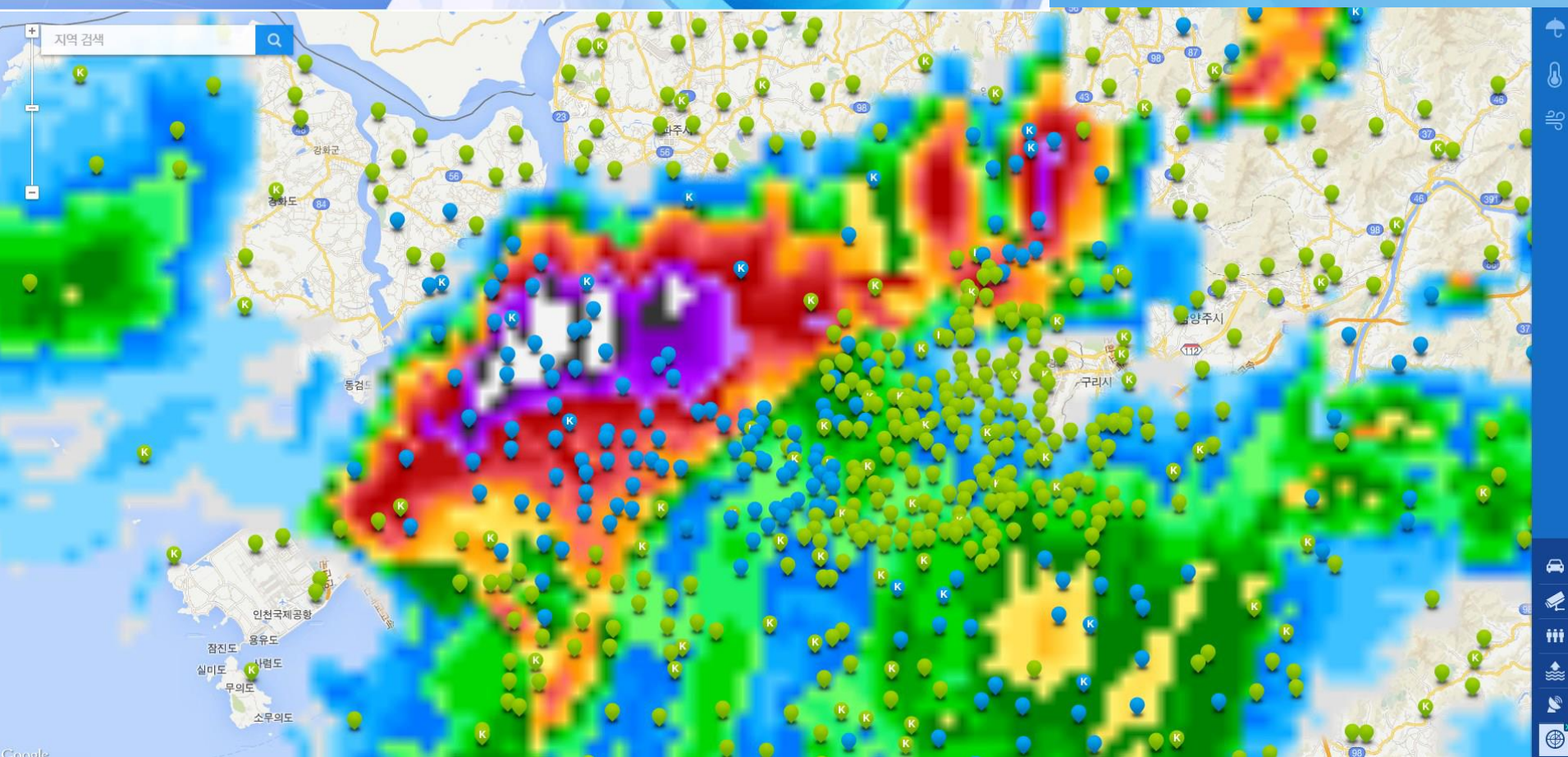
강수량
0.0 mm

최고-최저
25° | 16°

습도
59%

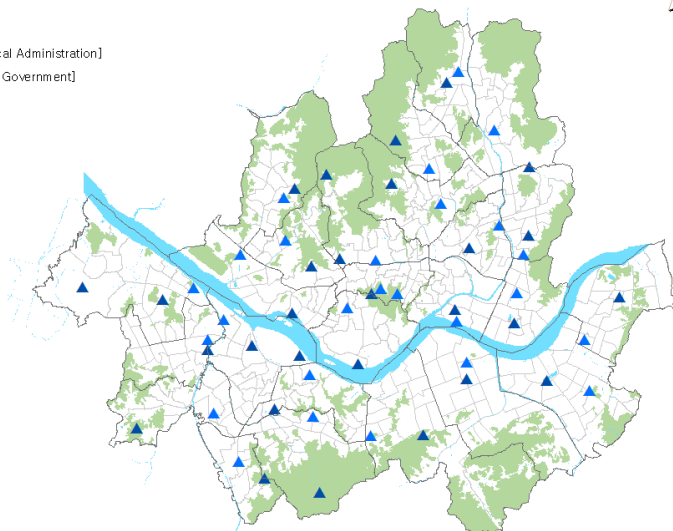
풍속-동남풍
1.6 m/s

05:31	구름많음	27° 17°
08:01	구름조금	30° 16°
08:02	맑음	30° 17°
08:03	구름많음	29° 18°



Automatic Weather System

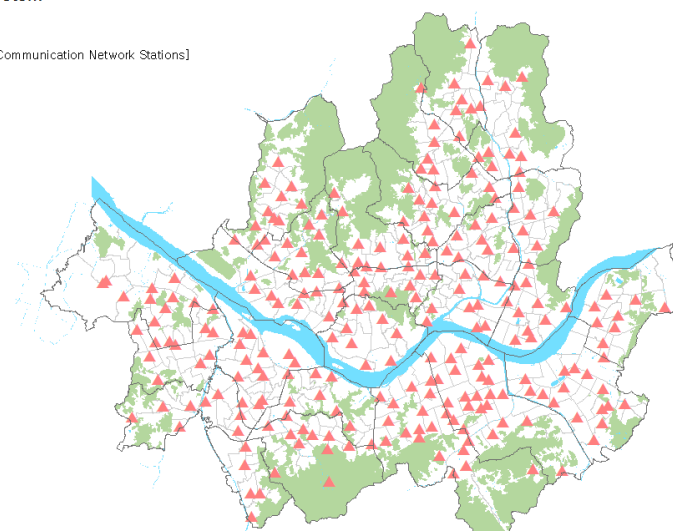
- ▲ AWS [Korea Meteorological Administration]
- ▲ AWS [Seoul Metropolitan Government]
- River
- Mt



0 2.5 5 Km

Automatic Weather System

- ▲ AWS [SKplanet Mobile Communication Network Stations]
- River
- Mt



0 2.5 5 Km

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

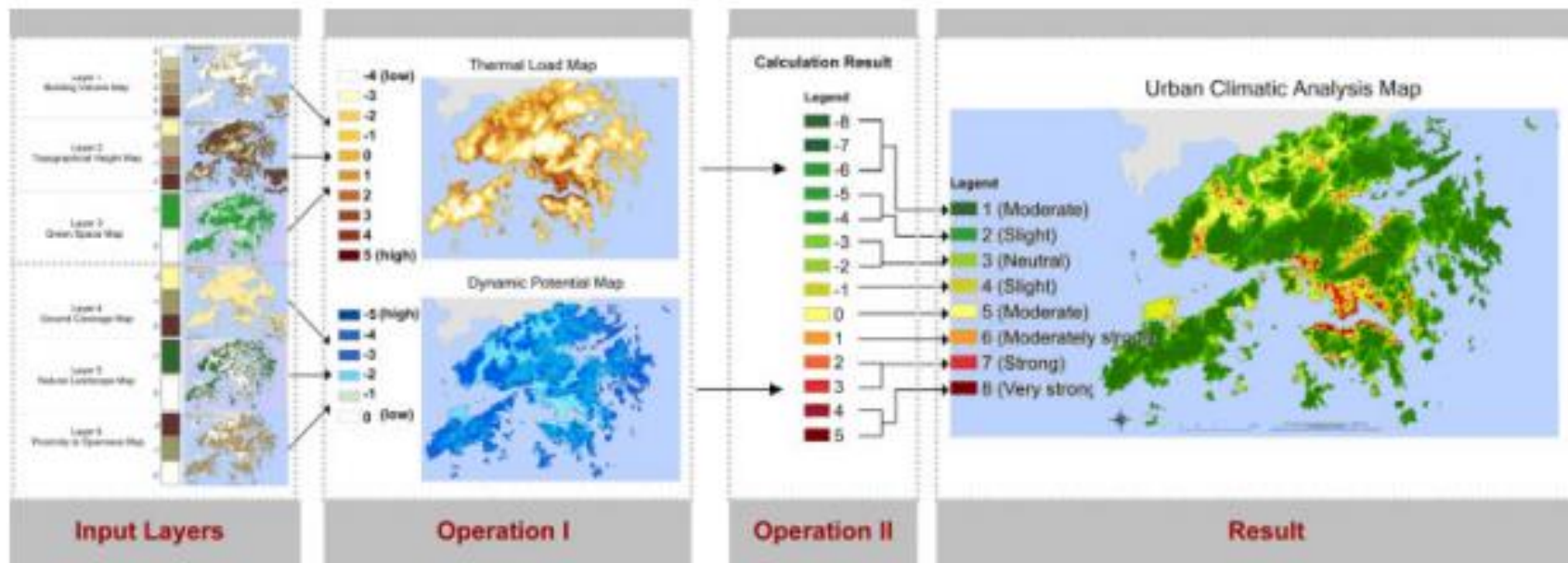
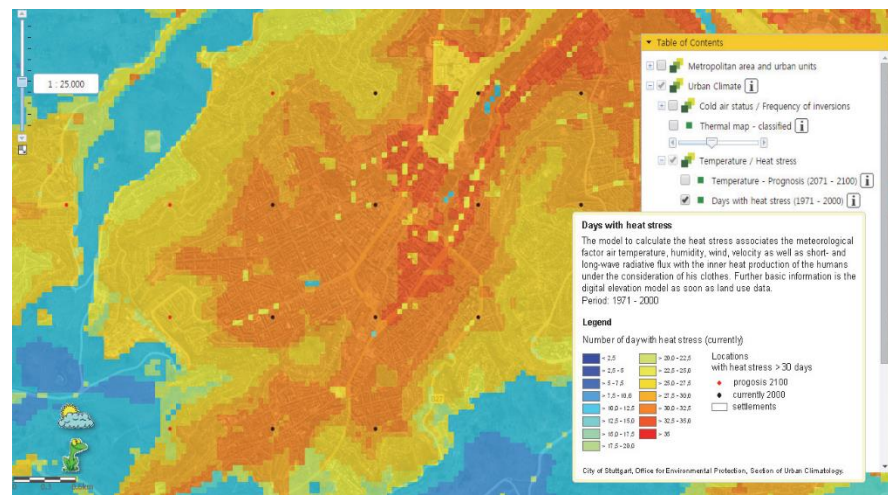
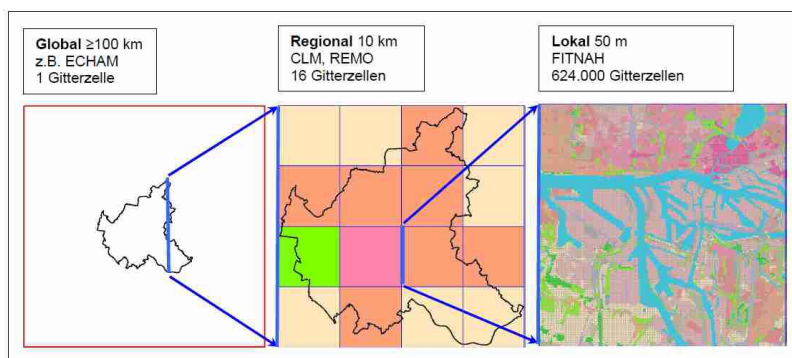
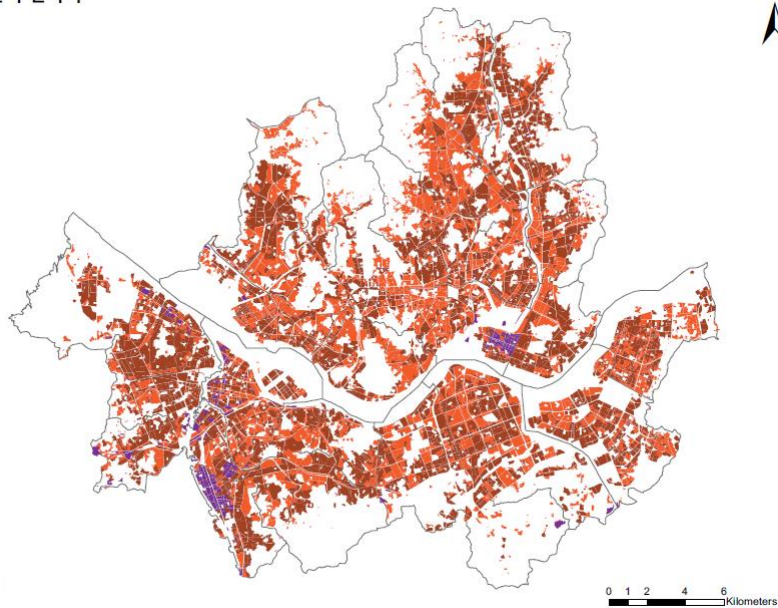


Figure 5. The working process of the UC-AnMap of Hong Kong (Ng *et al.*, 2008a). This figure is available in colour online at wileyonlinelibrary.com/journal/joc

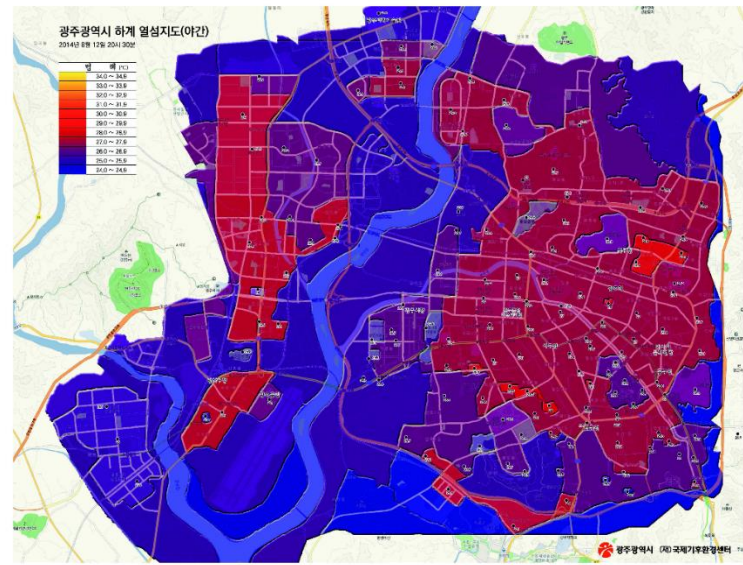
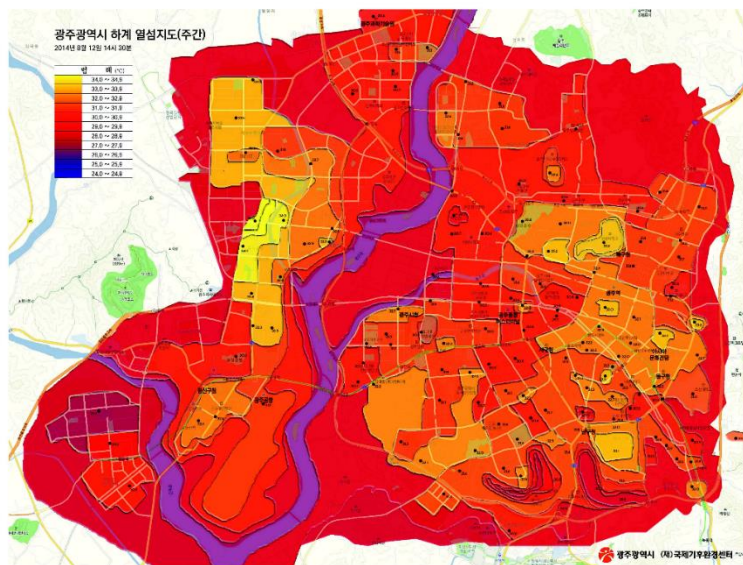
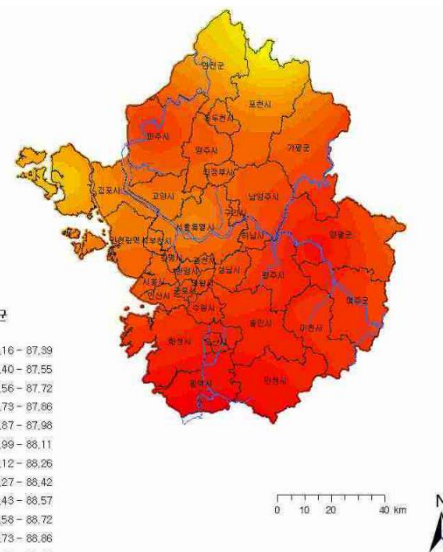


열환경개선 우선지역

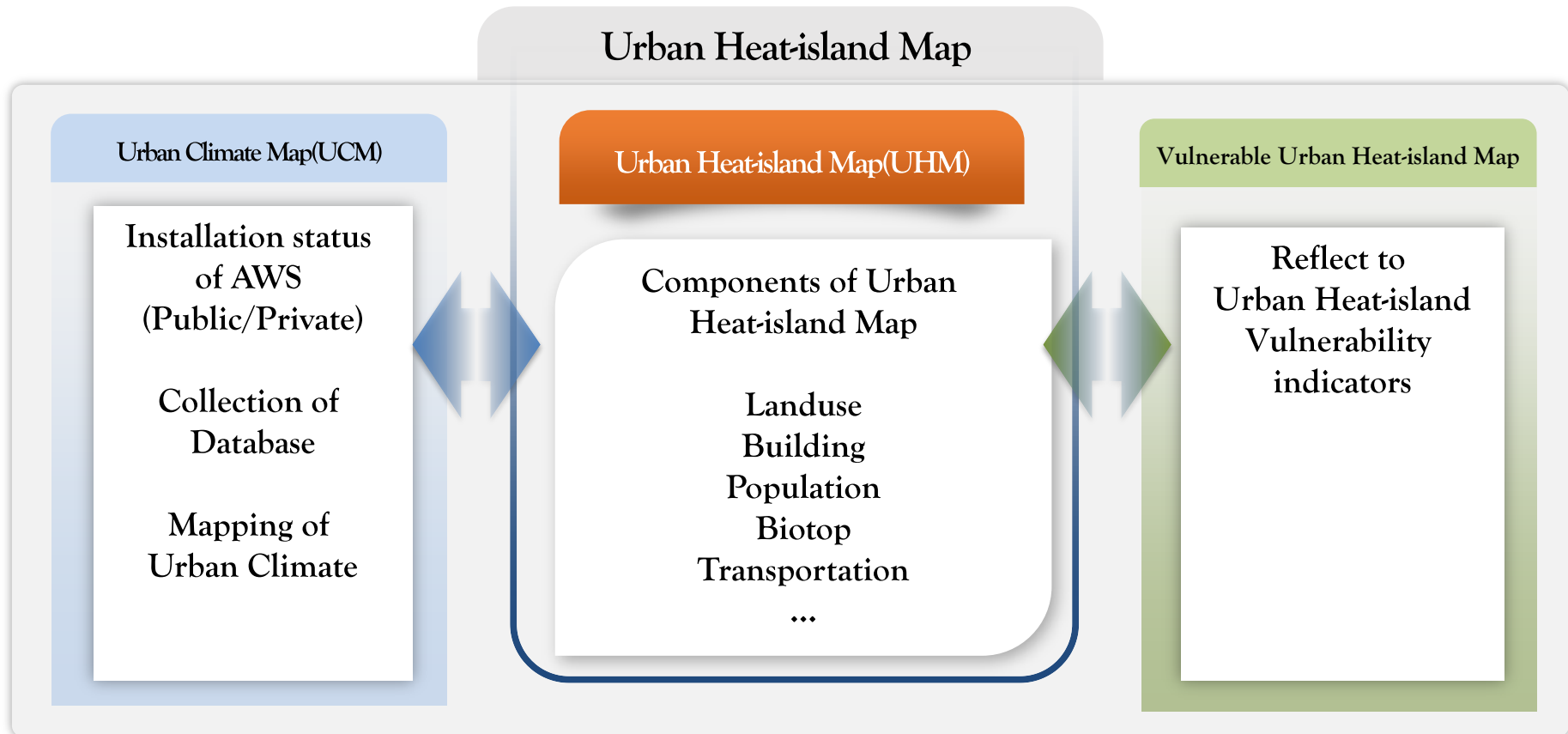


기후특유형
 고밀 도시
 중밀 도시
 공업

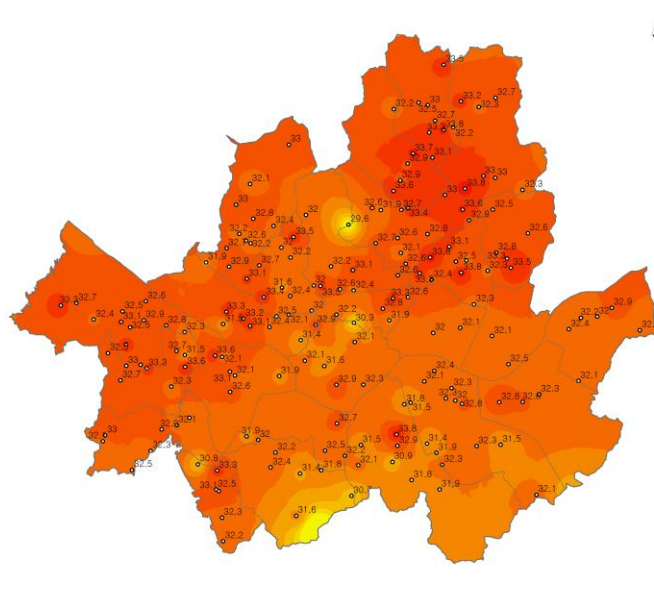
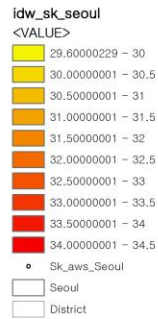
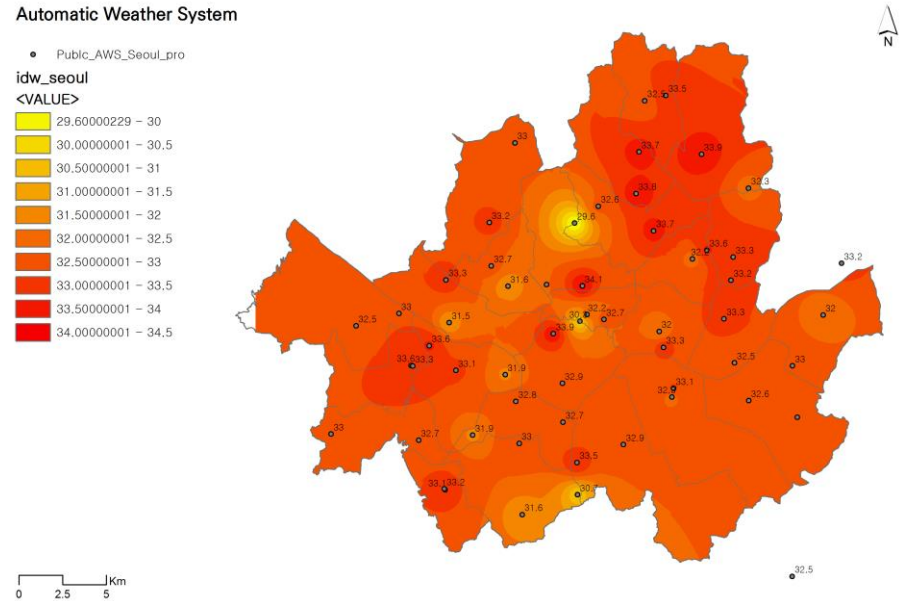
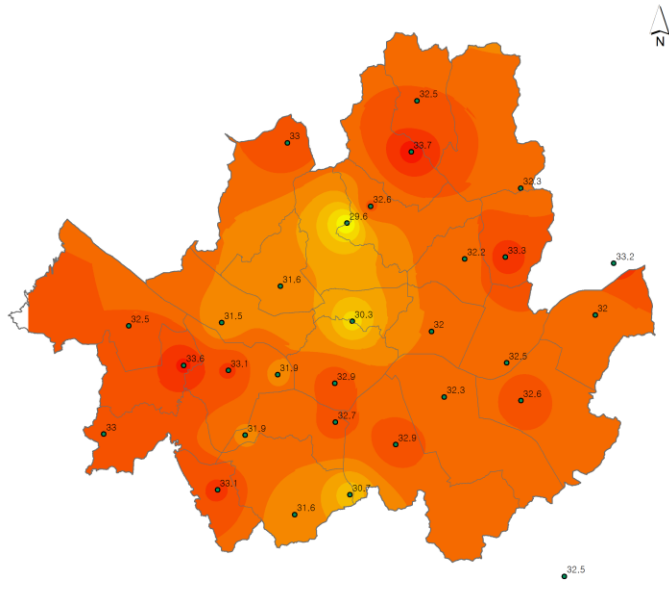
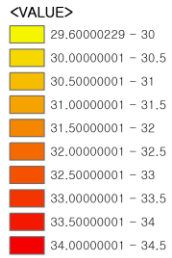
범례
 30년평균
 IHW
 87.16 - 87.39
 87.40 - 87.55
 87.56 - 87.72
 87.73 - 87.88
 87.87 - 87.98
 87.99 - 88.11
 88.12 - 88.26
 88.27 - 88.42
 88.43 - 88.57
 88.58 - 88.72
 88.73 - 88.86
 88.87 - 88.98
 88.99 - 89.11
 89.12 - 89.26
 89.27 - 89.49



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

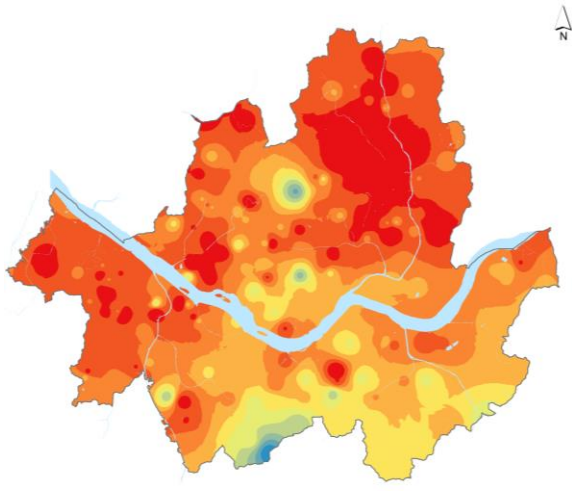


(1) Urban Climate Map

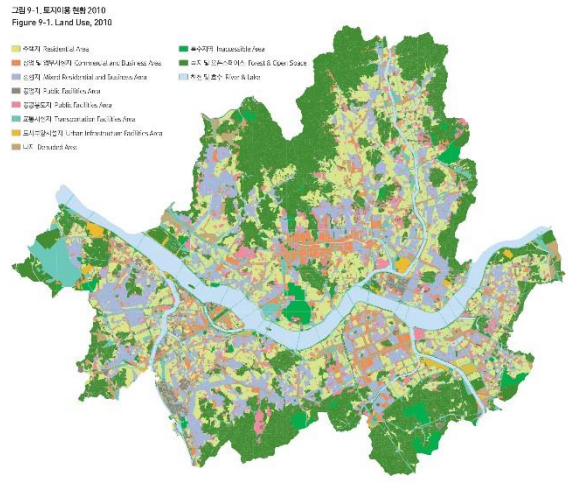


3pm. August 2, 2014.

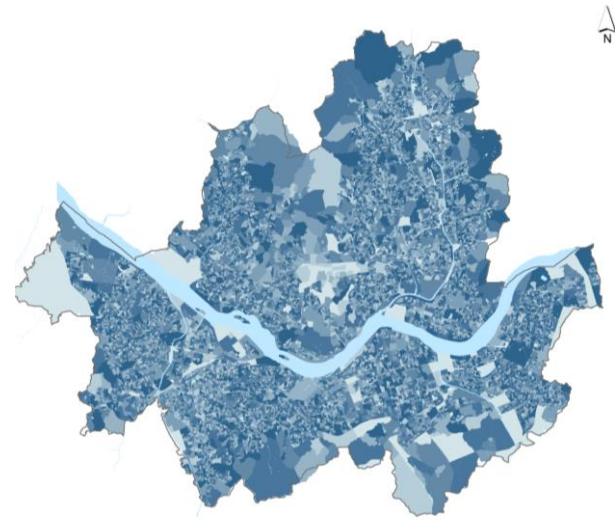
(2) Urban Heat-island Map



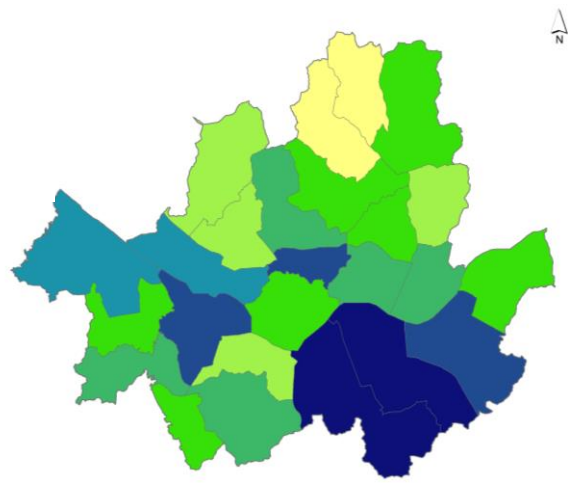
Temperature (SK)



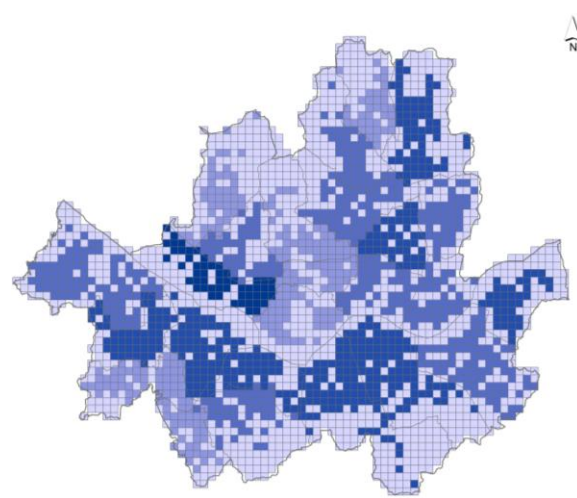
Landuse



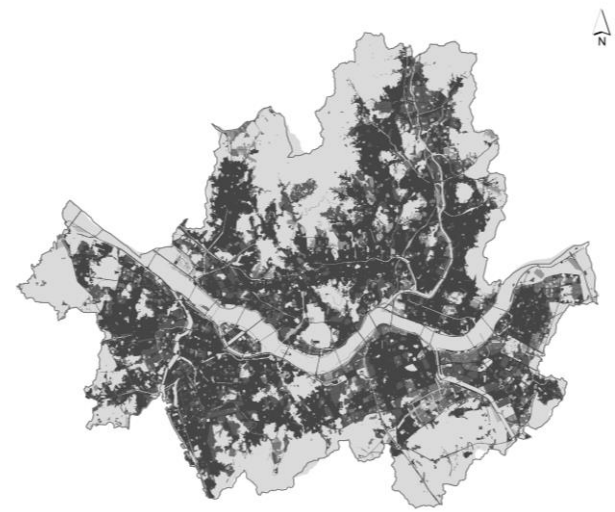
Population



Energy



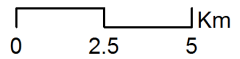
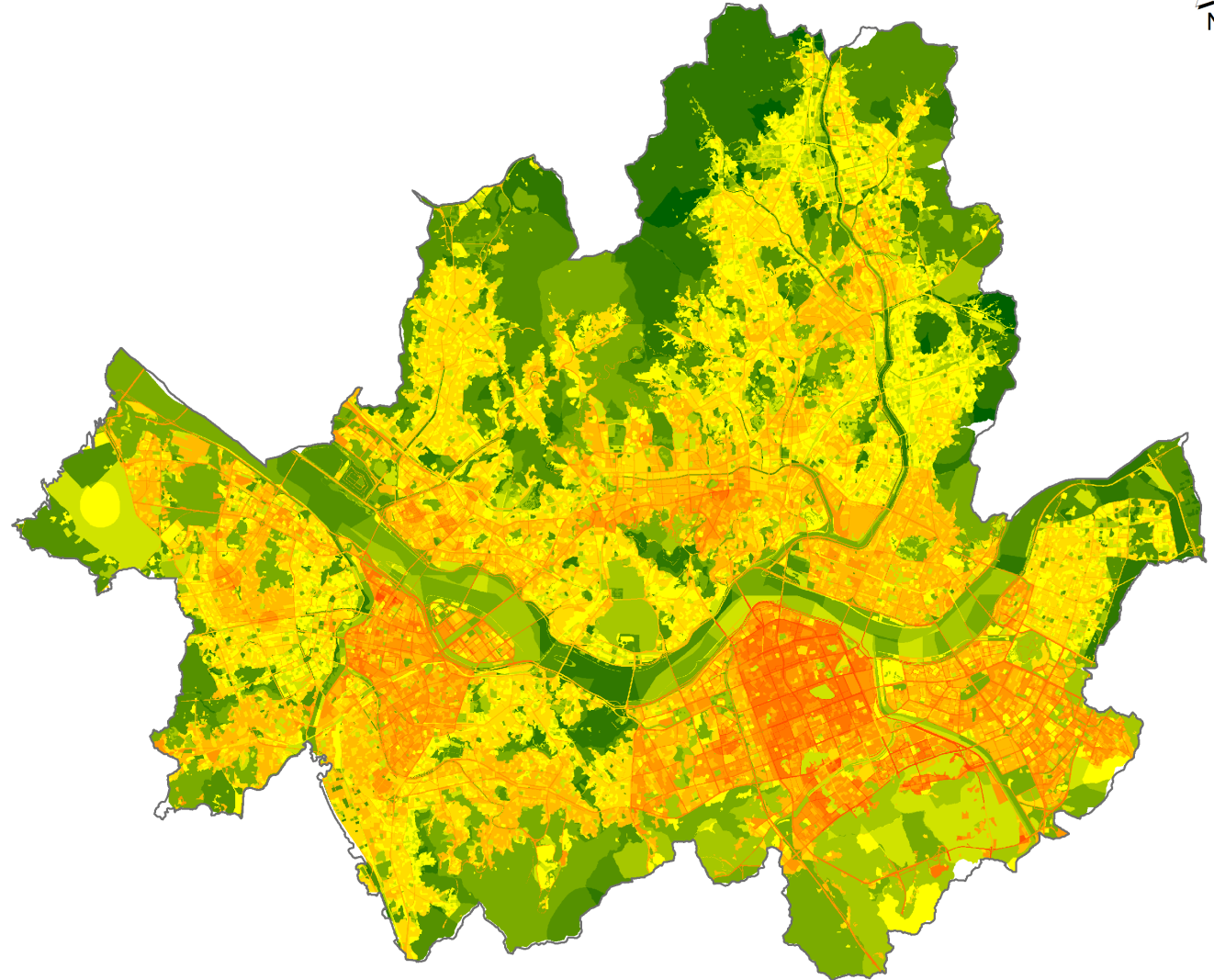
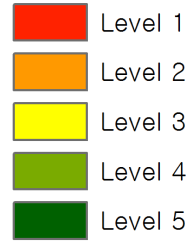
Transportation



Impermeable layer

(2) Urban Heat-island Map

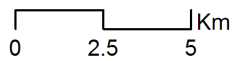
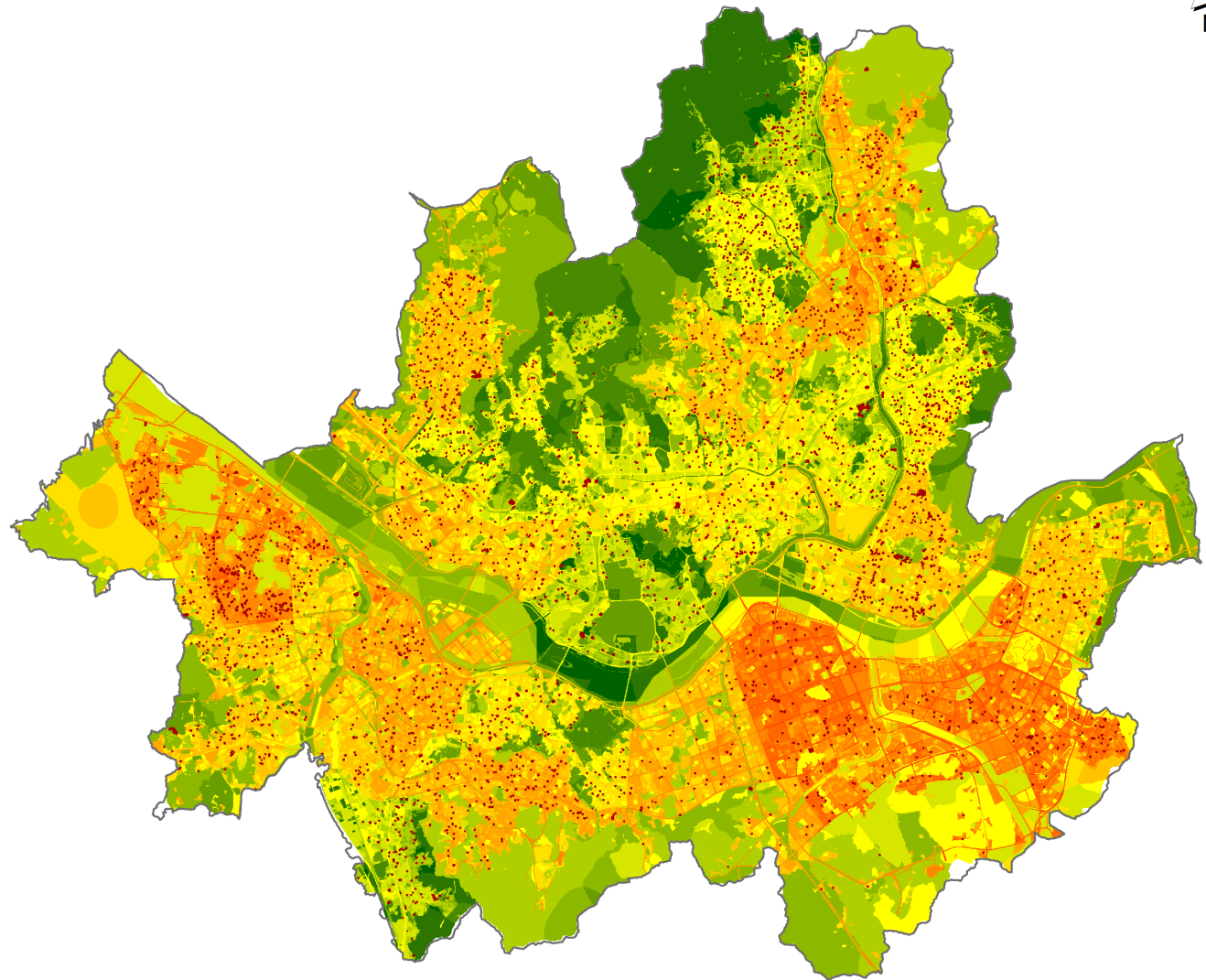
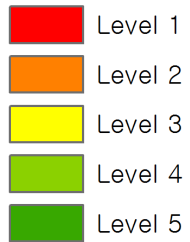
UHM_SEOUL
VALUE



(3) Vulnerable Urban Heat-island Map



Vulnerable_UHM
VALUE



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.







전방 300m
~ 월요일 22:00
~ 월요일 22:00
~ 월요일 22:00

330A 6793



Thank you

Q&A : tree@kict.re.kr