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Joint Research Centre



GEO Human Planet Initiative

GEO GROUP ON
EARTH OBSERVATIONS



Global Human Settlement datasets for SDG's Focus on Human Settlements

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Session Title: Geospatial Information for Urban Sustainable Development

United Nations World Geospatial Information Congress

DEQING, CHINA

19-21 November 2018

The Global Human Settlement Layer

open input, open method, open output

Full repeatability

Multi-temporal and spatial **harmonization** of information

Evidence-based output analytics

Real-world (big) data scenario



GEO Human Planet Initiative



GHSL Landsat

First available multi-temporal assessment of human settlements



Available 1975-1990-2000-2014

Population density map



Available for: 1975-1990-2000-2014

E04SDGs

These Urban SDG indicators are very sensitive to the city boundaries

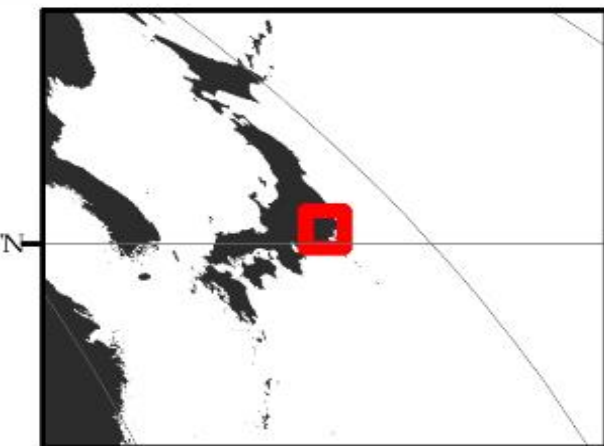
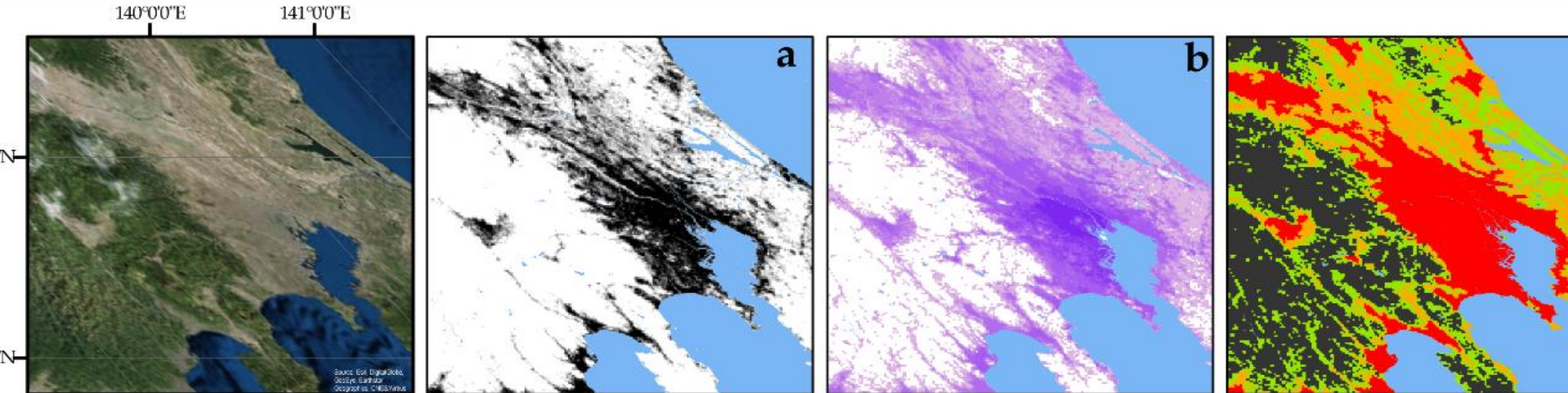
- 11.2.1 Proportion of population that has convenient access to public transport
- 11.3.1 Ratio of land consumption rate to population growth rate
- 11.6.2 Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities
- 11.7.1 Average share of the built-up area of cities that is open space for public use for all



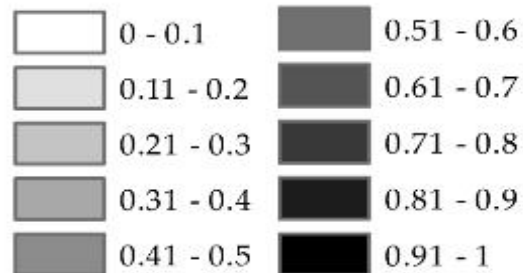


	Population distribution	Cities and infrastructure monitoring	Elevation and topography	Land cover and use	Oceanographic observations	Hydrological and atmospheric observations	Atmospheric and environmental monitoring	Biodiversity and ecosystem observations	Agricultural monitoring	Hazards, disaster risk and environmental impact
1 No poverty										
2 Zero hunger										
3 Good health and well-being										
4 Quality education										
5 Gender equality										
6 Clean water and sanitation										
7 Affordable and clean energy										
8 Decent work and economic growth										
9 Industry, innovation and infrastructure										
10 Reduced inequalities										
11 Sustainable cities and communities										
12 Responsible consumption and production										
13 Climate action										
14 Life below water										
15 Life on land										

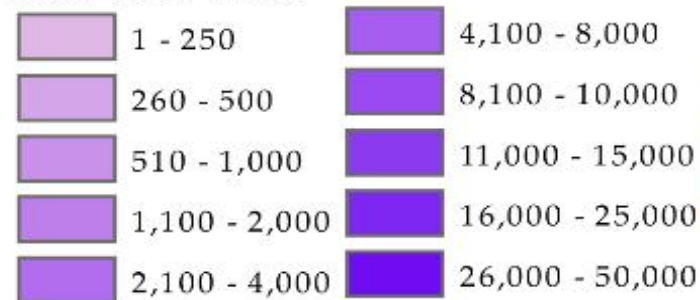
Built-up and Population density, city outline



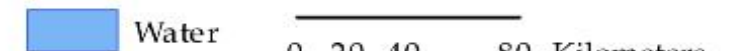
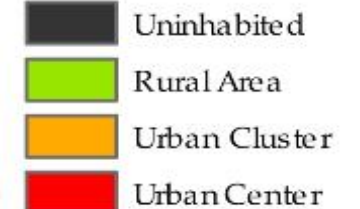
**Built-up density
GHS-BUILT 2015**



**Population density
GHS-POP 2015**



**Settlement model
GHS-SMOD 2015**



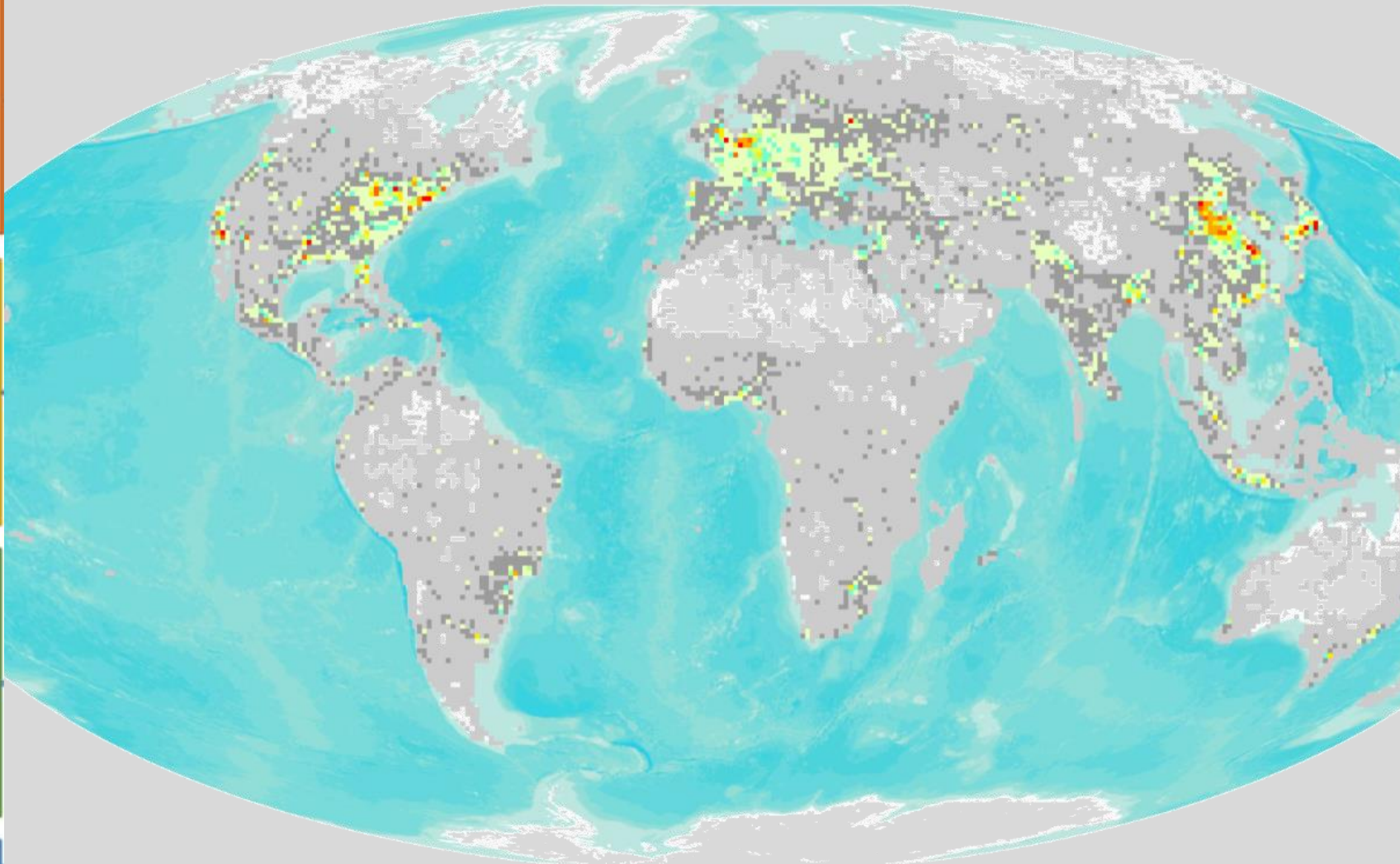
New degree of urbanization map

Urban Centre
(HDC)

Urban Cluster
(LDC)

Rural Grid
Cells

Not land surface



Cooperation

- 1 European Commission
- 2 OECD
- 3 UN Habitat
- 4 World Bank
- 5 FAO

13,000 Cities



GHSL – City Centre Database

Geography

- Elevation
- Travel time to capital
- River basin
- Income class
- Name of the center
- etc.

Environment

- Climate
- Biome
- Temperature
- Precipitation
- Greenness
- CO₂ concentration
- PM2.5 emission

DRR – exposure to

- Flood
- Earthquake
- Storm surge
- Heatwave

Socio-economic

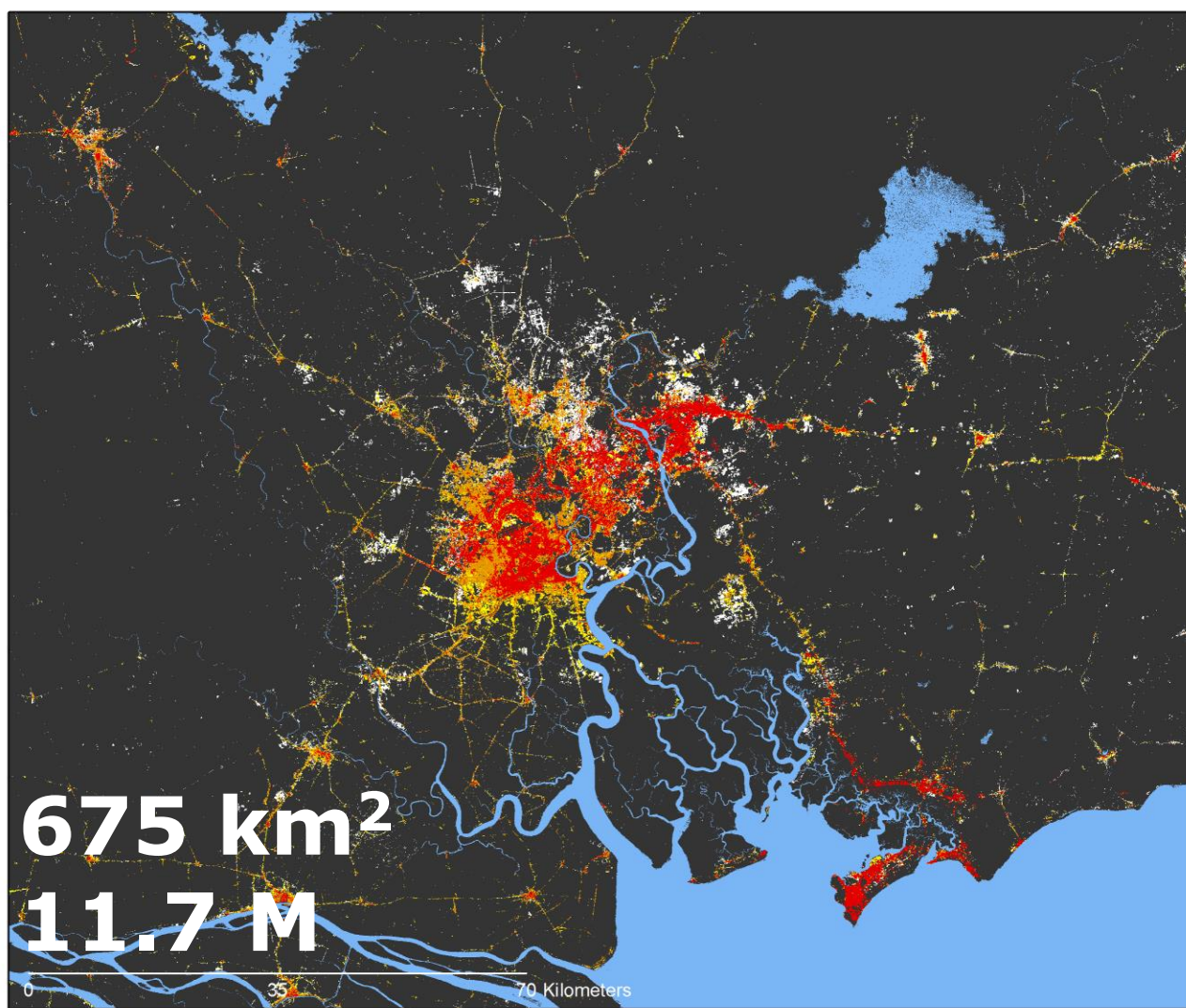
- Population
- Built-up areas
- GDP
- HDI
- Nighttime lights
- area



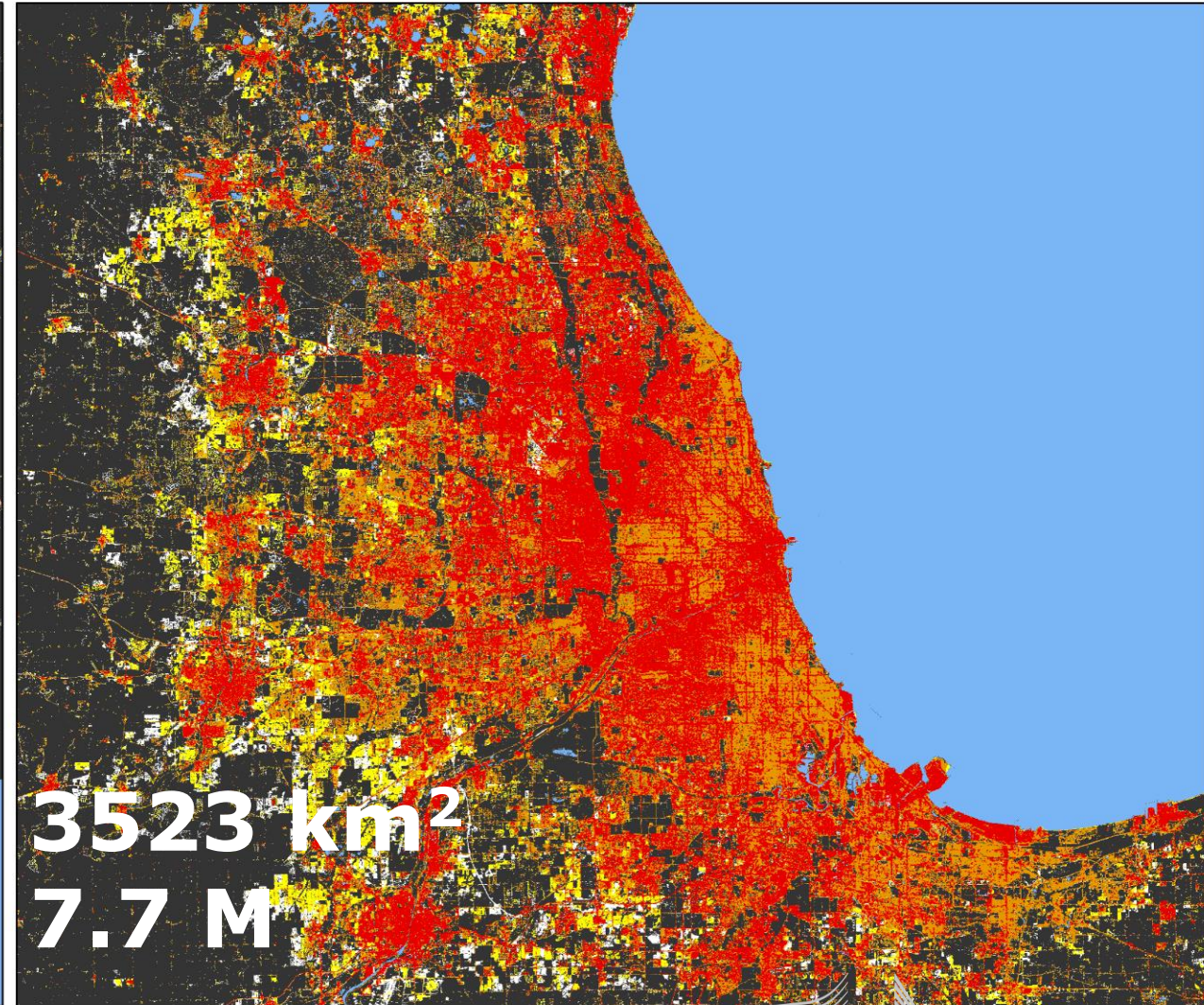
Estimate **3 SDG** indicators

Multi-temporal information
1975-1990-2000-2015

Comparisons



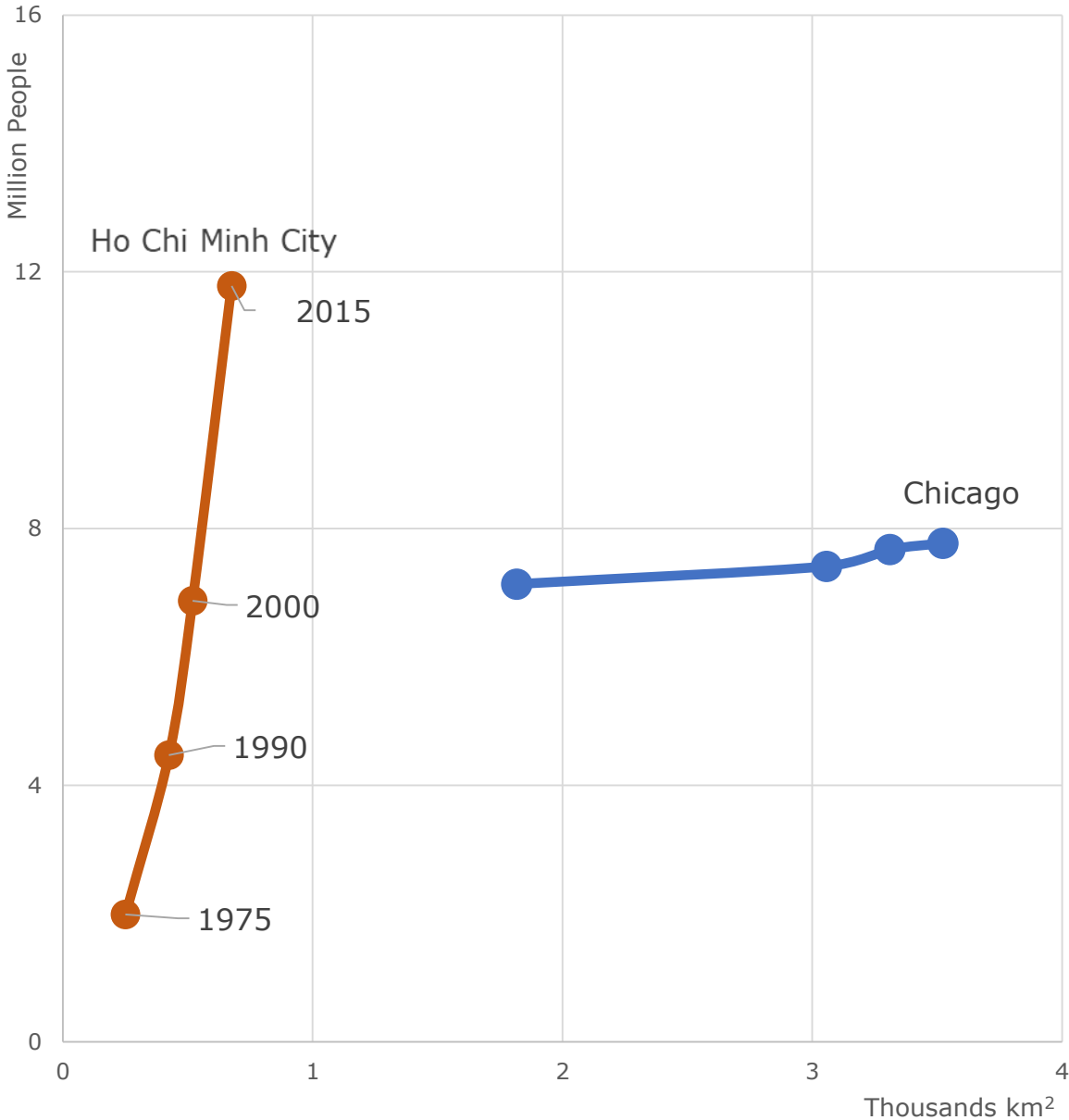
Ho Chi Minh City, Viet Nam



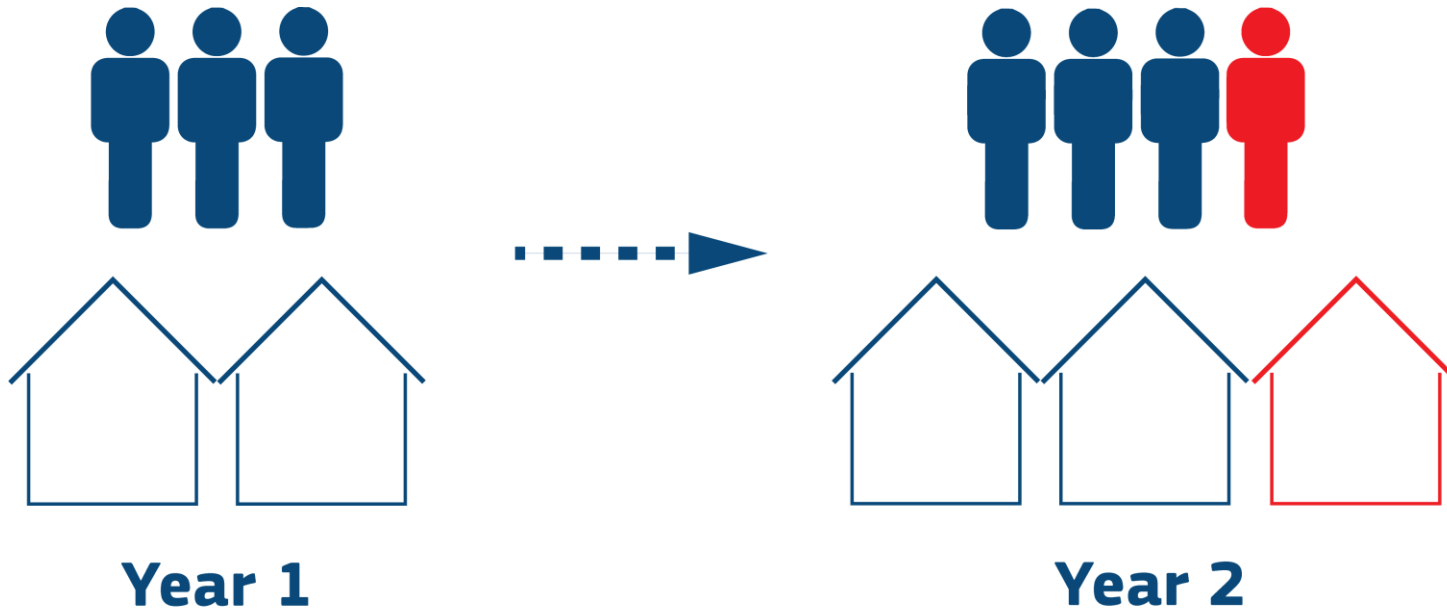
Chicago, USA

Sociospatial patterns of change 1975-2015

	Population	Built-up Areas
Ho Chi Minh City	6x	3x
Chicago	1x	2x



SDG 11.3.1

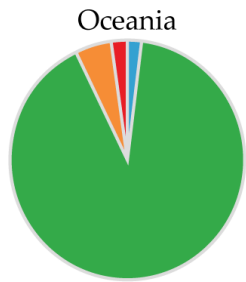
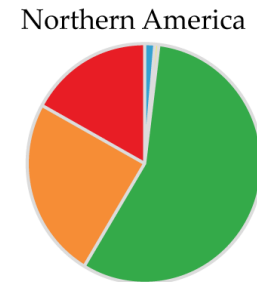
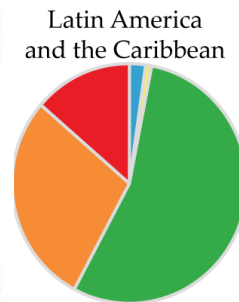
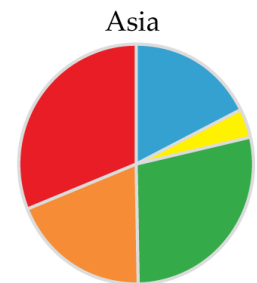
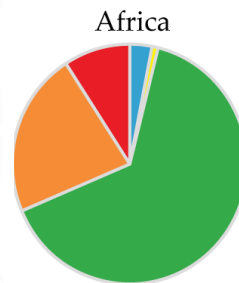
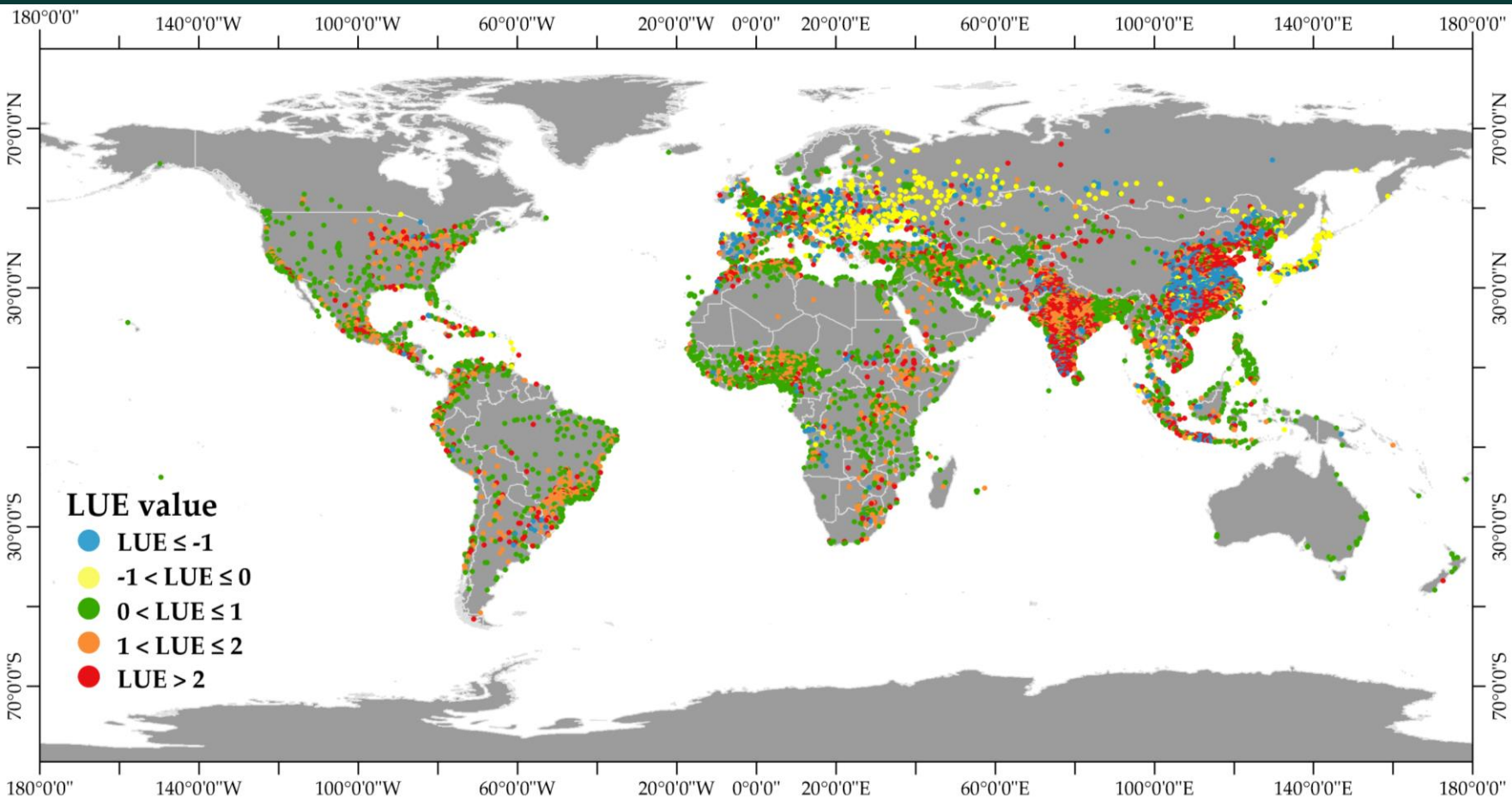


$$\frac{\text{Ln} \left(\frac{\text{House}_{\text{Year 2}}}{\text{House}_{\text{Year 1}}} \right)}{\text{Ln} \left(\frac{\text{Pop}_{\text{Year 2}}}{\text{Pop}_{\text{Year 1}}} \right)} = \text{LUE}$$



Ratio of land consumption rate to population growth rate
Tier II indicator

Land Use Efficiency

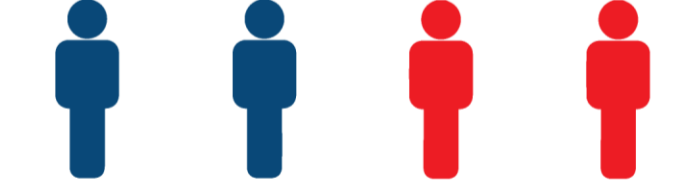
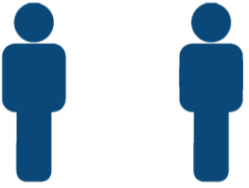


Comparisons

Narrowtown



Broadville



LUE = 1

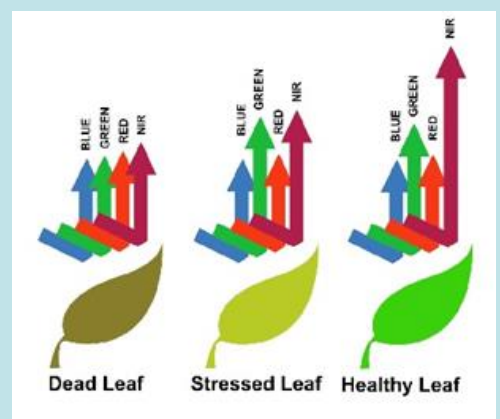
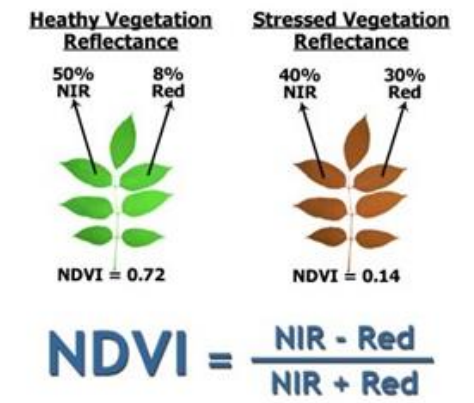
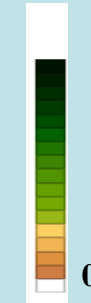
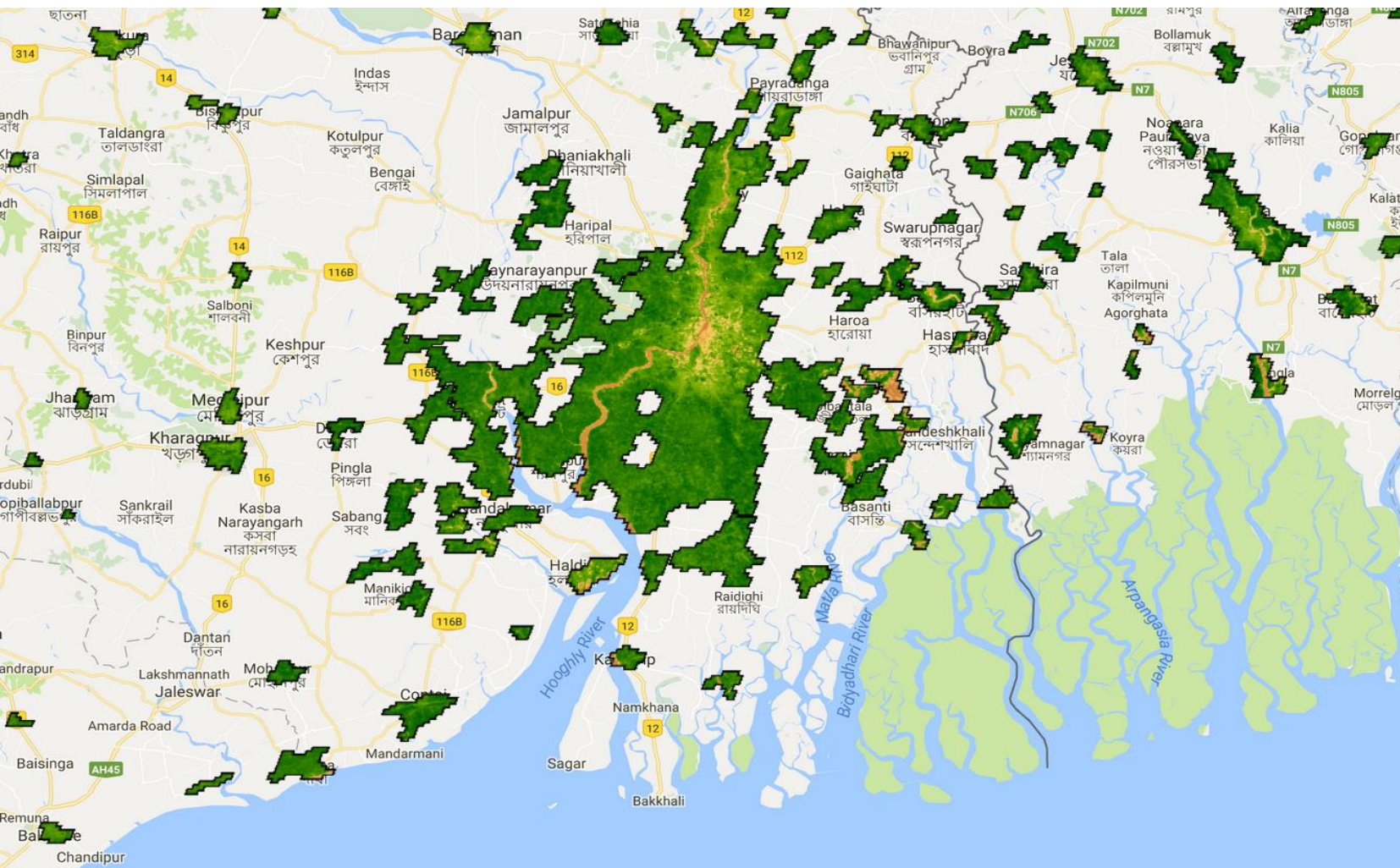
Abstract Achieved Population Density in Expansion Area (AAPDEA)



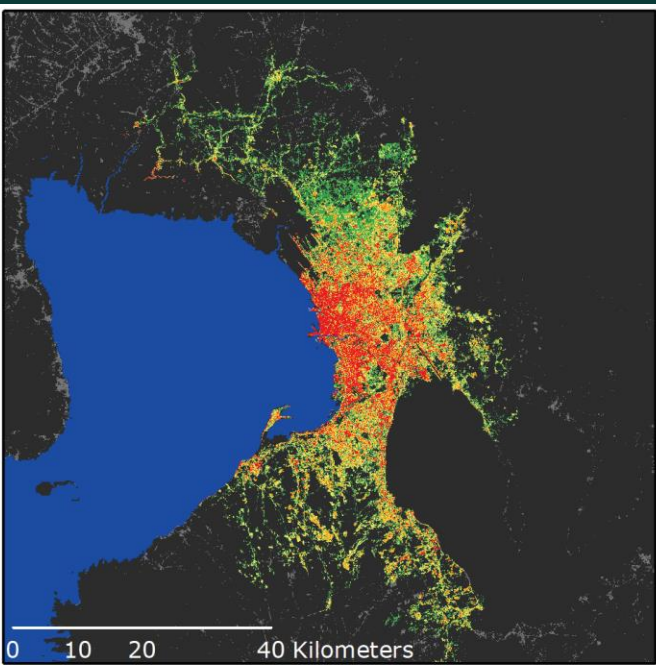
13,000 Cities



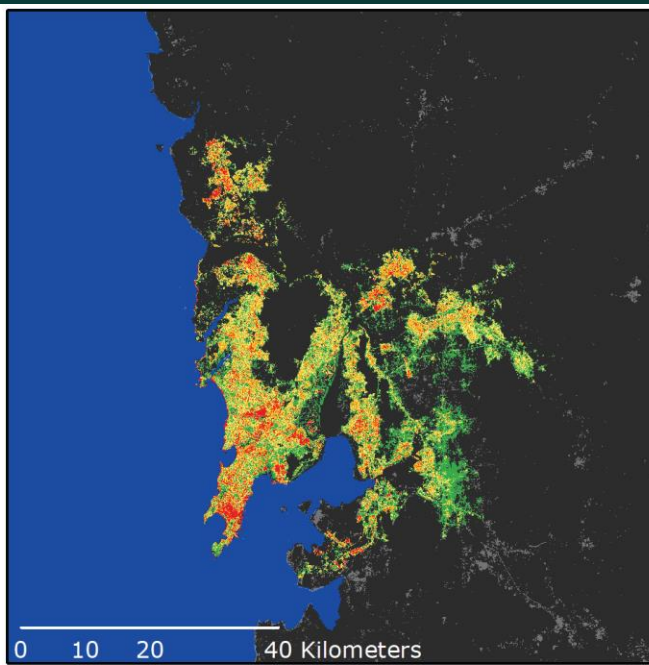
Urban centers greenness



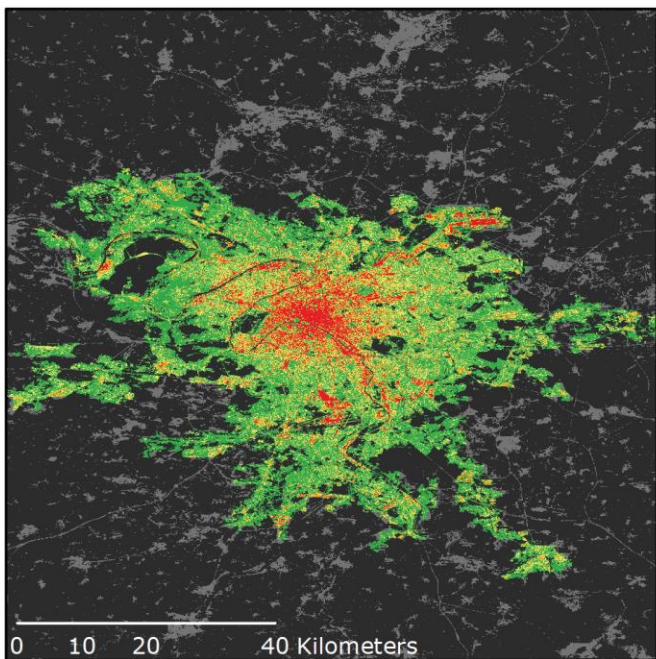
Example of Greenness in an HDC derived from Landsat greenness



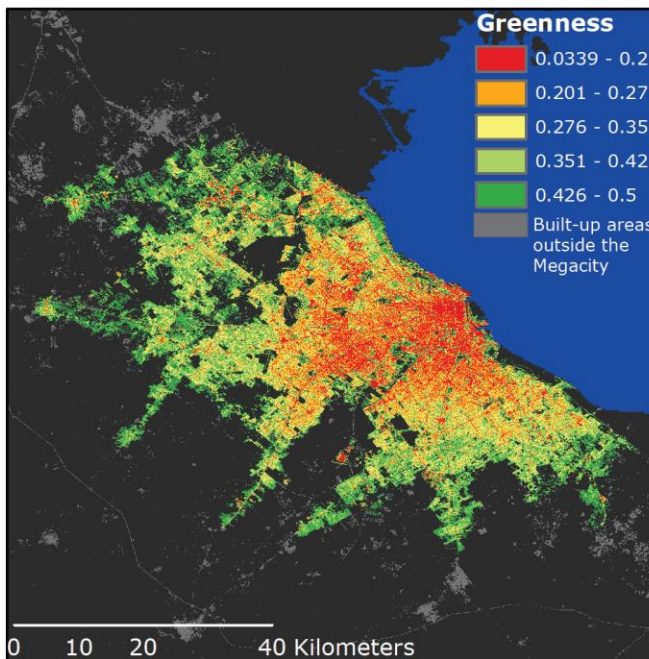
Manila, Philippines



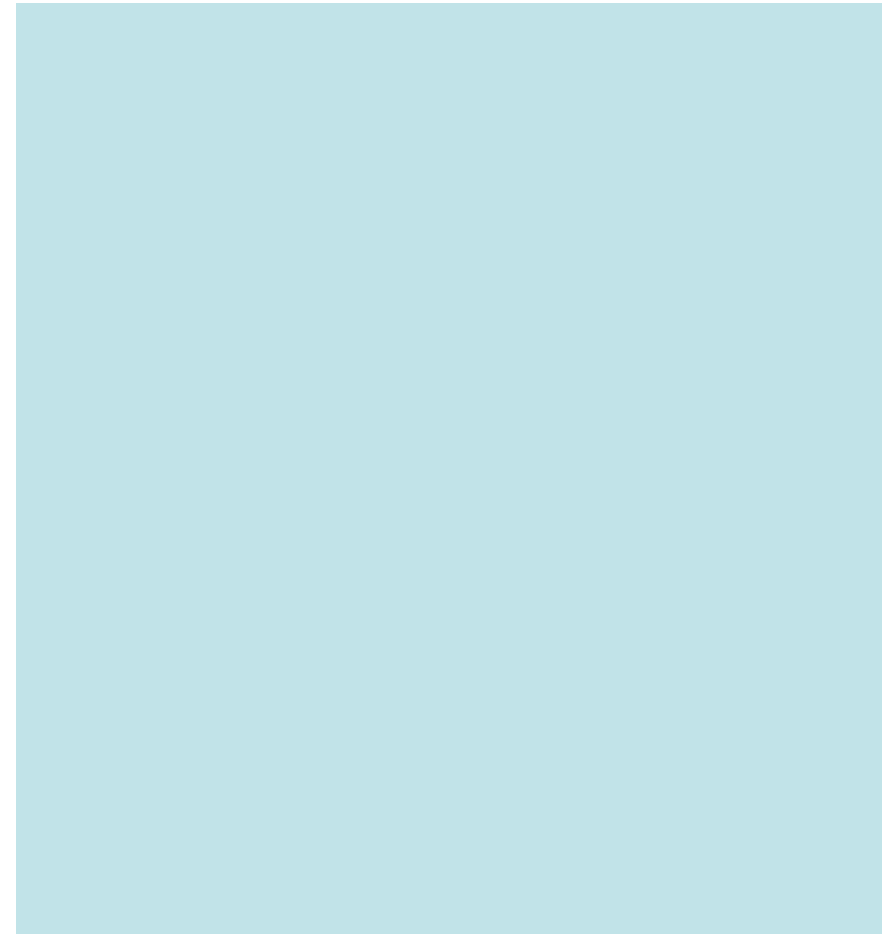
Mumbai, India



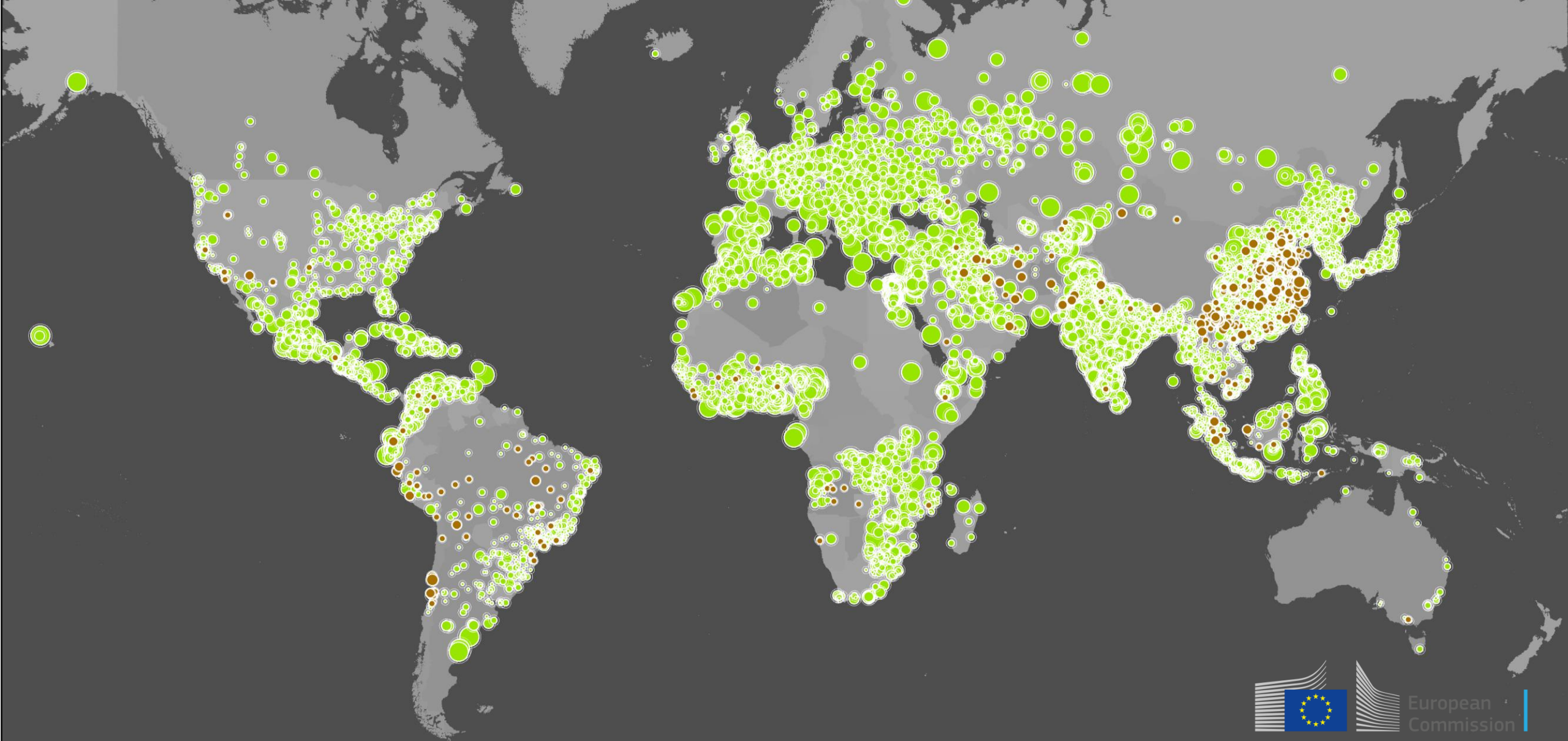
Paris, France



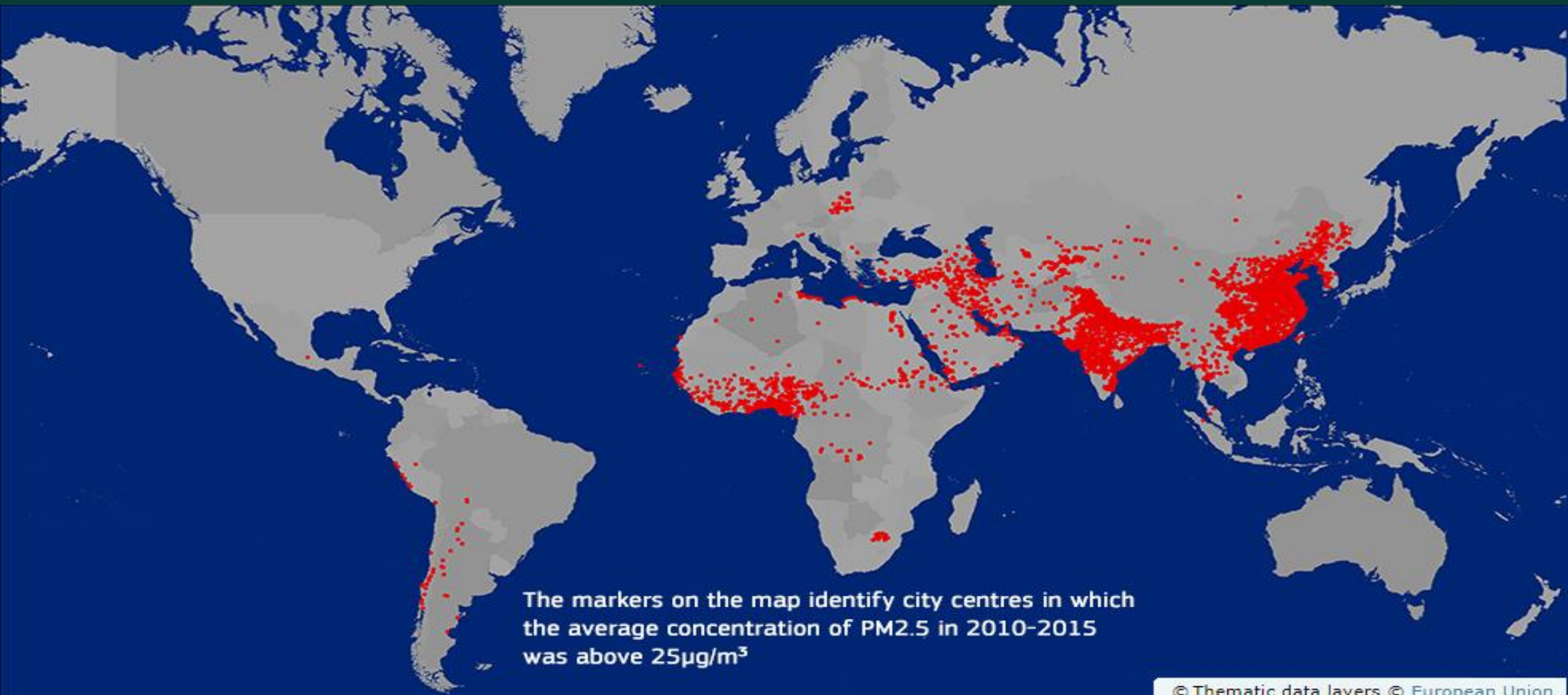
Buenos Aires, Argentina



Greening Urban Centres



PM2.5 concentration



Global Human Settlement Layer (GHSL)

The most complete, consistent, global, free and open data set on human settlements. from the village to the megacity, for the epochs 1975 – 1990 – 2000 – 2015



The screenshot shows the homepage of the Global Human Settlement Layer (GHSL) website. At the top, there is a navigation bar with links for 'Legal notice', 'Cookies', 'Contact', 'Search', and 'English (en)'. Below this is the European Commission logo and the text 'EUROPEAN COMMISSION Global Human Settlement'. A secondary navigation bar includes 'Home', 'About', 'Copernicus', 'Documents', 'Atlases', 'Global Definition', 'Data', 'Tools', 'Visualisation', and 'News'. The main content area features the title 'GHSL - Global Human Settlement Layer' and a sub-heading 'A new open and free tool for assessing the human presence on the planet'. A list of bullet points describes the tool's capabilities and its support by the JRC and DG REGIO. A 'Geospatial World Excellence Award' badge is displayed on the right. A news section at the bottom highlights a 2017 update regarding the 'Degree of urbanisation'.

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European Commission

EUROPEAN COMMISSION
Global Human Settlement

European Commission > EU Science Hub > GHS

Home | About | Copernicus | Documents | Atlases | Global Definition | Data | Tools | Visualisation | News

GHSL - Global Human Settlement Layer

A new open and free tool for assessing the human presence on the planet

- Produces new global spatial information, evidence-based analytics and knowledge describing the human presence on the planet
- Operates in an open and free data and methods access policy (open input, open method, open output)
- Supported by the Joint Research Centre (JRC) and the DG for Regional Development (DG REGIO) of the European Commission, together with the international partnership [GEO Human Planet Initiative](#)

Geospatial World Excellence Award

News 11/09/2017 **Degree of urbanisation** - New page of our website, contains country fact sheets used to inform the discussion on the "global harmonized definition of cities and settlements"

Full open free data and tools at <http://ghsl.jrc.ec.europa.eu>
<http://www.geoportal.org/>