



PROGRAMME OF THE
EUROPEAN UNION



©European Union, Copernicus Sentinel-2 imagery

Sustainable Cities

Monitoring settlement and population growth with
the Global Human Settlement Layer

Thomas Kemper & the GHSL Team

Integrating Disaster Risk Data in Policy

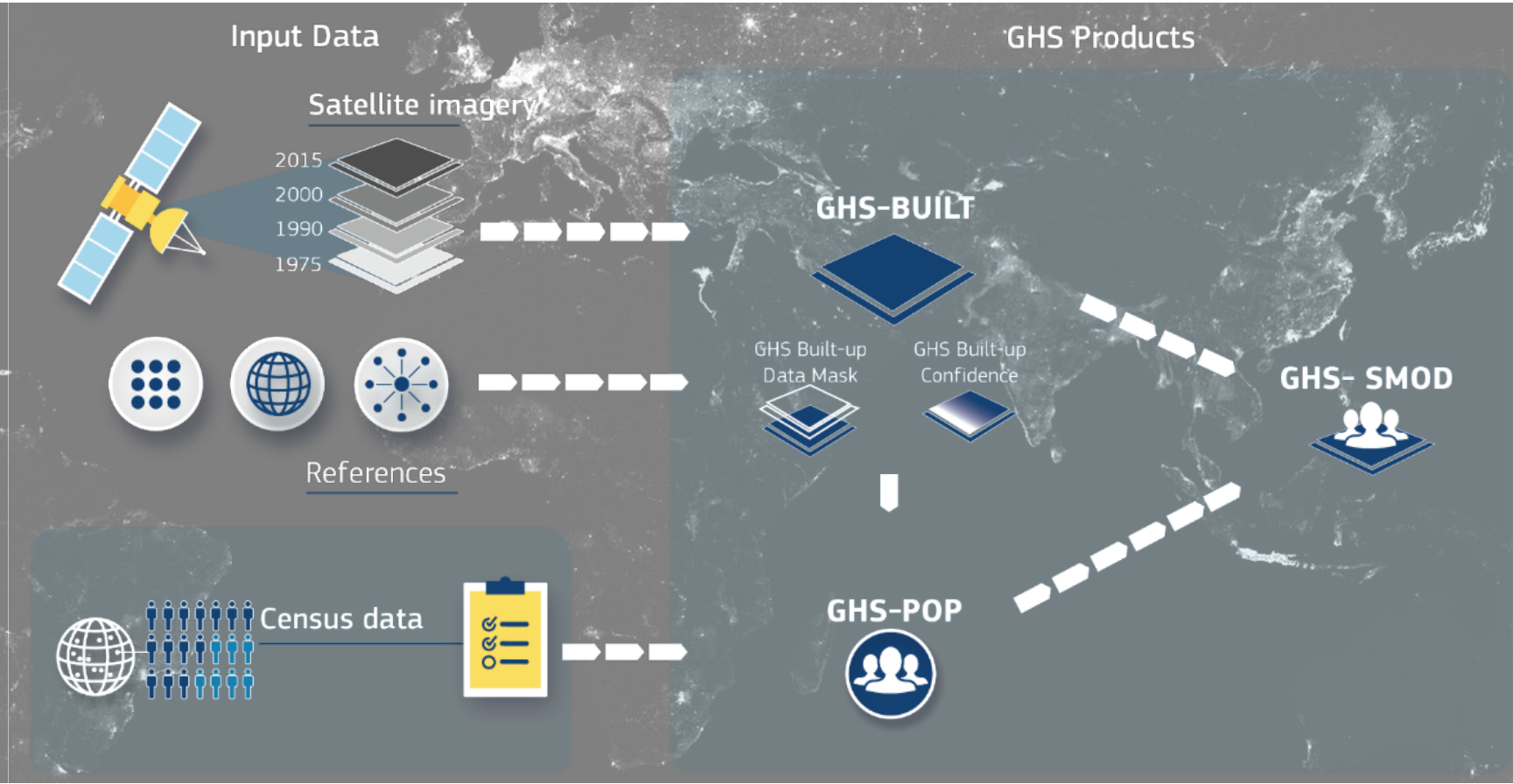
13 October 2023

Human Settlement information is essential for policy frameworks and crisis management



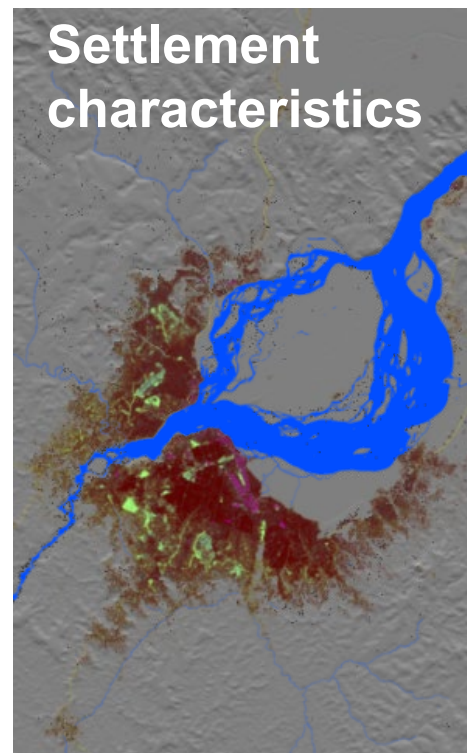
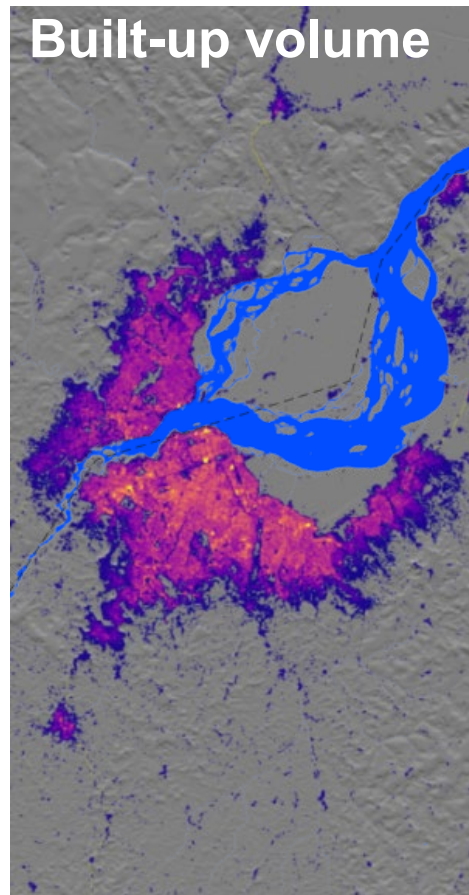
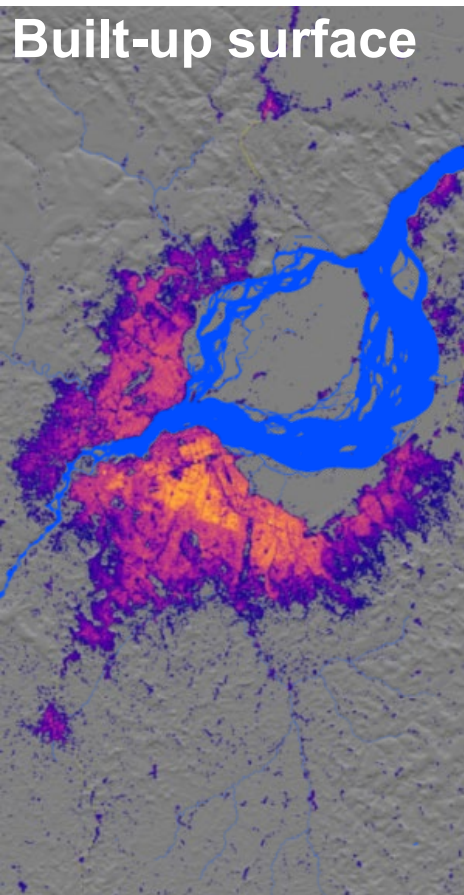
The Global Human Settlement Layer (GHSL)

- Monitoring human presence on planet Earth:
 - Population
 - Built-up areas
 - Settlements
- Free & open data
- Operational service

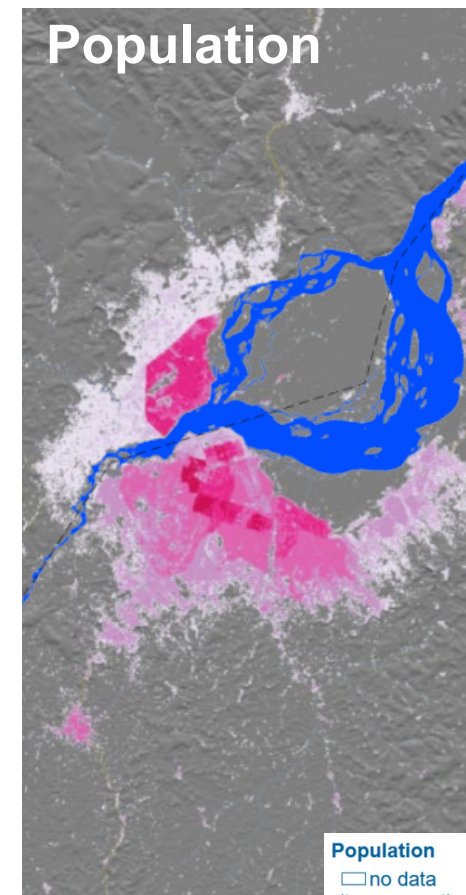


GHSL Release 2023

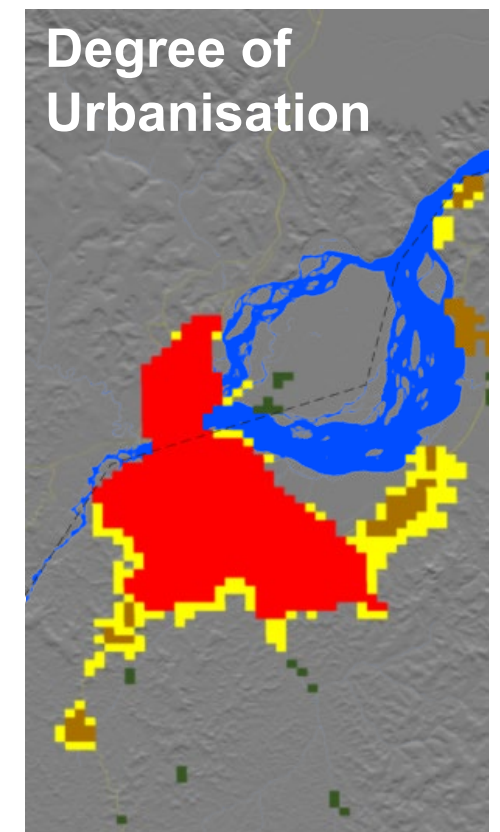
Brazzaville (Rep. Congo) – Kinshasa (DRC)



- Settlements characteristics**
- 01: open spaces, low vegetation surfaces NDVI ≤ 0.3
 - 02: open spaces, medium vegetation surfaces $0.3 < \text{NDVI} \leq 0.5$
 - 03: open spaces, high vegetation surfaces NDVI > 0.5
 - 04: open spaces, water surfaces LAND < 0.5
 - 05: open spaces, road surfaces
 - 11: built spaces, residential, building height $\leq 3\text{m}$
 - 12: built spaces, residential, $3\text{m} < \text{building height} \leq 6\text{m}$
 - 13: built spaces, residential, $6\text{m} < \text{building height} \leq 15\text{m}$
 - 14: built spaces, residential, $15\text{m} < \text{building height} \leq 30\text{m}$
 - 15: built spaces, residential, building height $> 30\text{m}$
 - 21: built spaces, non-residential, building height $\leq 3\text{m}$
 - 22: built spaces, non-residential, $3\text{m} < \text{building height} \leq 6\text{m}$
 - 23: built spaces, non-residential, $6\text{m} < \text{building height} \leq 15\text{m}$
 - 24: built spaces, non-residential, $15\text{m} < \text{building height} \leq 30\text{m}$
 - 25: built spaces, non-residential, building height $> 30\text{m}$

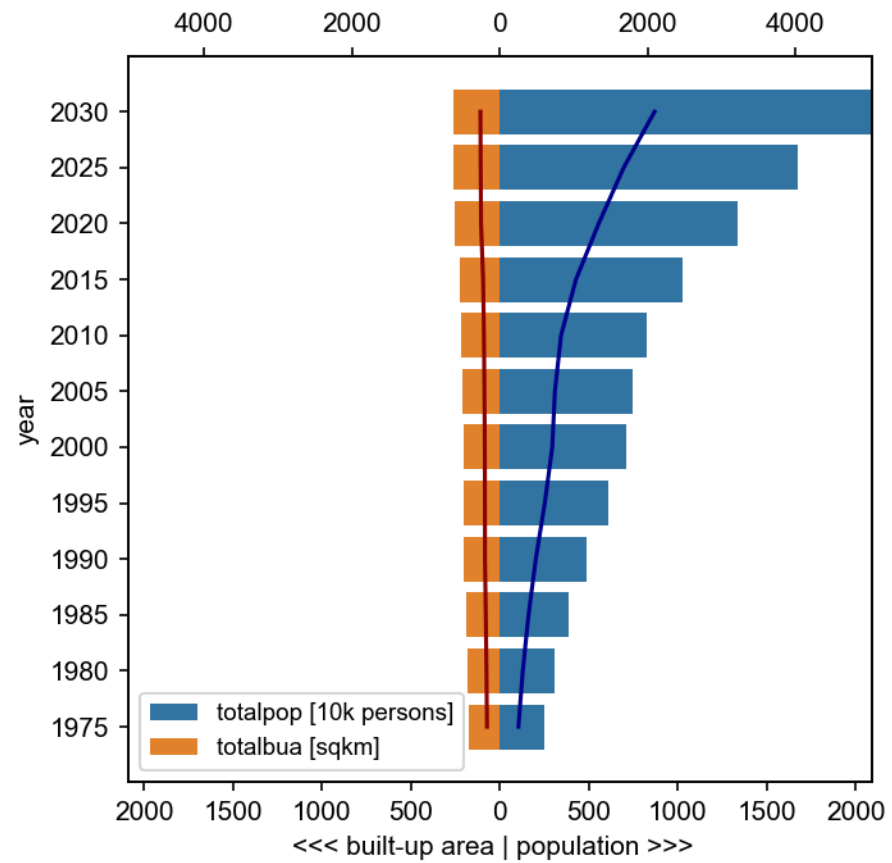


- Population**
- no data (transparent)
 - 0 - 5
 - 6 - 20
 - 21 - 100
 - 101 - 300
 - 301 - 500
 - 501 - 1,000
 - 1,000 - Max

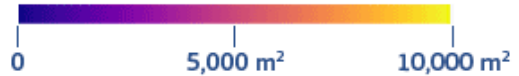


- Degree of Urbanisation**
- Urban centre (City):**
 - Urban cluster (Town & suburb):**
 - Rural grid cells (Rural area):**

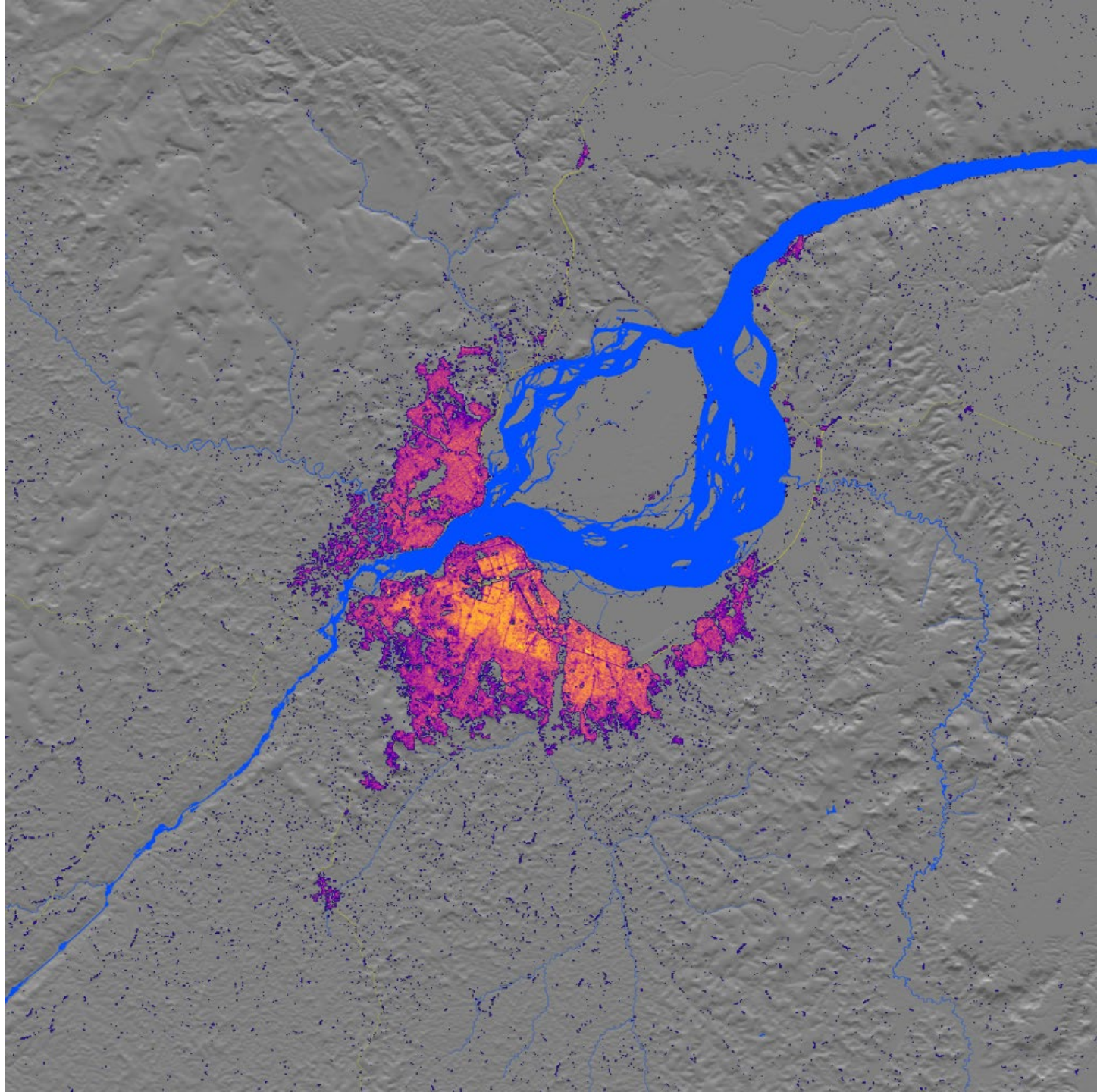
Kinshasa/ Brazzaville



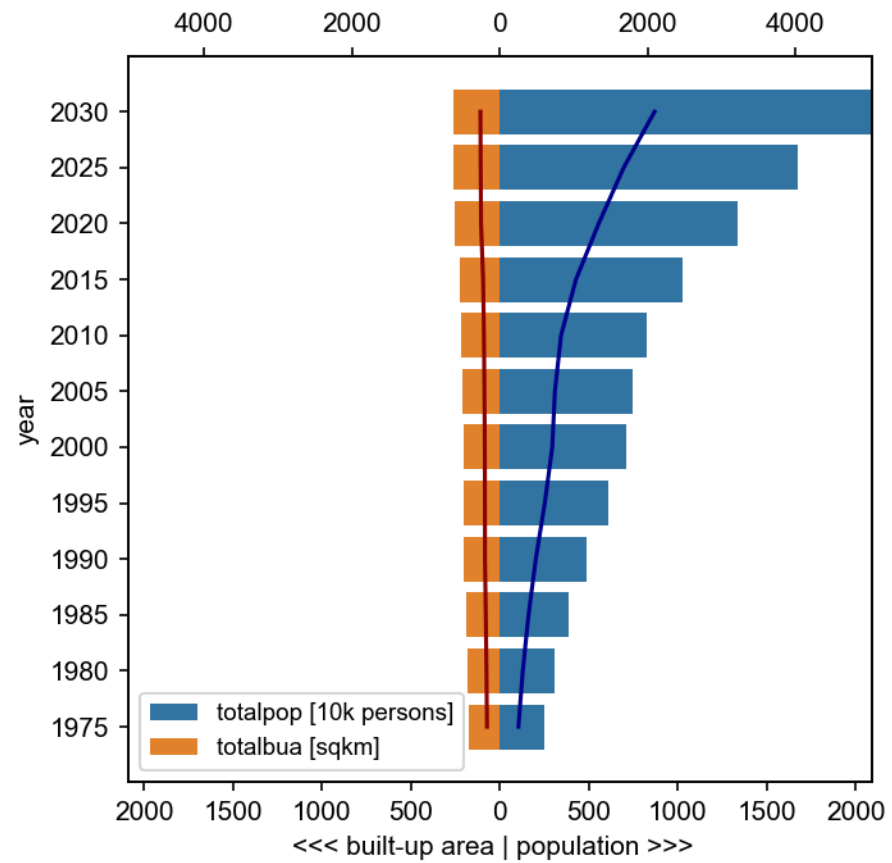
Built-up Surface (100m)



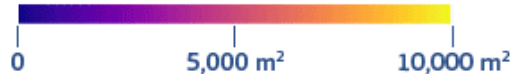
1975



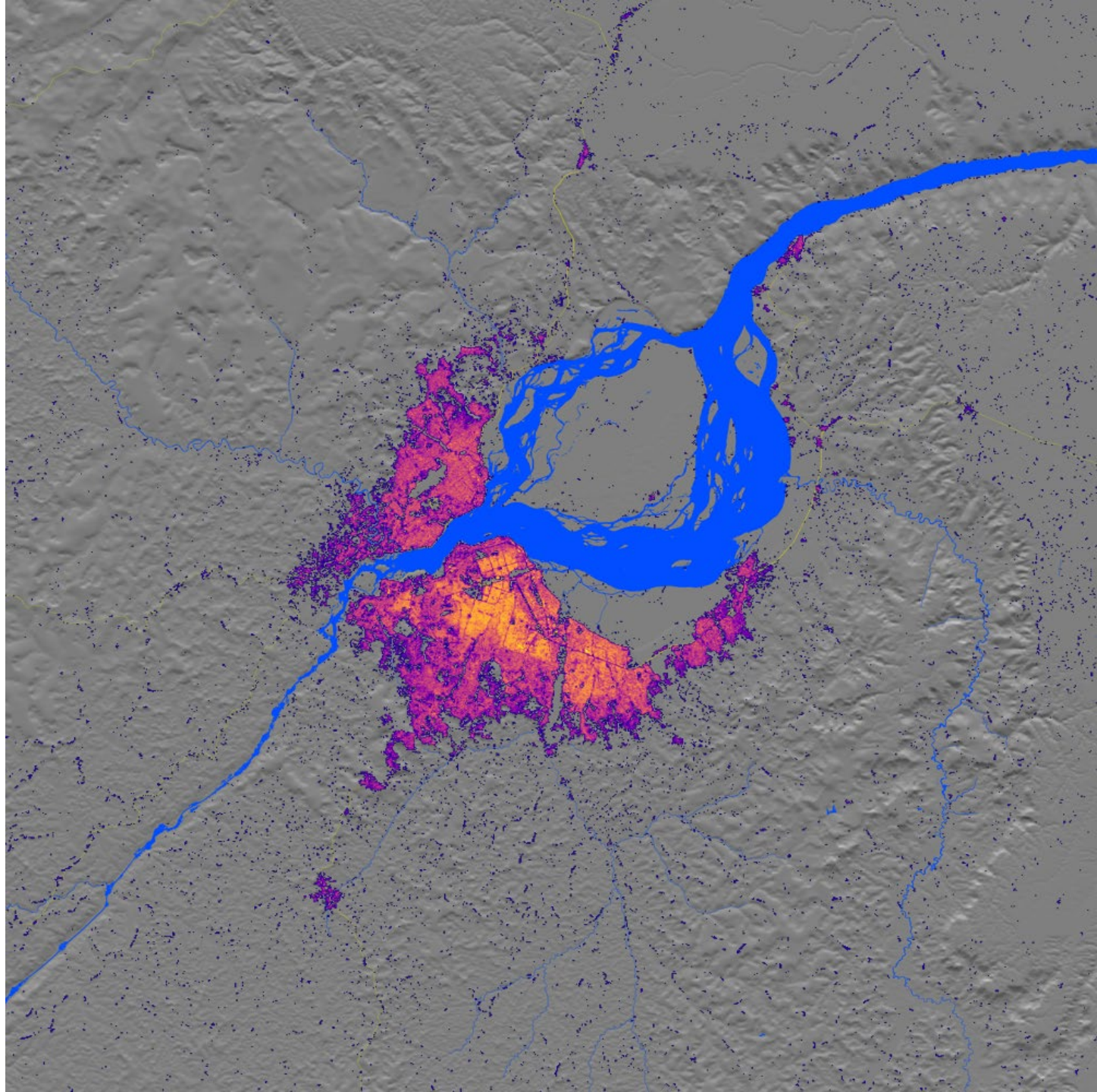
Kinshasa/ Brazzaville



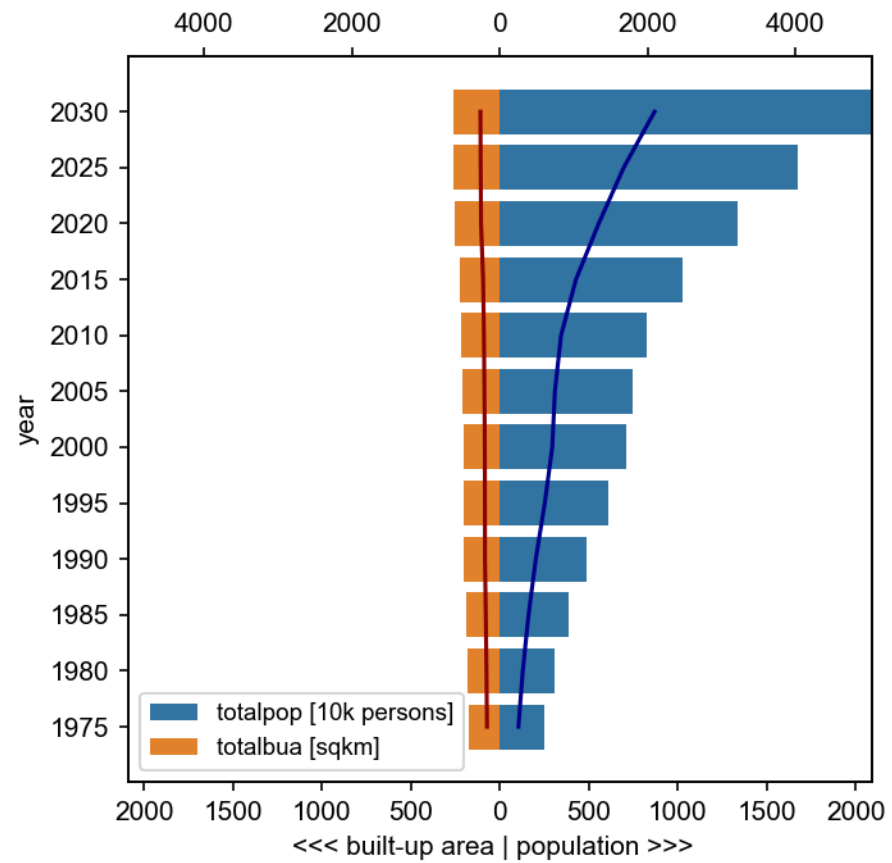
Built-up Surface (100m)



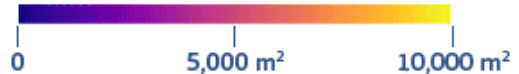
1980



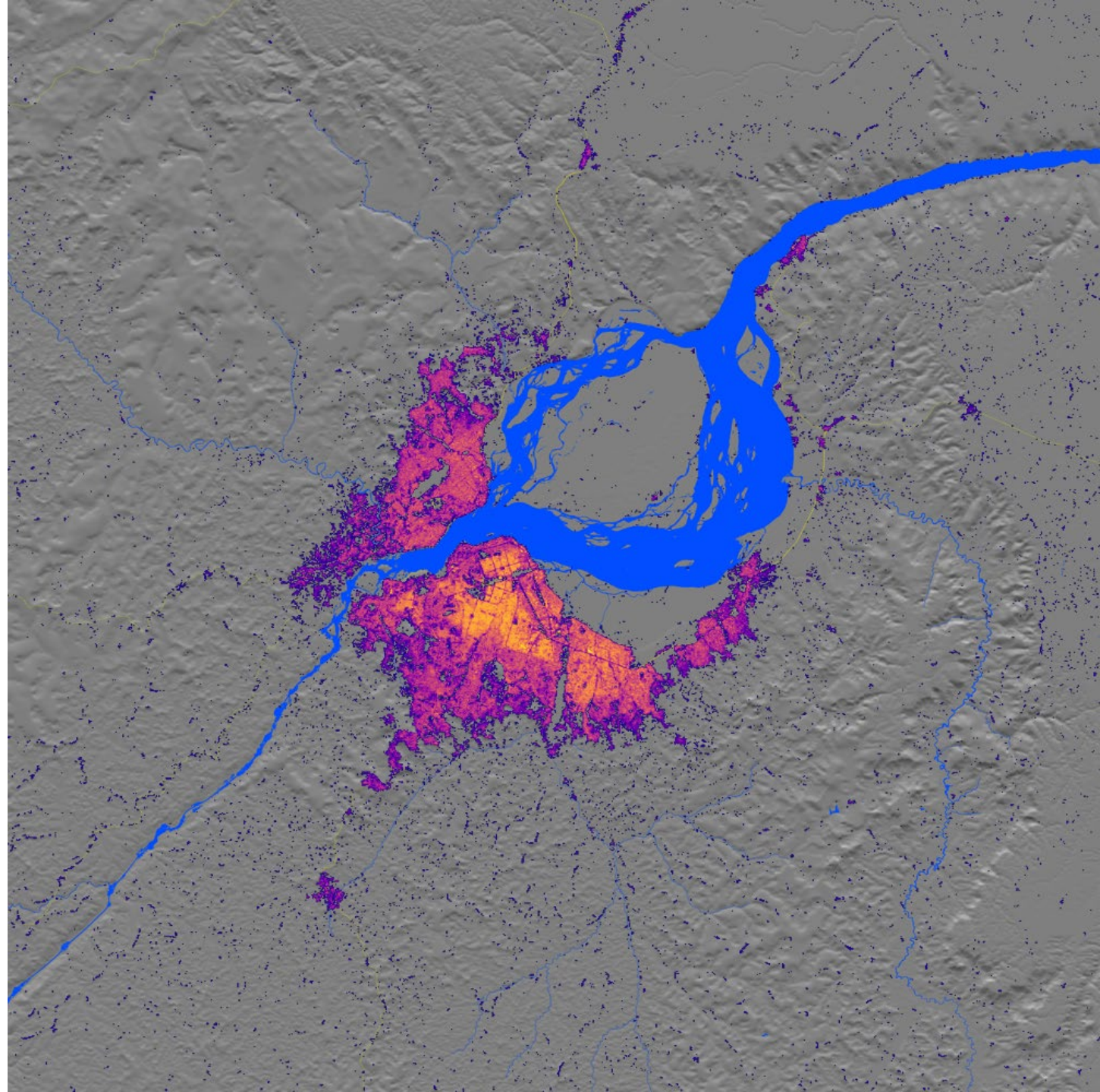
Kinshasa/ Brazzaville



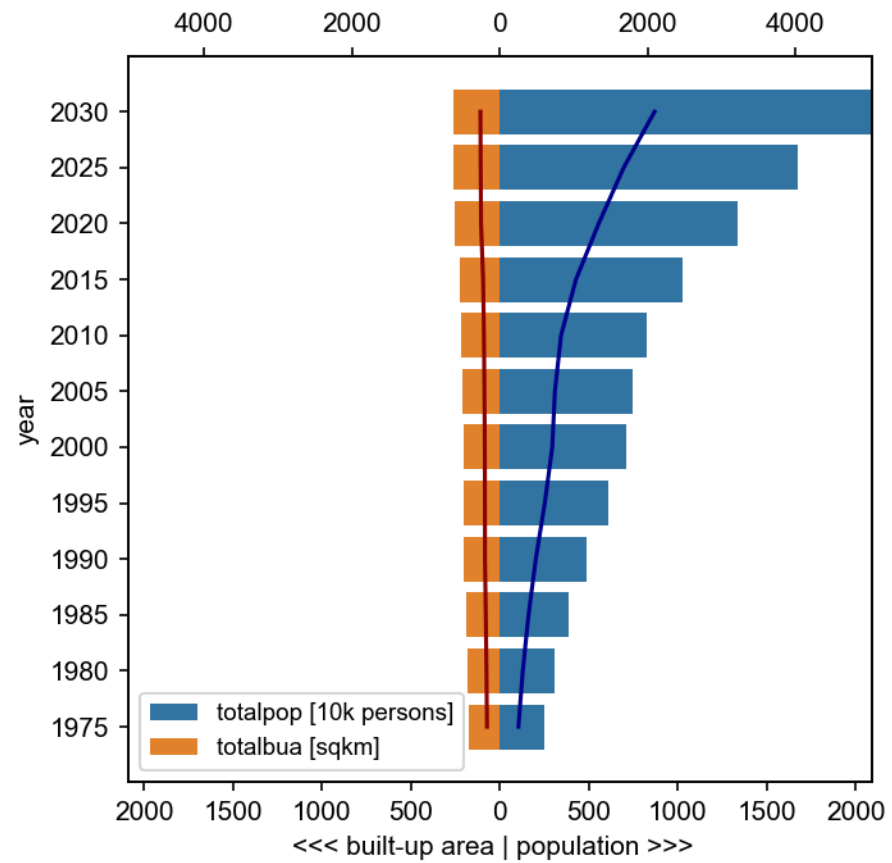
Built-up Surface (100m)



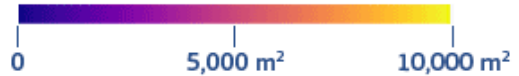
1985



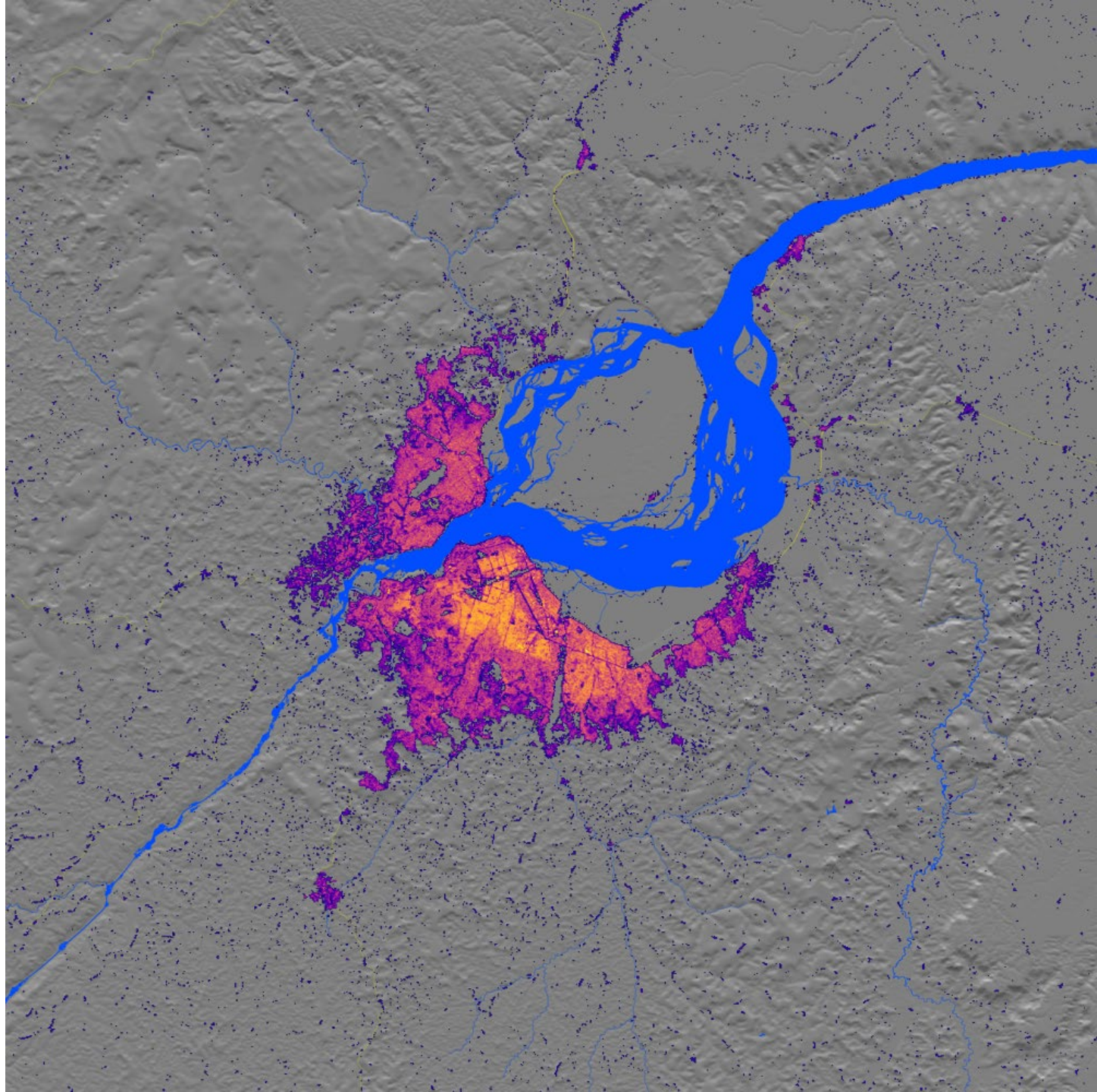
Kinshasa/ Brazzaville



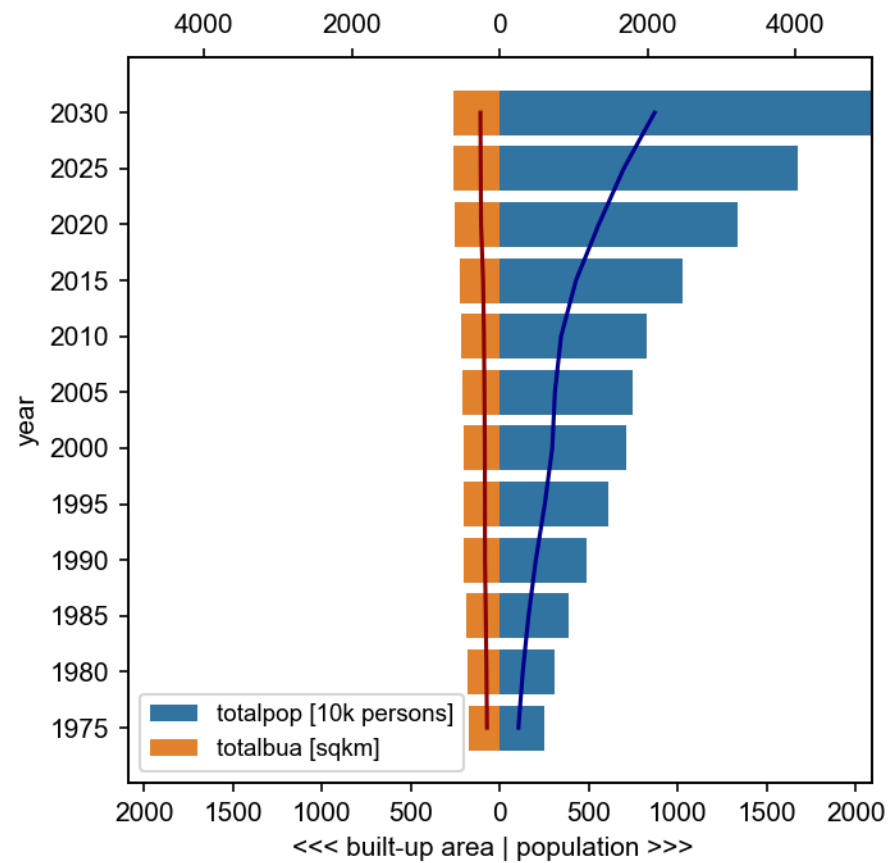
Built-up Surface (100m)



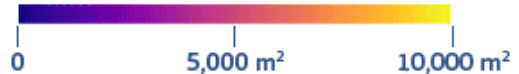
1990



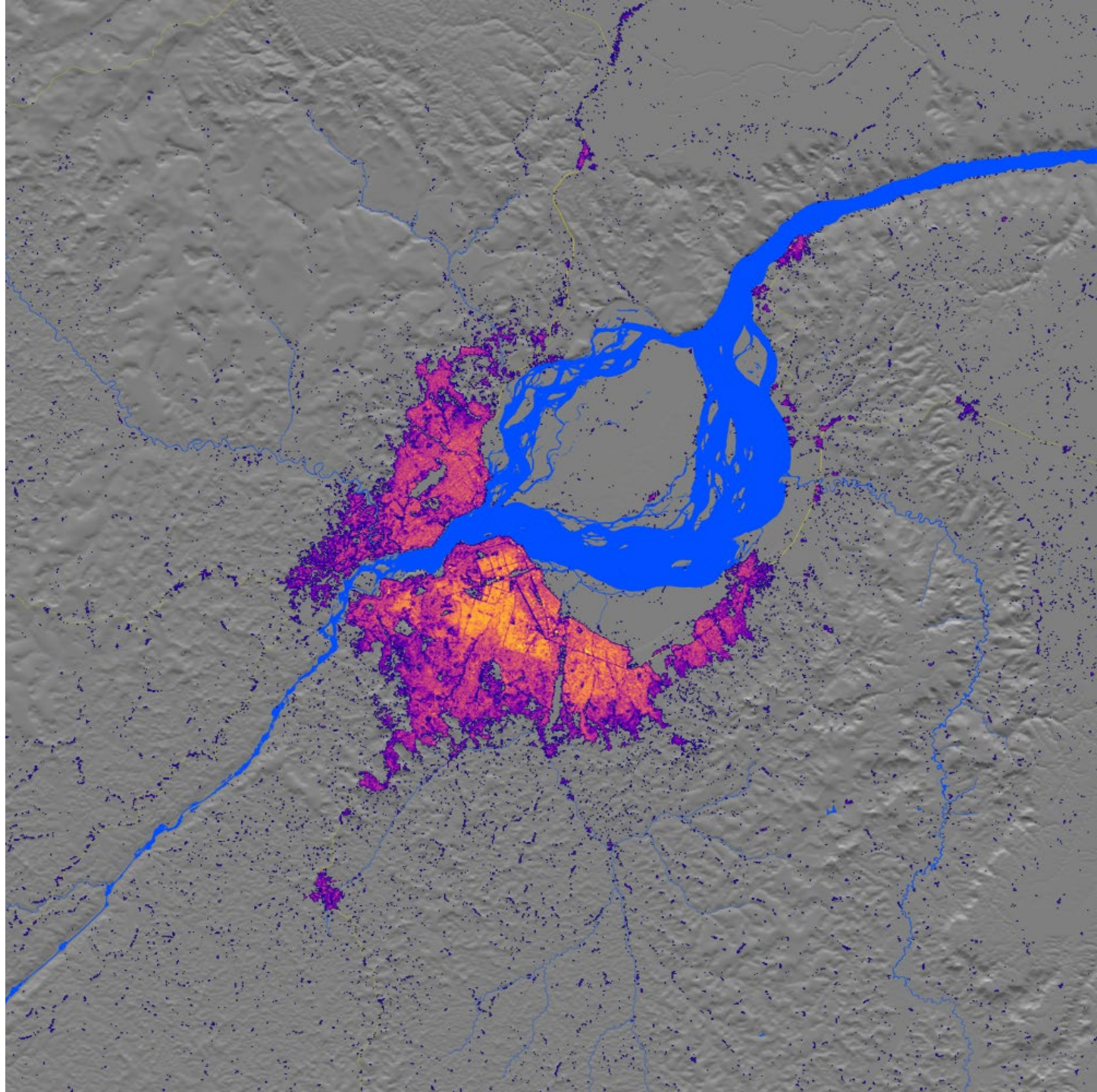
Kinshasa/ Brazzaville



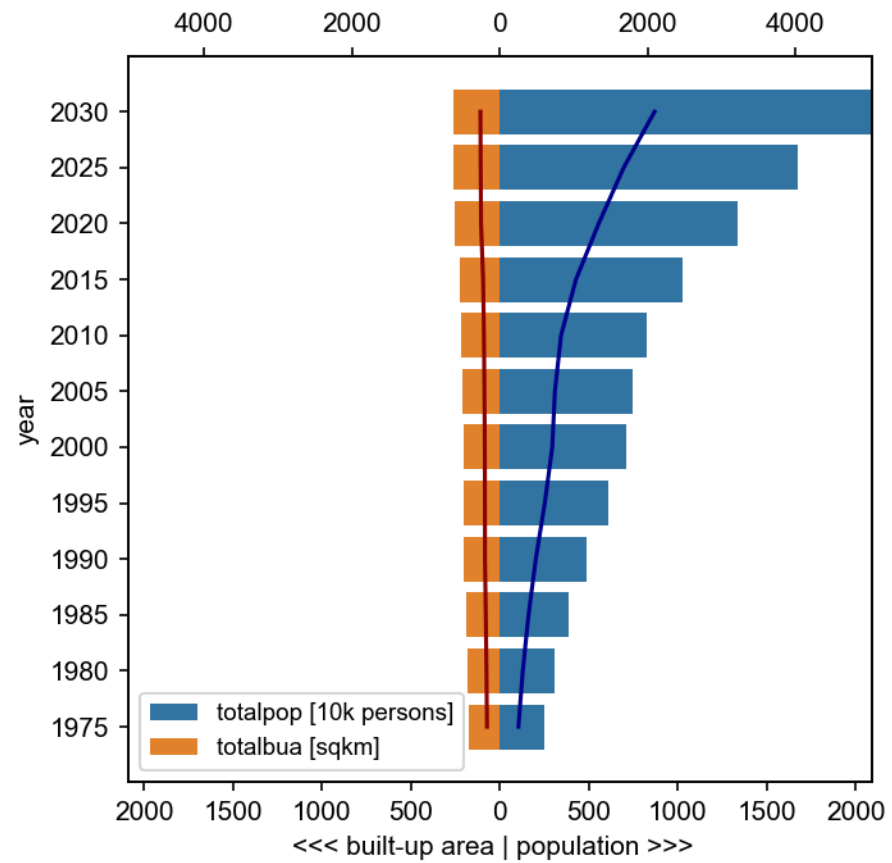
Built-up Surface (100m)



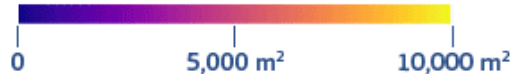
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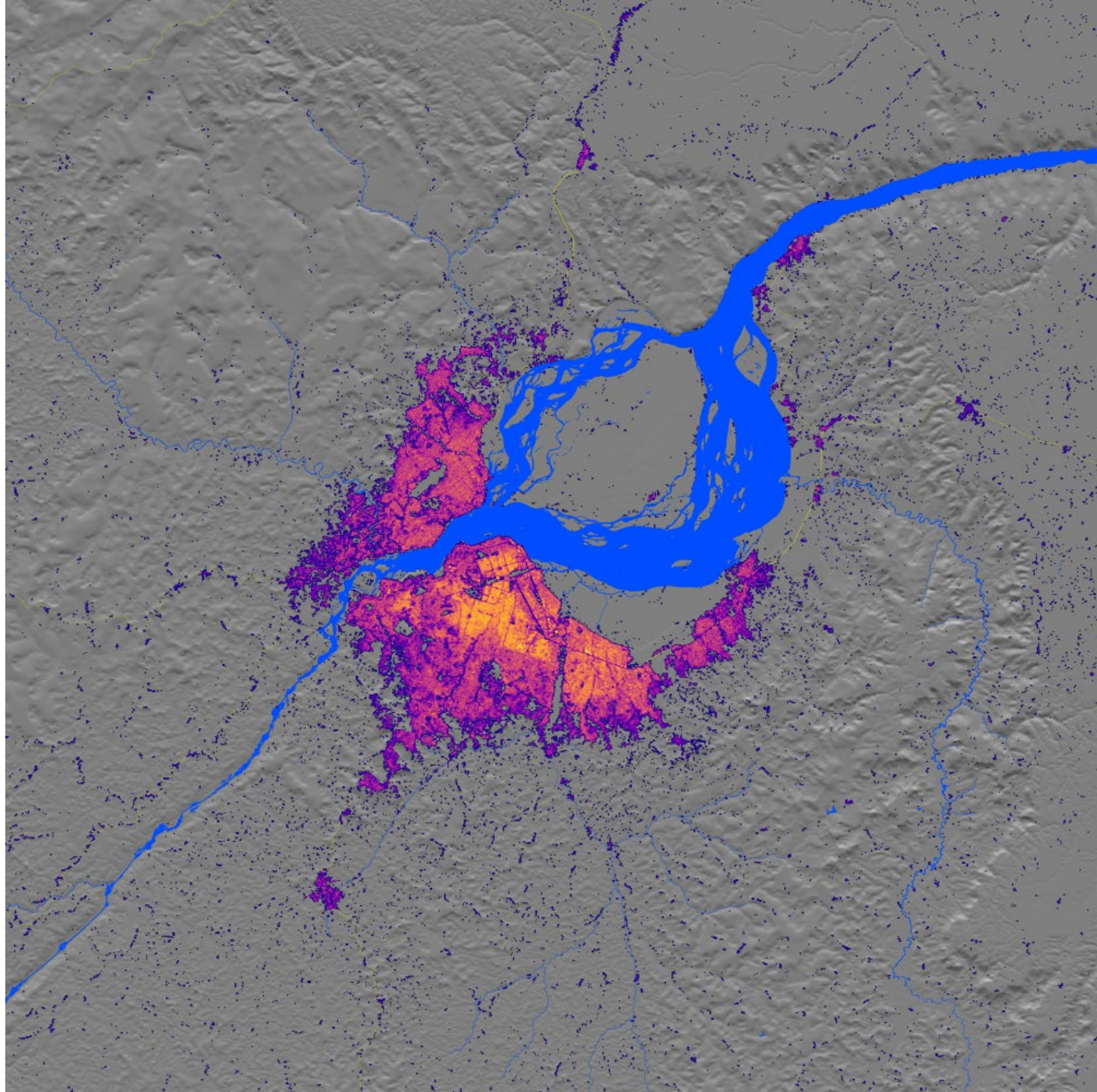
Kinshasa/ Brazzaville



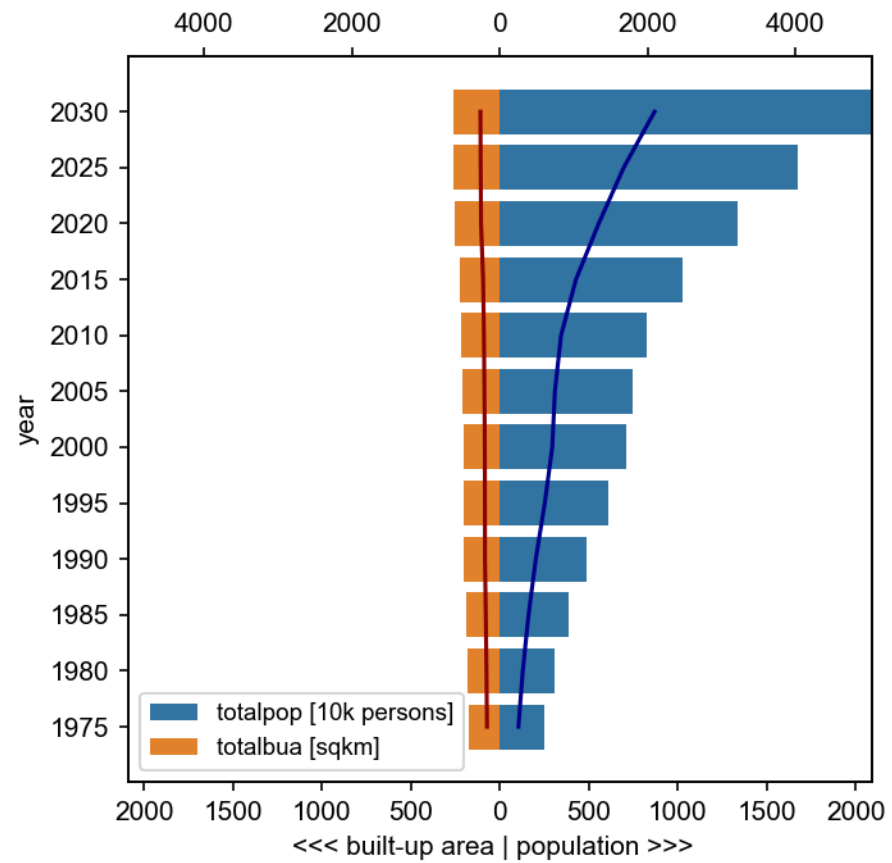
Built-up Surface (100m)



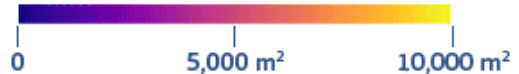
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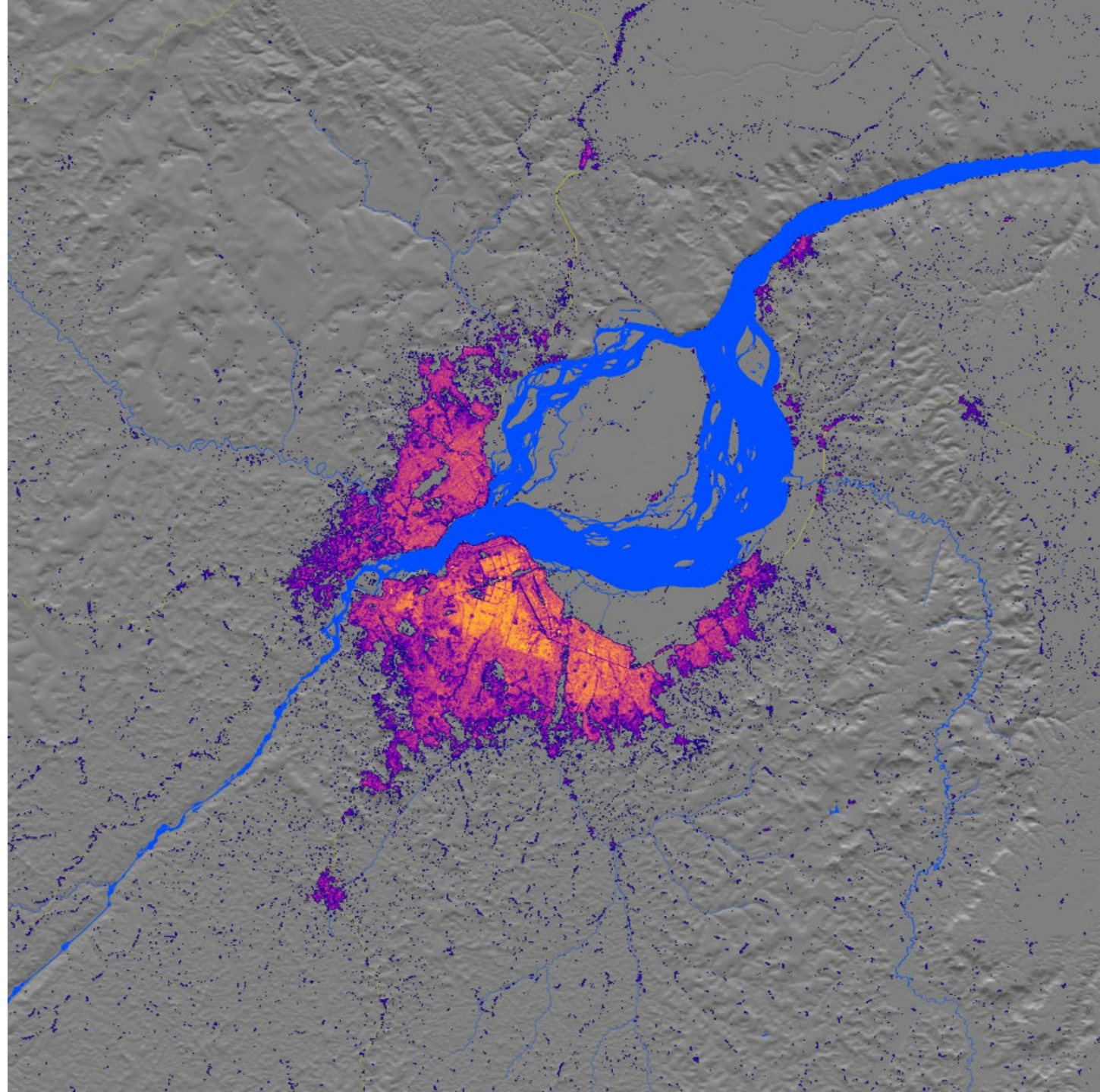
Kinshasa/ Brazzaville



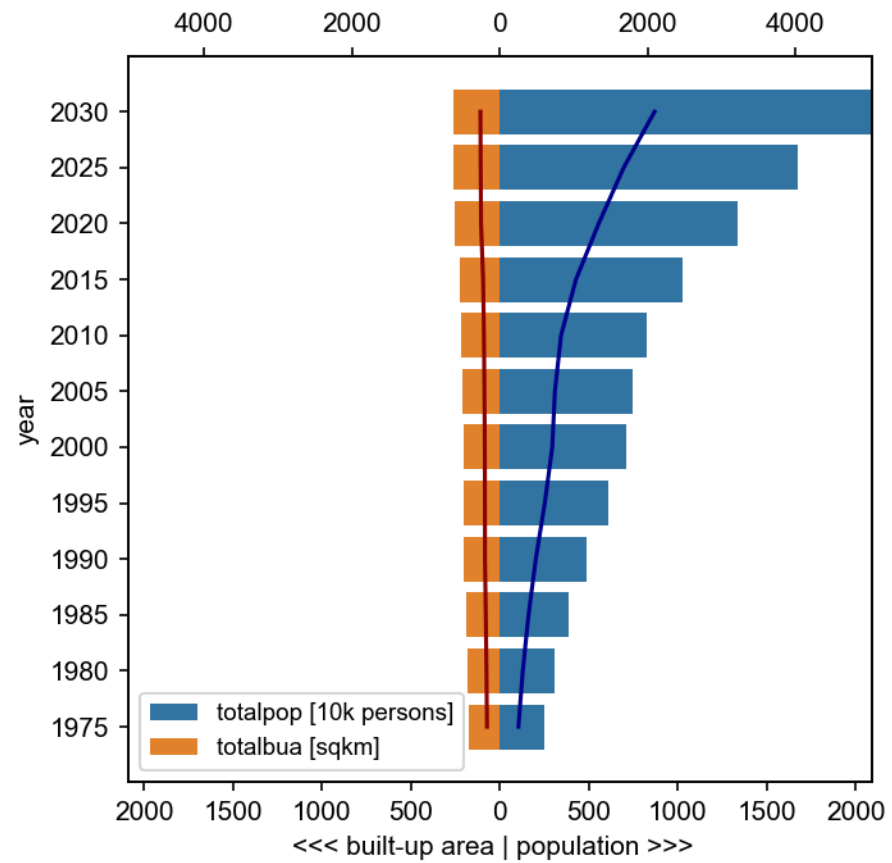
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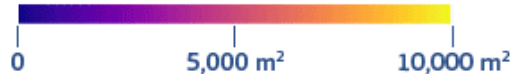
2005



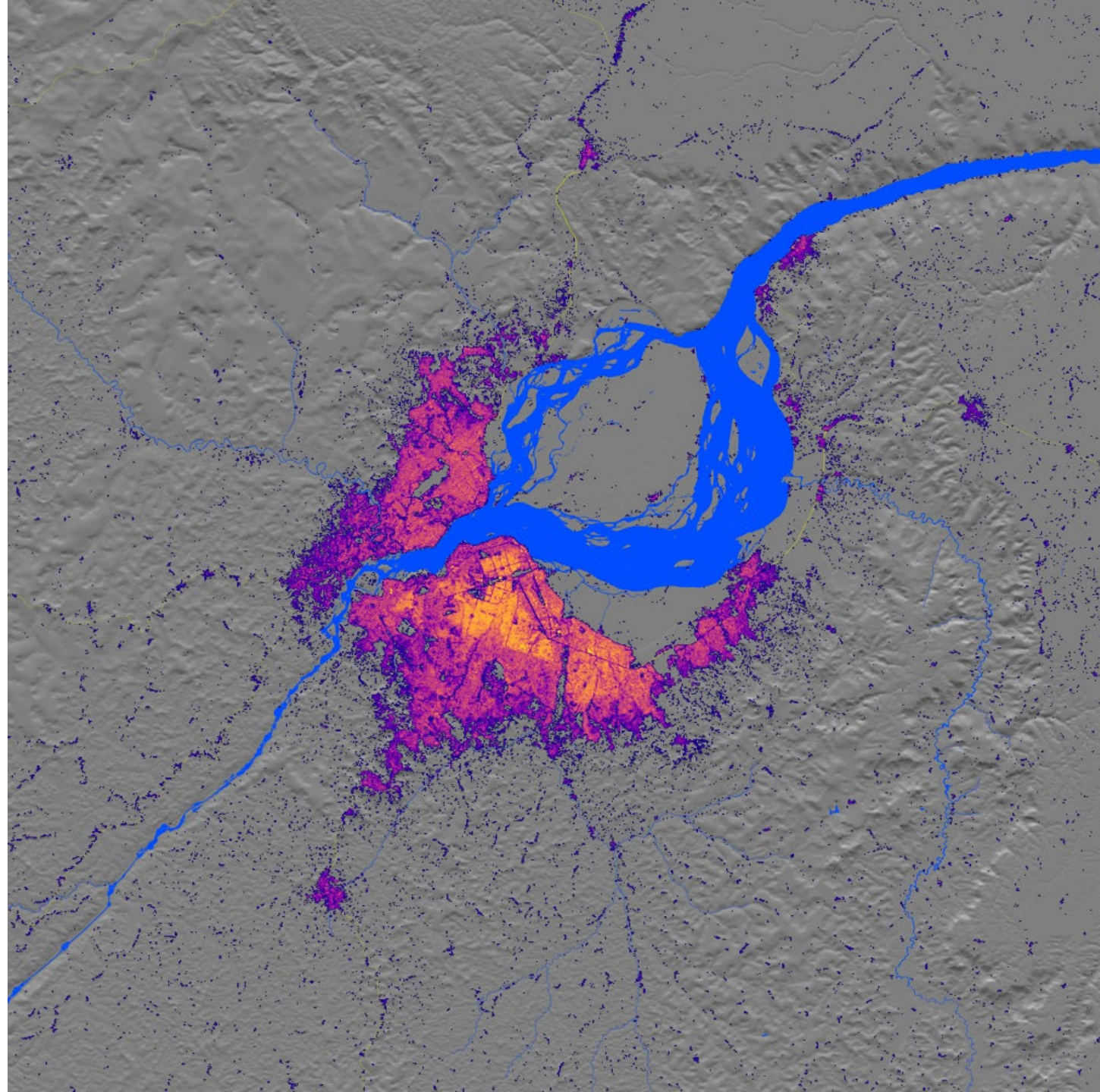
Kinshasa/ Brazzaville



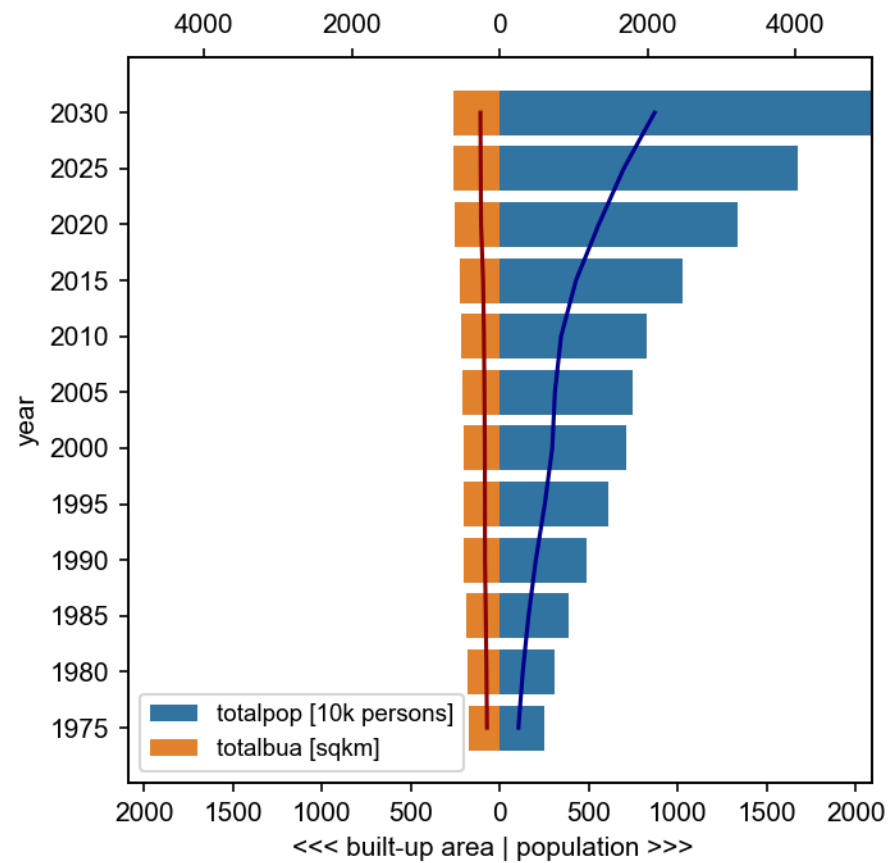
Built-up Surface (100m)



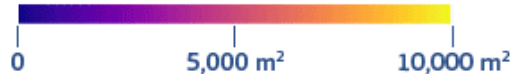
2010



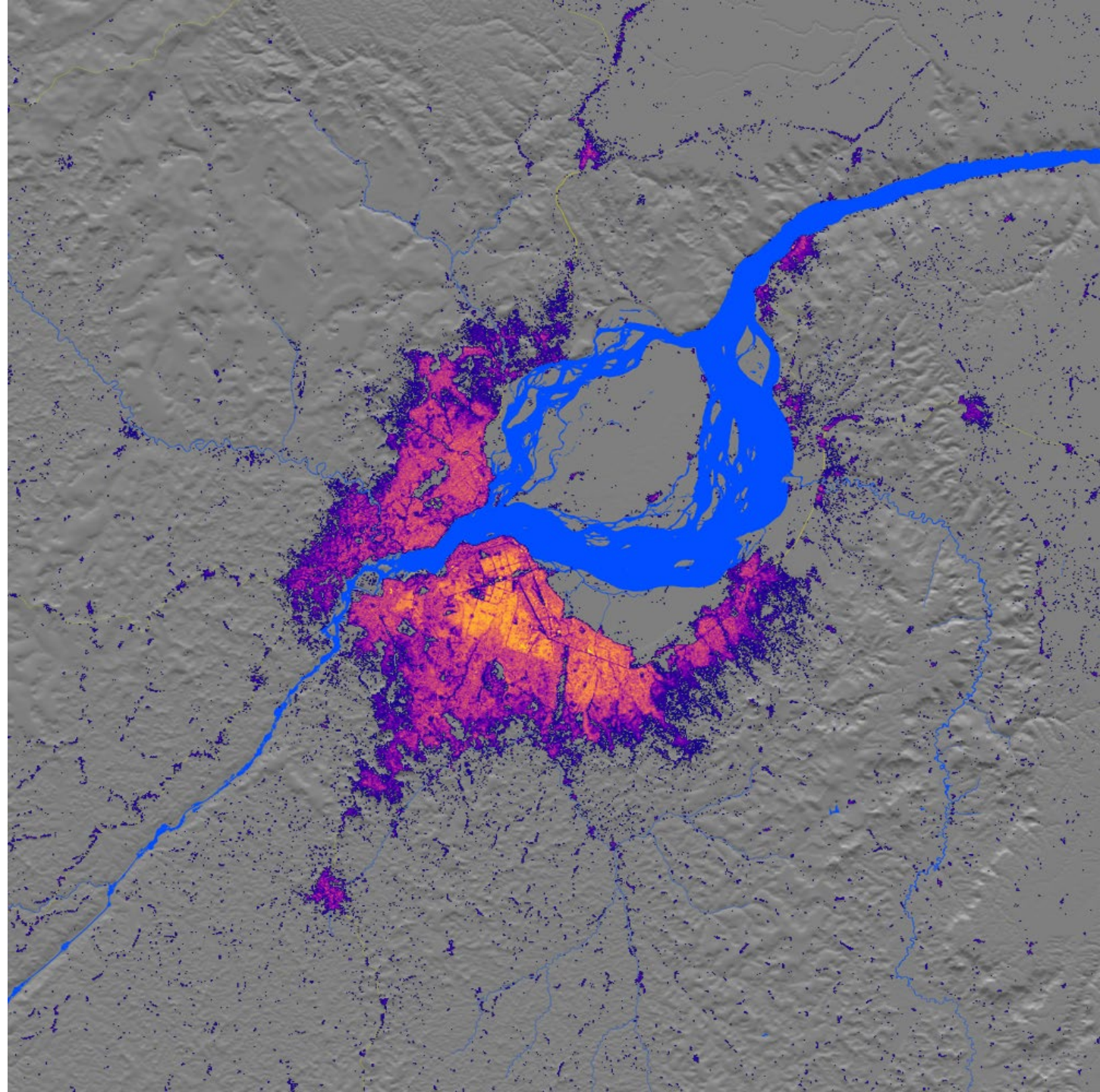
Kinshasa/ Brazzaville



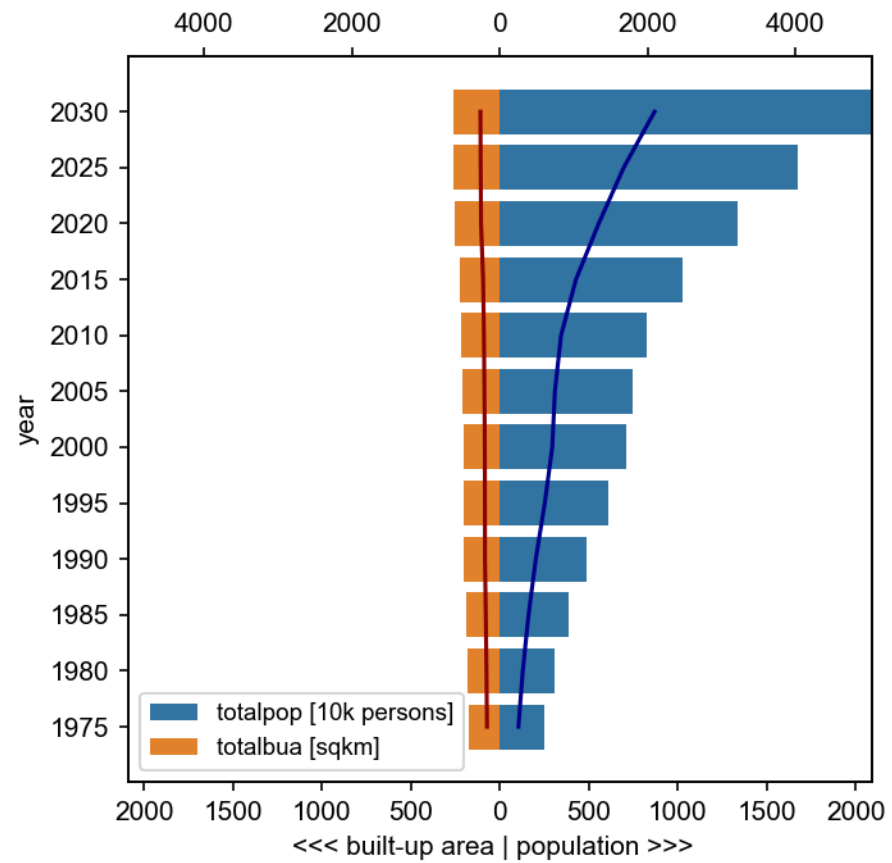
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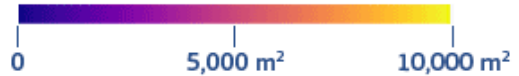
2015



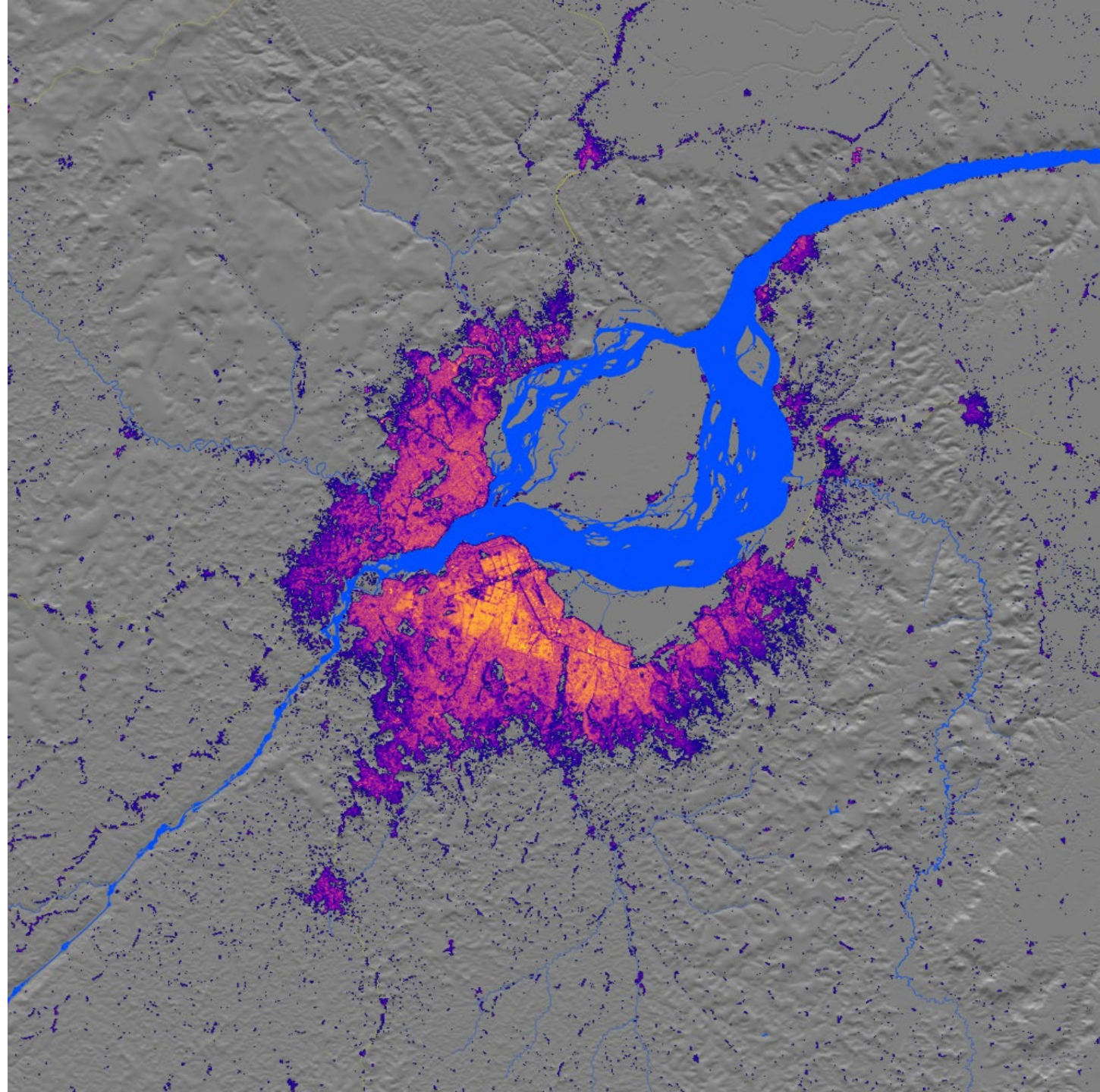
Kinshasa/ Brazzaville



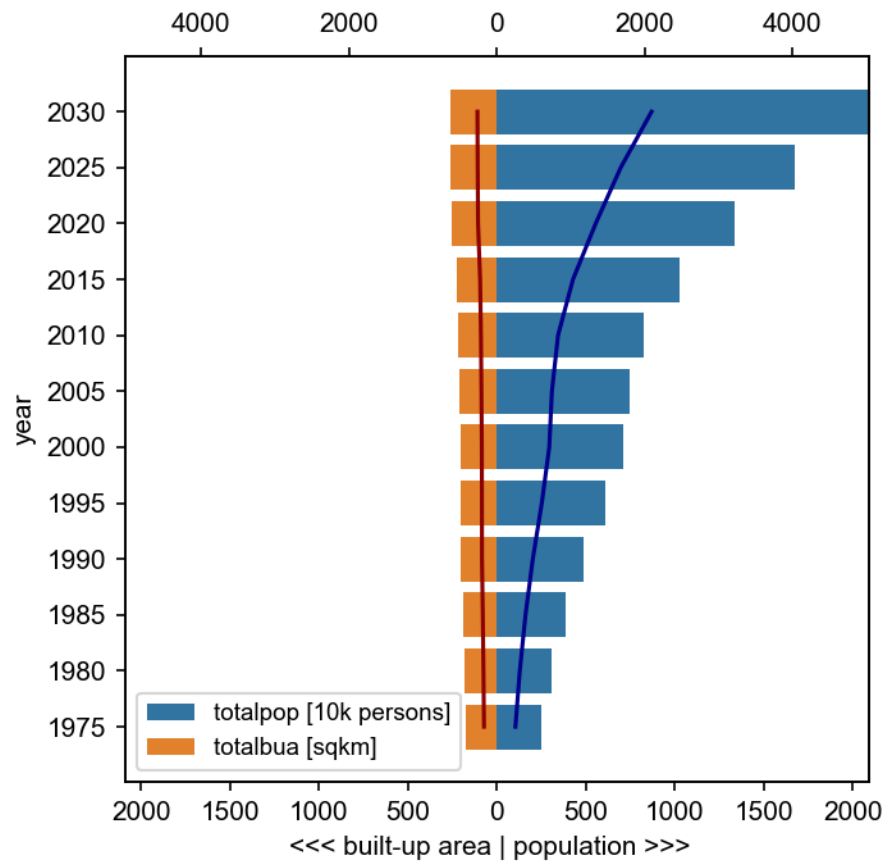
Built-up Surface (100m)



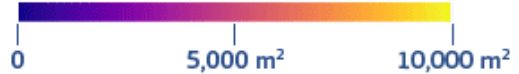
2020



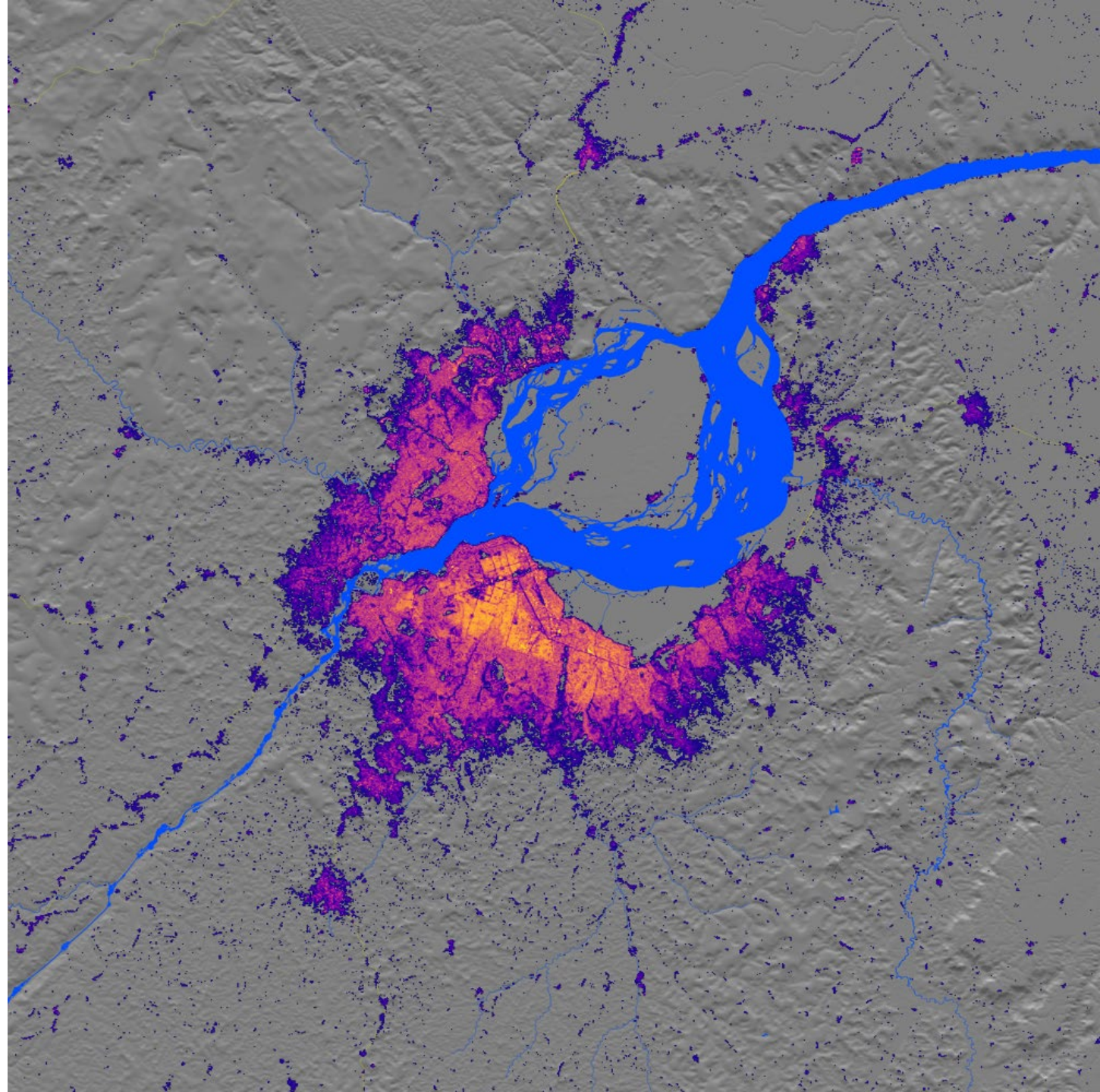
Kinshasa/ Brazzaville



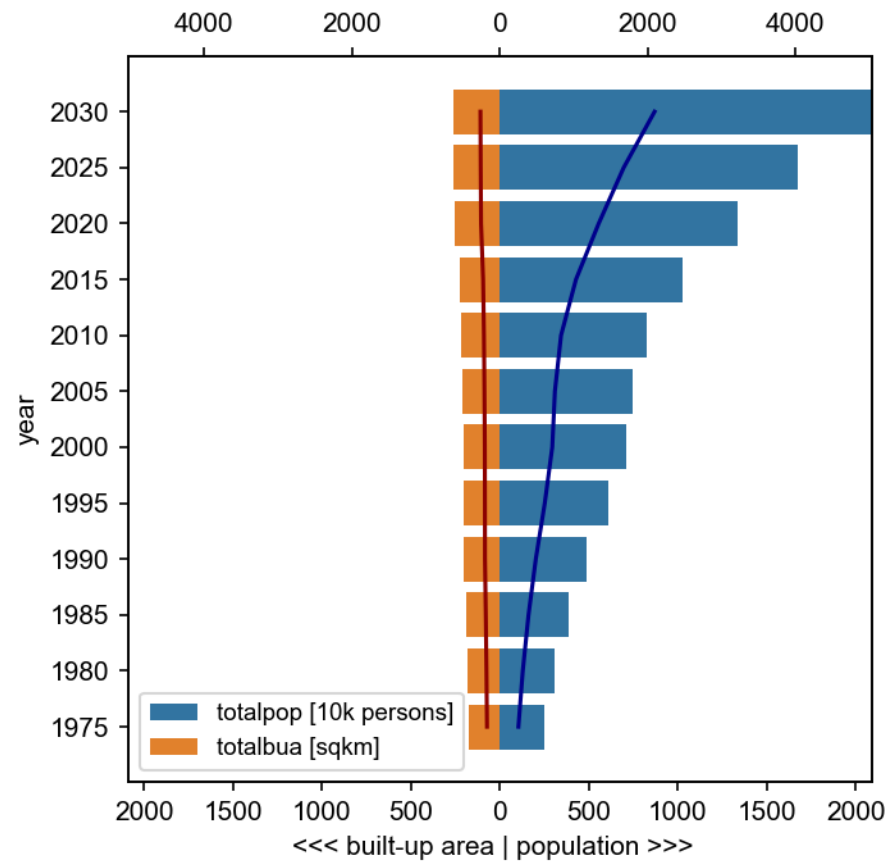
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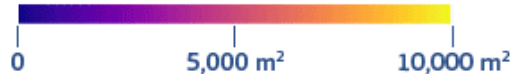
2025



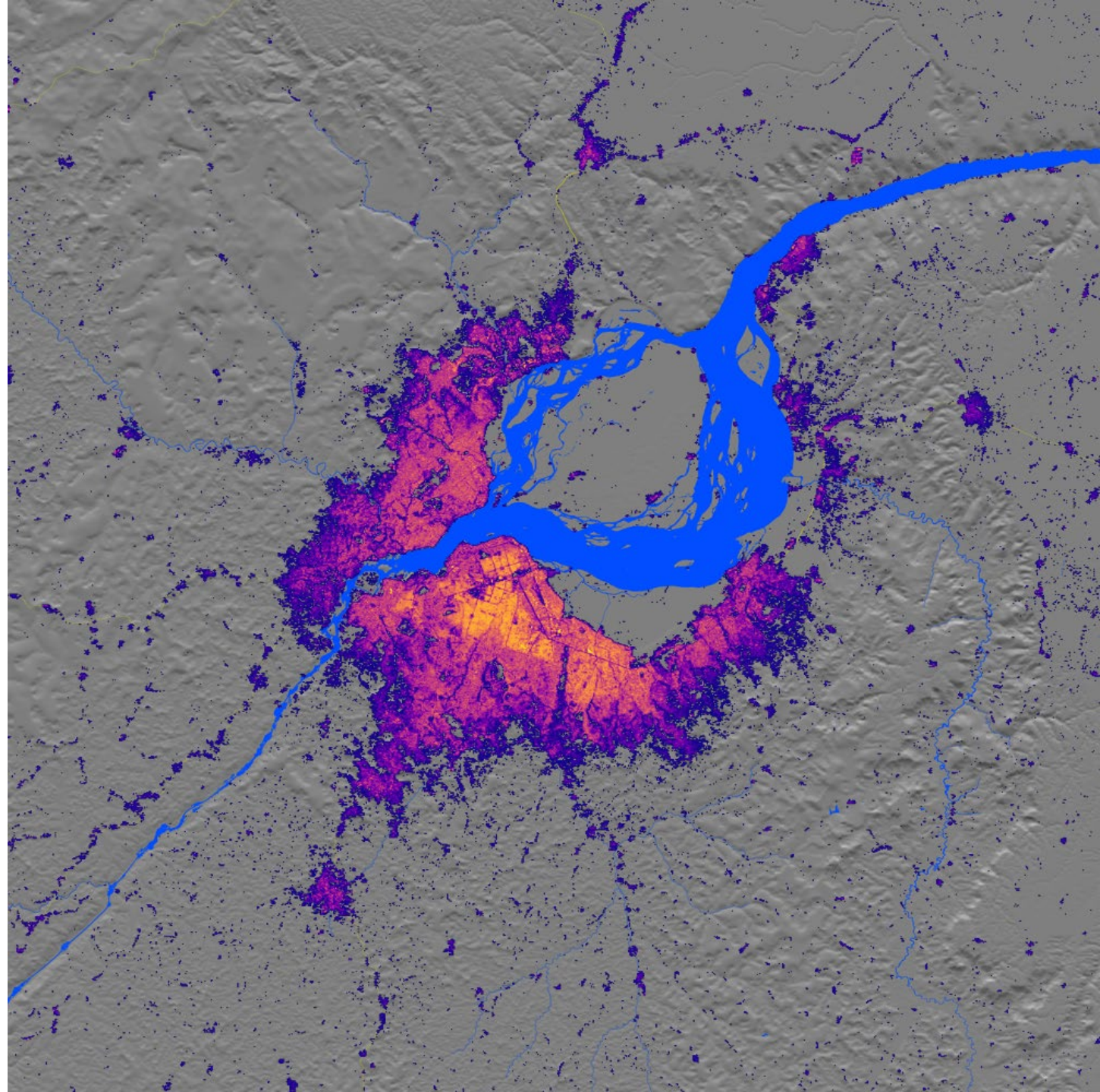
Kinshasa/ Brazzaville



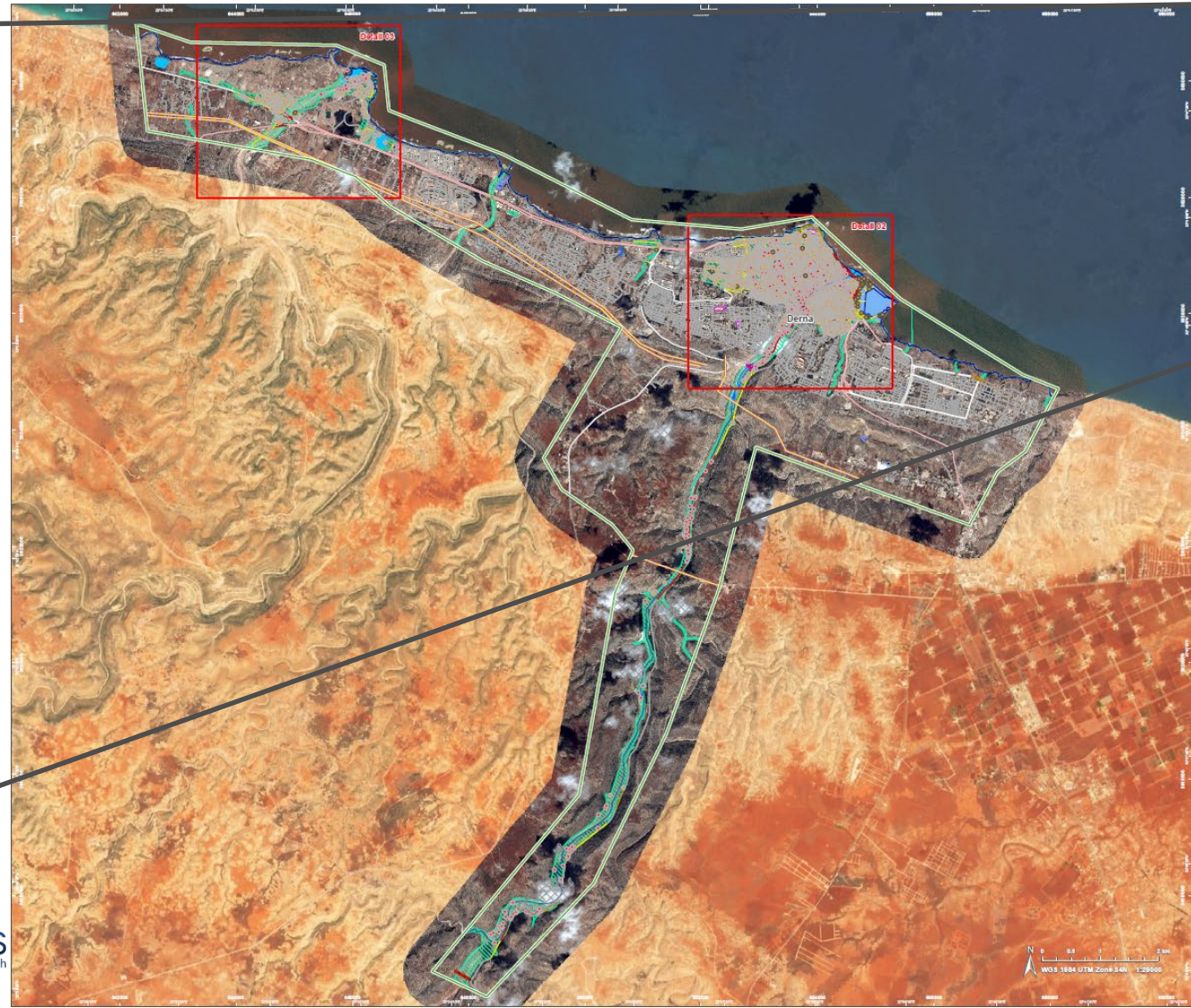
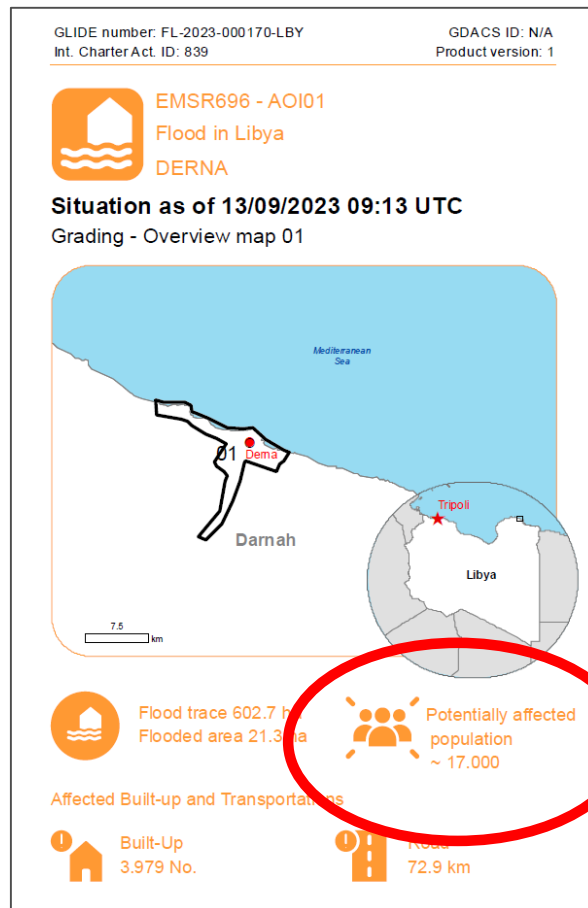
Built-up Surface (100m)



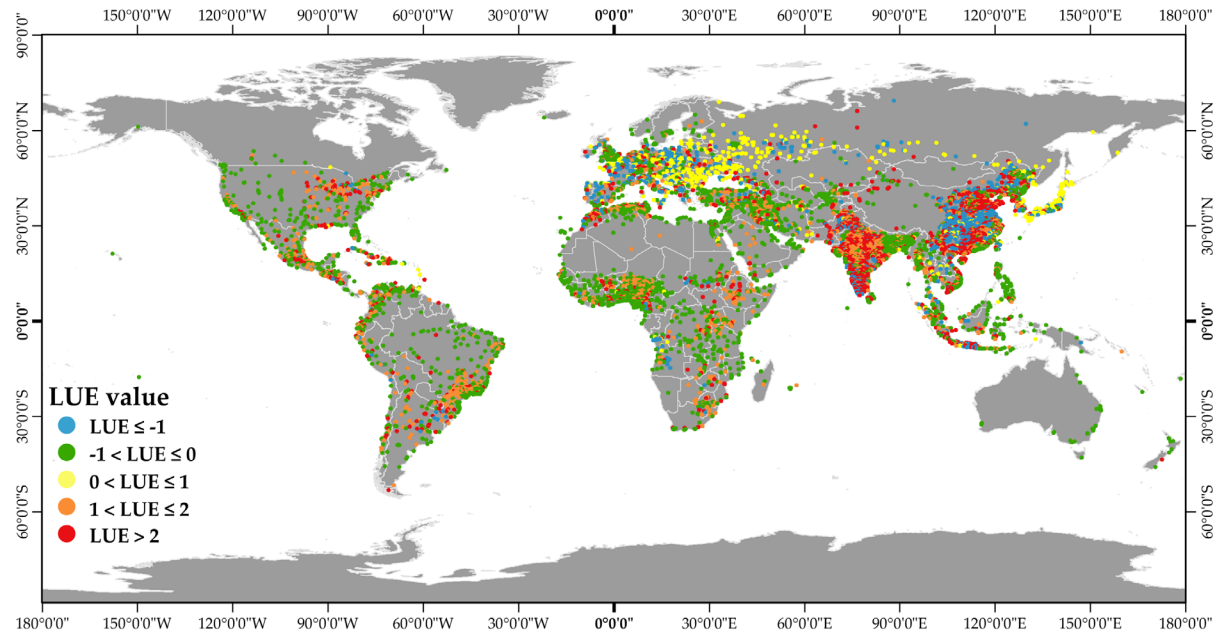
2030



GHSL Applications in CEMS: EMS696 Libya

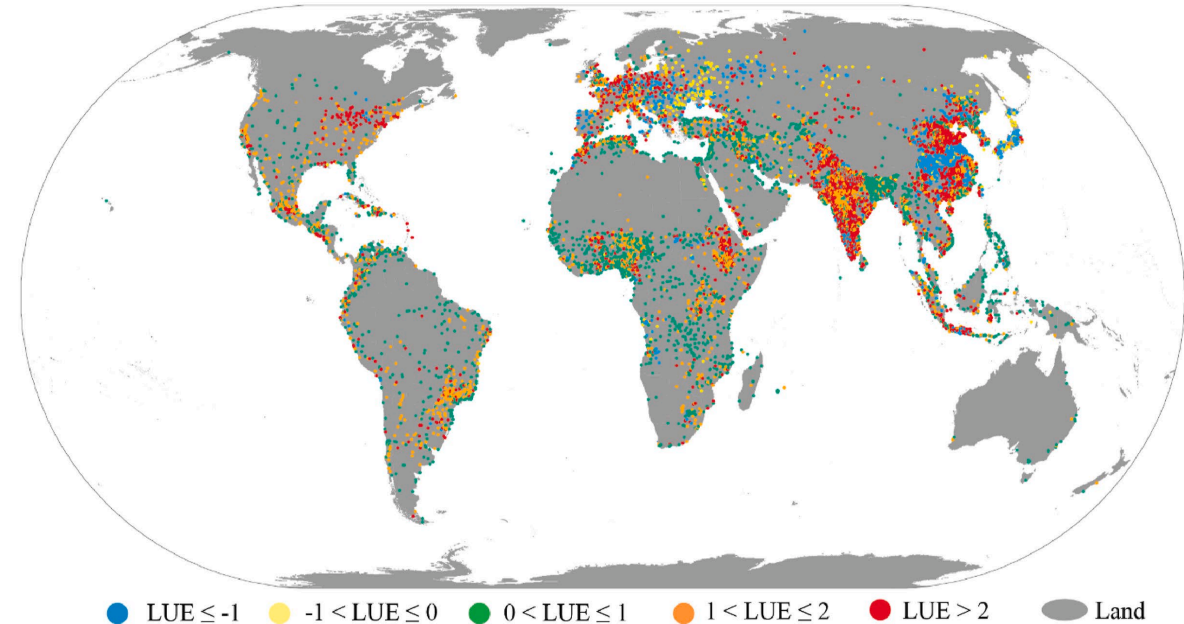


Land consumption (11.3.1)



Urban Centres

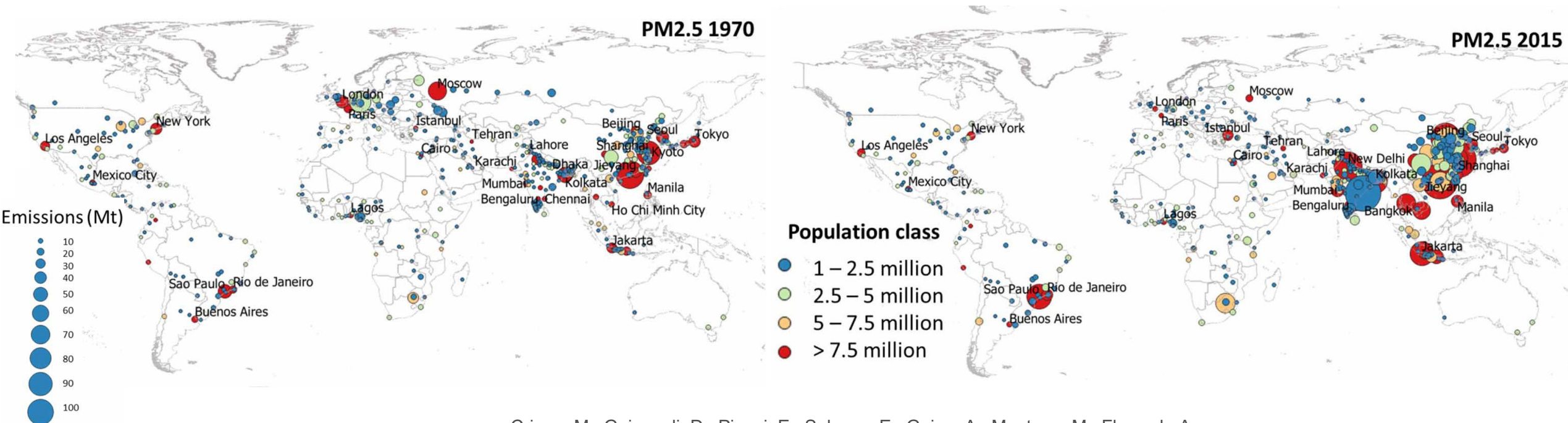
Melchiorri, M., Pesaresi, M., Florczyk, A. J., Corbane, C., & Kemper, T. (2019). Principles and applications of the global human settlement layer as baseline for the land use efficiency indicator—SDG 11.3. 1. ISPRS International Journal of Geo-Information, 8(2), 96.



Functional Urban Areas

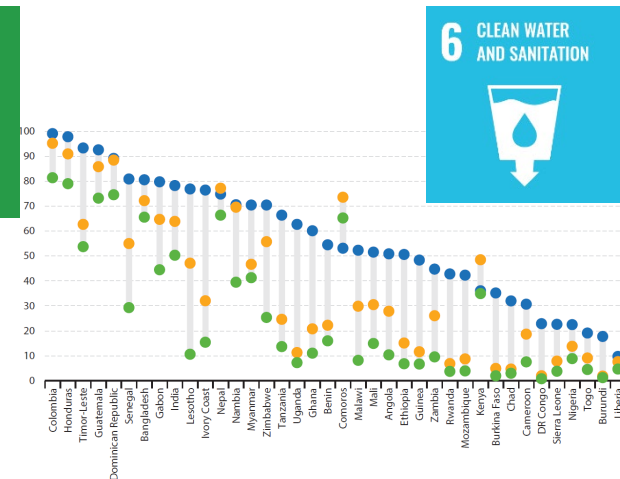
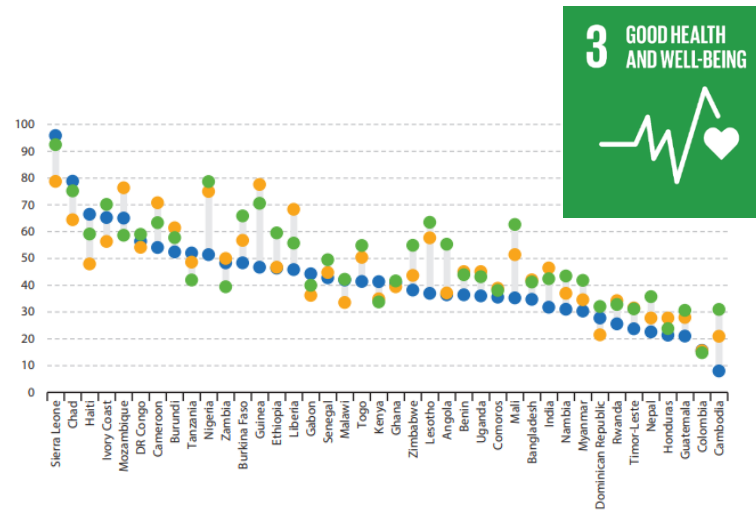
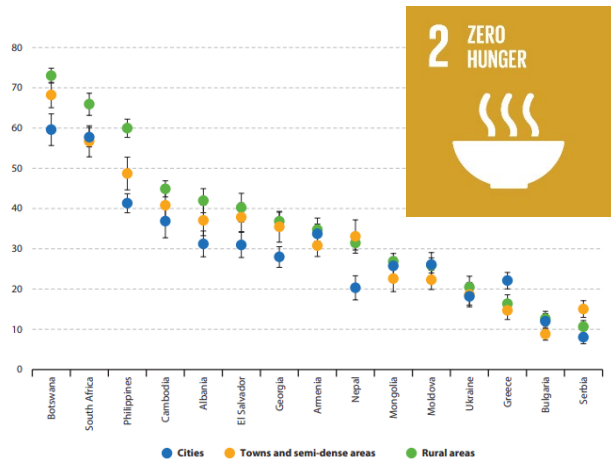
Schiavina, M., Melchiorri, M., Freire, S., Florio, P., Ehrlich, D., Tommasi, P., ... & Kemper, T. (2022). Land use efficiency of functional urban areas: Global pattern and evolution of development trajectories. Habitat International, 123, 102543.

Anthropogenic emissions (11.6.2)



Crippa, M., Guizzardi, D., Pisoni, E., Solazzo, E., Guion, A., Muntean, M., Florczyk, A., Schiavina, M., Melchiorri, M. and Hutfilter, A.F., 2021. Global anthropogenic emissions in urban areas: patterns, trends, and challenges. Environmental Research Letters, 16(7), p.074033.

Development indicators by Degree of Urbanisation



European Commission, and Statistical Office of the European Union. 2021. Applying the Degree of Urbanisation - a Methodological Manual to Define Cities, Towns and Rural Areas for International Comparisons. Publications Office of the European Union.

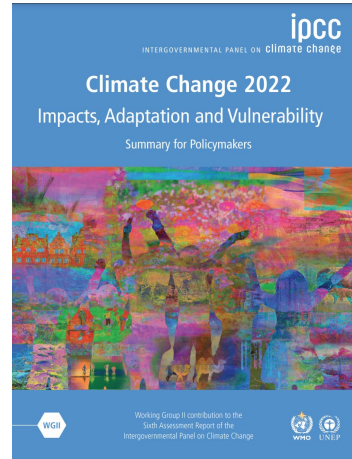
Supporting international policy frameworks



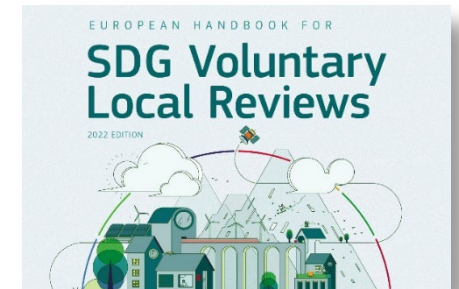
GEO 6 & GEO 6
Cities by UNEP



UN-Habitat SDG
11 synthesis
report



IPCC 6th
Assessment
Report



And many more ...



Open and Free Geospatial Data for Download

<https://ghsl.jrc.ec.europa.eu/download.php>

Product

[GHS-BUILT-S](#) [GHS-BUILT-H](#) [GHS-BUILT-V](#)
[GHS-BUILT-C](#) [GHS-LAND](#) [GHS-CONTOUR-S2](#)
[GHS-POP](#) [GHS-SMOD](#) [GHS-DUC](#)
[GHS-UCDB](#) [GHS-FLA](#) [ESM](#)
[ENACT-POP](#) [GHS-BUILT-LANGSTAT](#) [GHS-SDATA](#)

Epoch

[2030](#) 2025 2020
2018 2015 2011
2010 2005 2000
1995 1990 1985
1980 1975

Resolution

2m 10m [100m](#) 1km
3 arcsec 30 arcsec

Coord. system

[GHS built-up surface \(R2023\)](#)
[Read the technical details for this product](#)

Current selection:
Product: GHS-BUILT-S, epoch: 2030, resolution: 100m, coordinate system: Mollweide, classification: Total RES+NRES

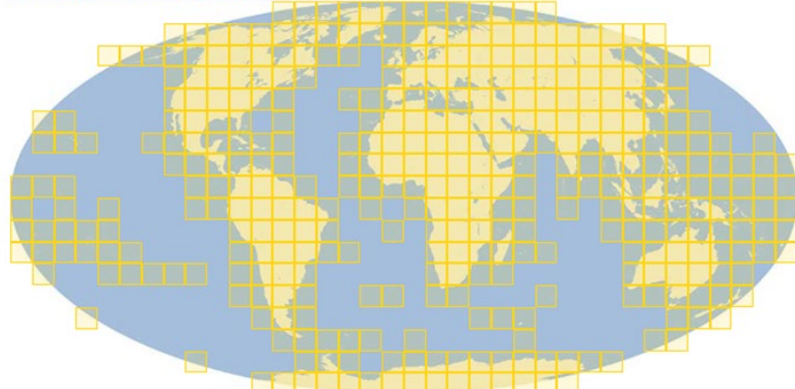
Select the classification

Classification (RES/NRES)

☒ Total RES+NRES ☐ Non residential
[Residential \(RES\) or non residential \(NRES\) classification.](#)

To be noted that some variation might be available only for a certain product. The options not available for a product are disabled and greyed out.

Download by tiles (click on each box to download a single file):
[Interactive visualisation of the GHS built-up surface \(R2023\)](#)



[Download the shapefile containing the tiling schema used in the map above.](#)

Hover over a tile to see its boundaries

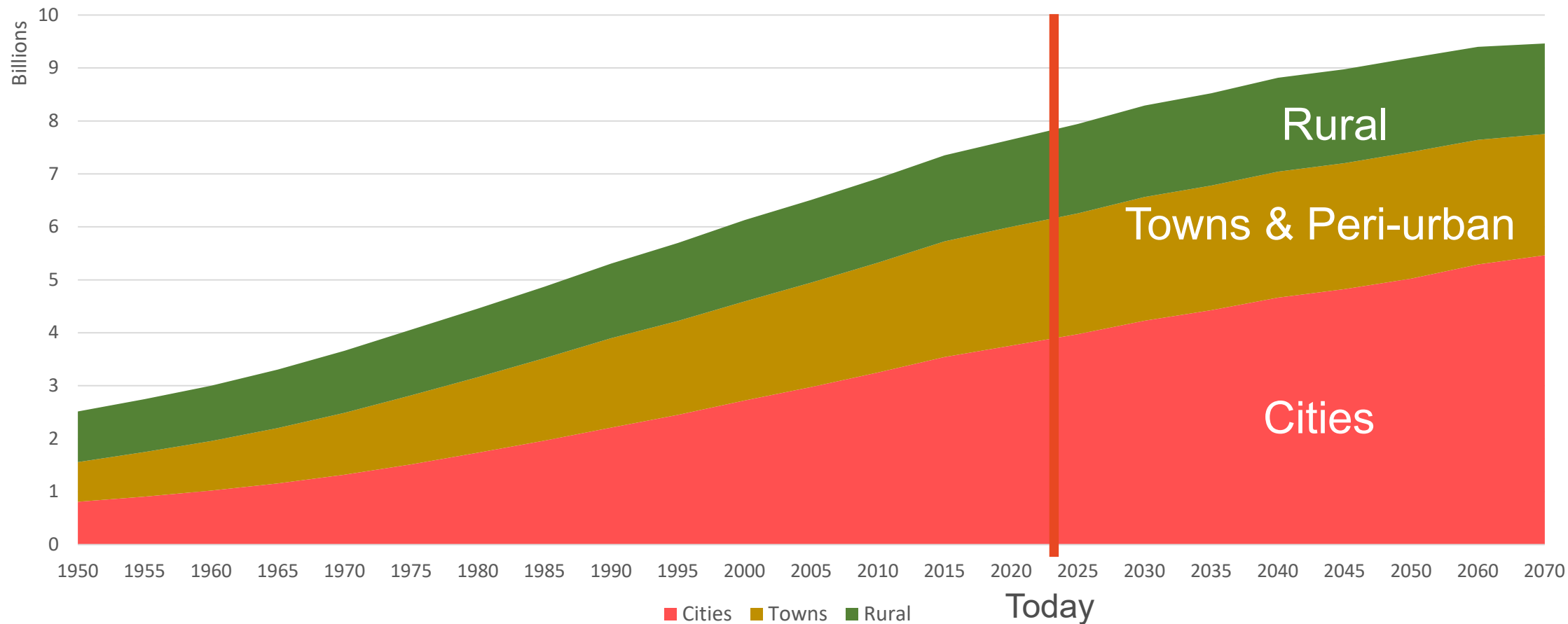
GHSL data in a nutshell



- **5-year time series: 1975-2030**
- **Global, harmonized coverage**
 - **Population density** [100 m]
 - **Built-up surface** [10 m]
 - **Building height/volume** [100 m]
 - **Degree of Urbanization** [1 km]
- **Operational Data Production**
under the Copernicus Programme
- **Bi-annual updates 2022, 2024, 2026**
- Quality controlled and validated

<https://ghsl.jrc.ec.europa.eu>

Future population growth will be urban



Keep in touch

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