Global Change - Urbanisation

Monitoring Cities from Space

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The Future is Urban

By 2050

70% of global population will be living in cities

90% of population growth will take place in urban areas

80% of increased prosperity will arise from cities

60% of energy consumption refers to urban agglomerations

Monitoring global urbanization is of key importance to effectively support the sustainable development and resilience of future cities with up-to-date data on:

Socio-Economic Development

Population Distribution

Vulnerability and Risk

Nature and Climate Protection

Mapping Urbanisation from Space

DLR has recently launched the **World Settlement Footprint**, a novel suite of **open-and-free** high spatial resolution **global datasets** facilitating the **analysis of urbanisation**

World Settlement Footprint 2015

The binary WSF 2015 settlement mask indicates the **global settlement extent** at a spatial resolution of **10m**.

The layer is derived by jointly exploiting multitemporal radar and multispectral satellite imagery, including **~217,000 Landsat-8** (30m resolution) and **~107,000 Sentinel-1** (10m resolution) scenes.

The WSF 2015 is currently the **most accurate global layer** of its kind and the quality has been assessed based on **900.000 validation samples** collected by crowdsourcing photointerpretation of Google VHR satellite/aerial imagery.

More details: https://doi.org/10.1038/s41597-020-00580-5

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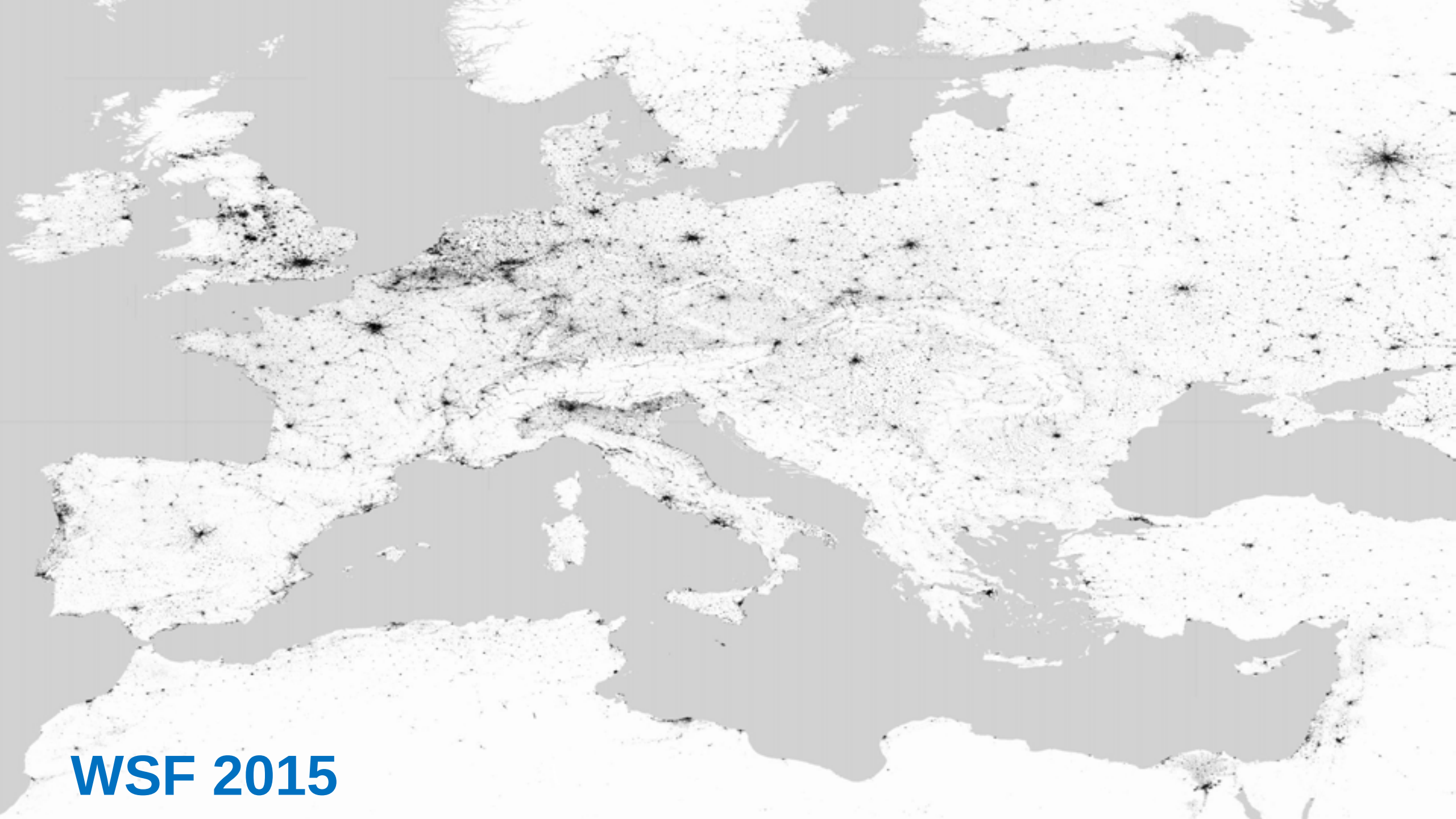
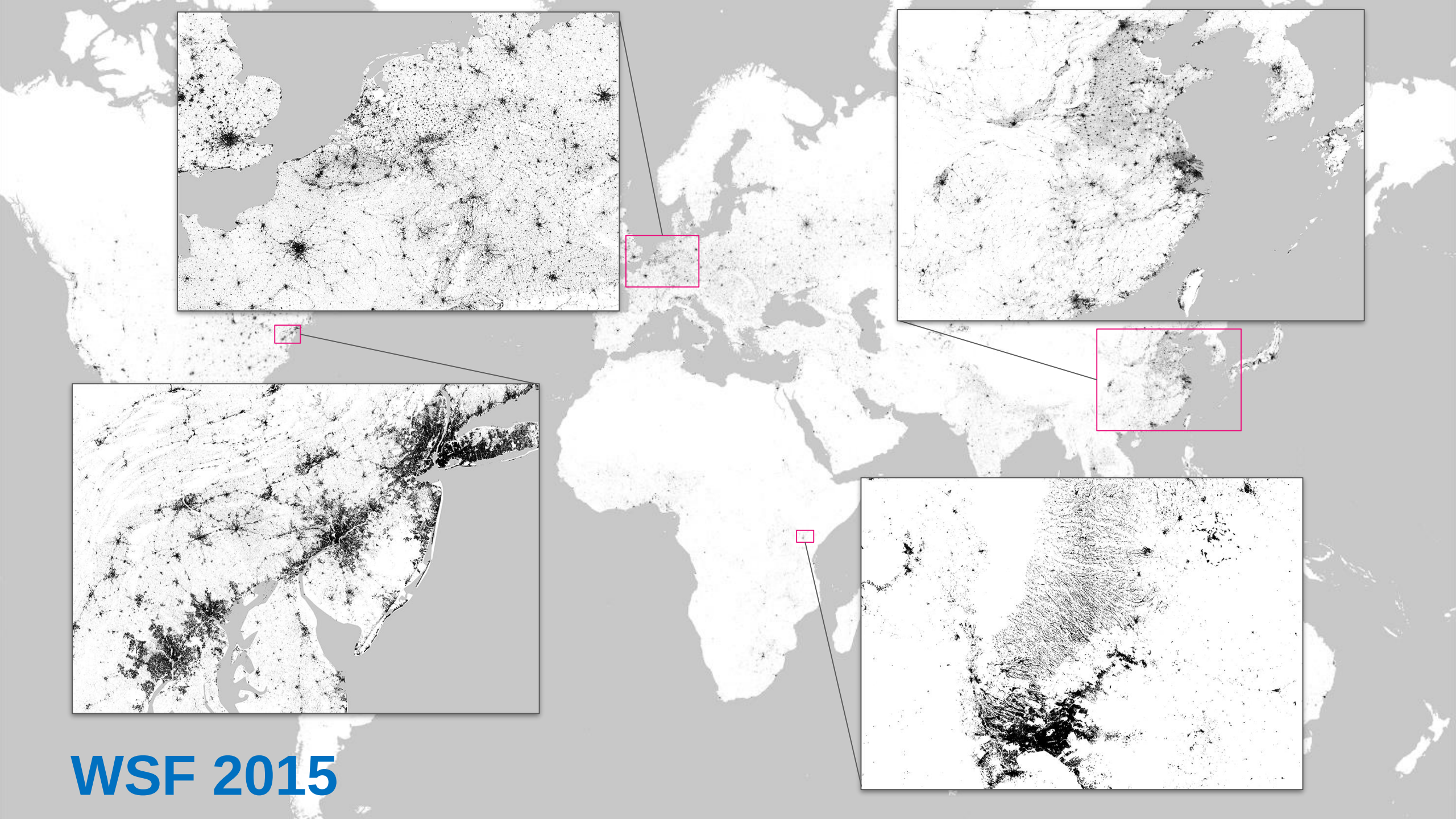
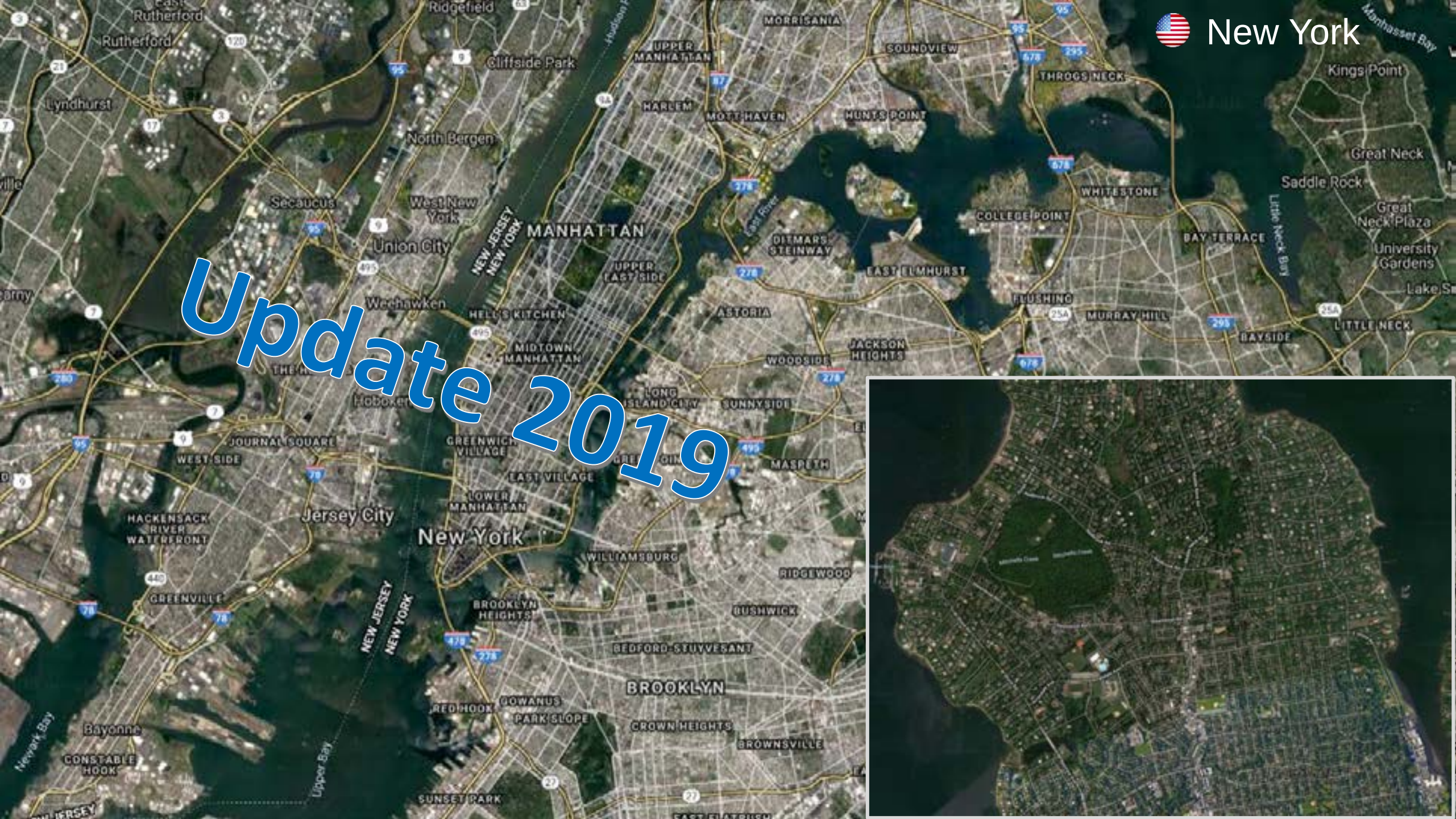

WSF 2015



WSF 2015


New York
Update 2019
MANHATTAN
New York
Jersey City
BROOKLYN
Rutherford
Cliffside Park
North Bergen
Secaucus
West New York
Union City
Weehawken
HELL'S KITCHEN
MIDTOWN MANHATTAN
UPPER EAST SIDE
HARLEM
MOTT HAVEN
HUNTS POINT
MORRISANIA
SOUNDVIEW
THROGS NECK
Kings Point
Great Neck
Saddle Rock
Great Neck Plaza
University Gardens
WHITESTONE
COLLEGE POINT
BAY TERRACE
FLUSHING
MURRAY HILL
BAYSIDE
LITTLE NECK
EAST ELMHURST
ASTORIA
JACKSON HEIGHTS
WOODSIDE
SUNNYSIDE
LONG ISLAND CITY
MASPETH
GREENWICH VILLAGE
EAST VILLAGE
LOWER MANHATTAN
JOURNAL SQUARE
WEST SIDE
HACKENSACK RIVER WATERFRONT
GREENVILLE
WILLIAMSBURG
RIDGEWOOD
BUSHWICK
BROOKLYN HEIGHTS
BEDFORD-STUYVESANT
RED HOOK
GOWANUS
PARK SLOPE
CROWN HEIGHTS
BROWNSVILLE
SUNSET PARK
Bayonne
CONSTABLE HOOK
Newark Bay
Upper Bay
NEW JERSEY
NEW YORK
Hudson River
East River
Little Neck Bay
Manhasset Bay


New York
WSF 2015


New York
WSF 2019

World Settlement Footprint Evolution

The WSF Evolution is a dataset outlining the **expansion of settlement extent** globally at **30m** spatial resolution on a **yearly** basis from **1985 to 2015**.

The layer has been generated by processing the entire **Landsat-5/7** archive including **~7,000,000** satellite images.

The WSF Evolution is expected to become a revolutionary product in support to a broad spectrum of users and application worldwide.

More details: https://urban-tep.eu/visat/scudeoStories19/globalWsf

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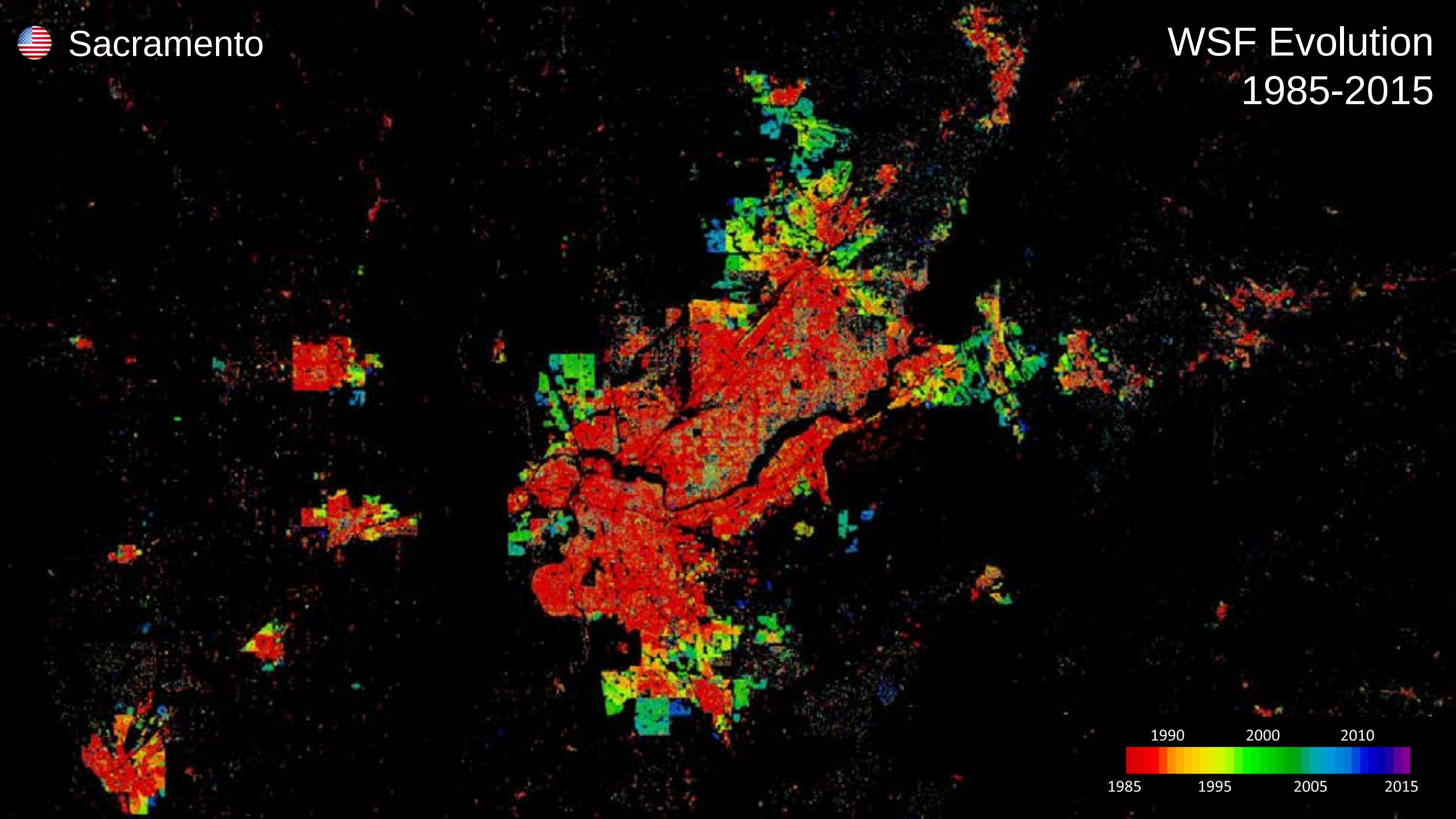
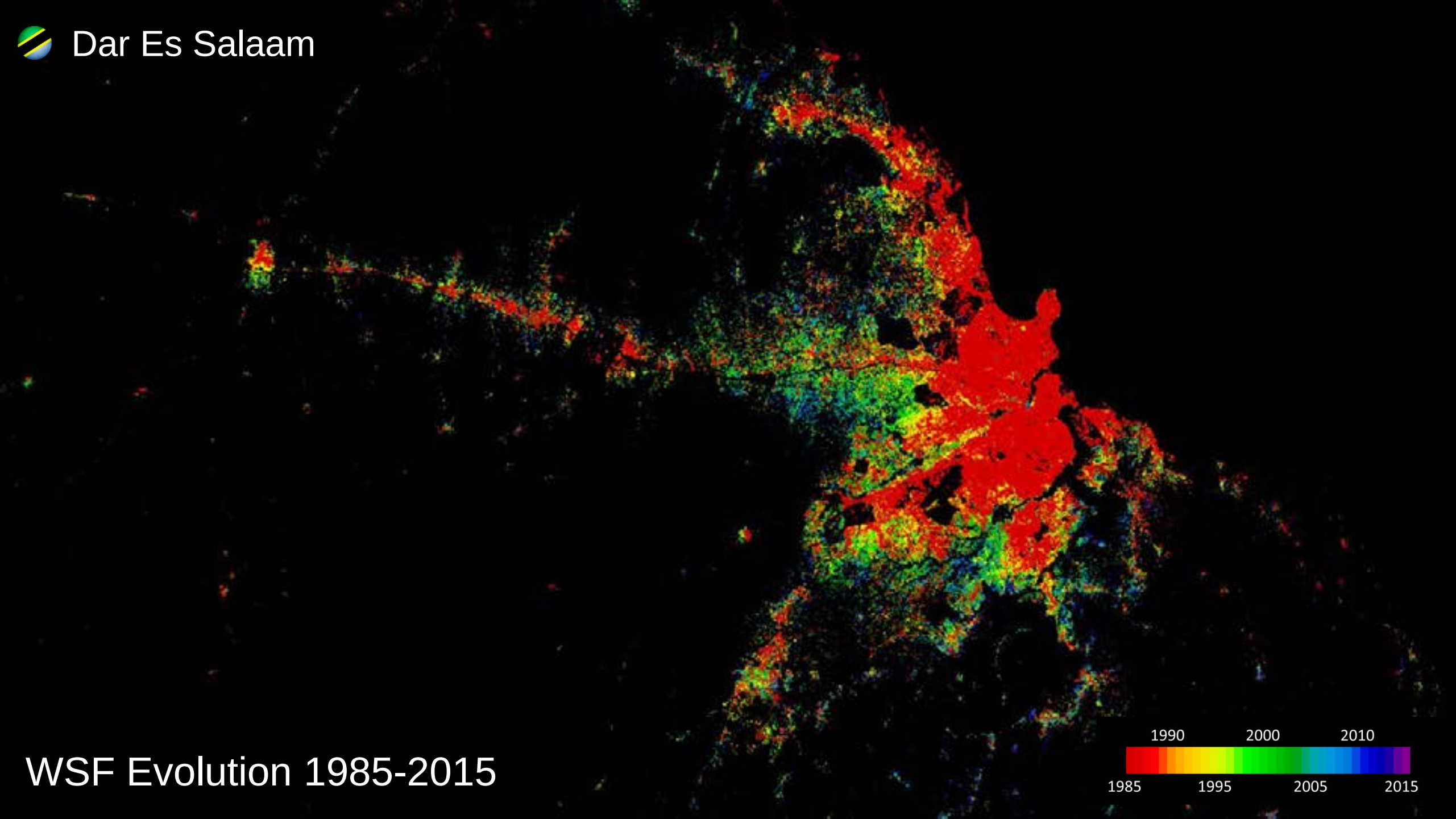
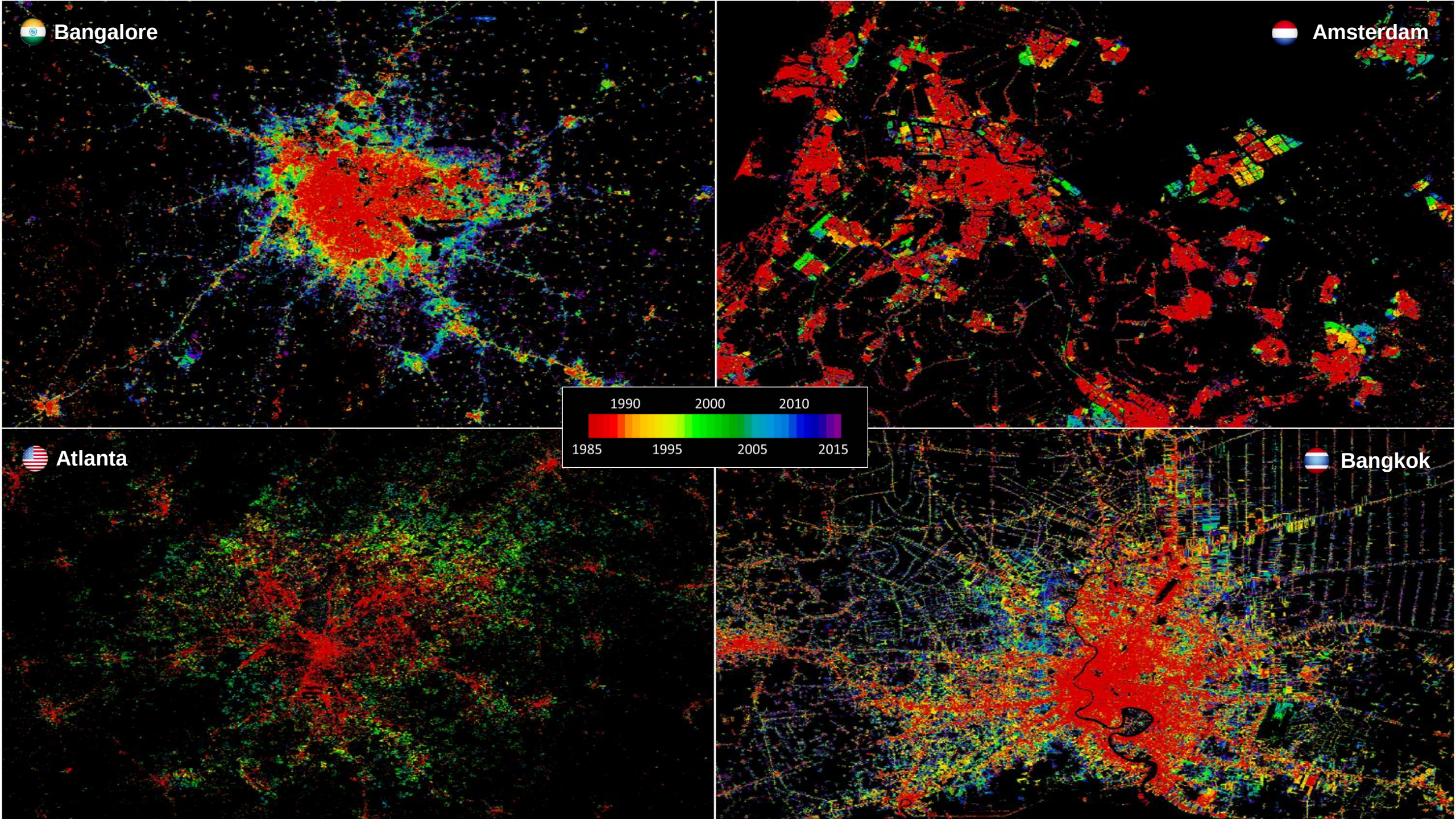
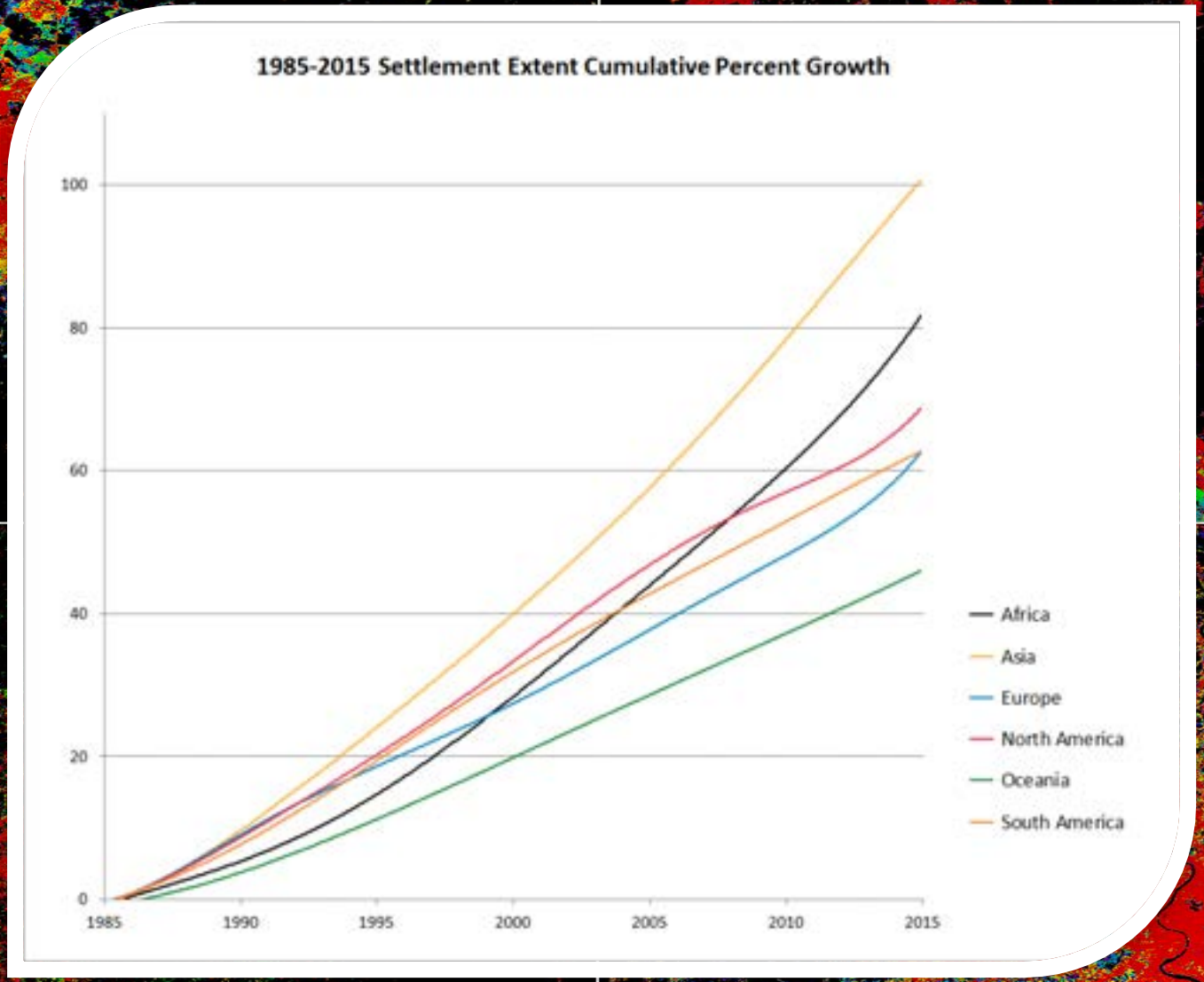

Sacramento
WSF Evolution
1985-2015
1990
2000
2010
1985
1995
2005
2015


Dar Es Salaam
1990
2000
2010
1985
1995
2005
2015
WSF Evolution 1985-2015


Bangalore
Amsterdam
1990
2000
2010
1985
1995
2005
2015
Atlanta
Bangkok

Bangalore

Amsterdam



Atlanta

Bangkok

World Settlement Footprint Imperviousness

Global estimation of **percent impervious surface** at **30m** spatial resolution on a **yearly** basis from **1985 to 2015**.

The layer has been generated by processing the whole **Landsat-5/7** archive including **~7,000,000** scenes.

Information on the percent impervious surface can be used as proxy for building density, population distribution, surface temperature or risk and vulnerability.

More details: https://doi.org/10.3390/rs10060895

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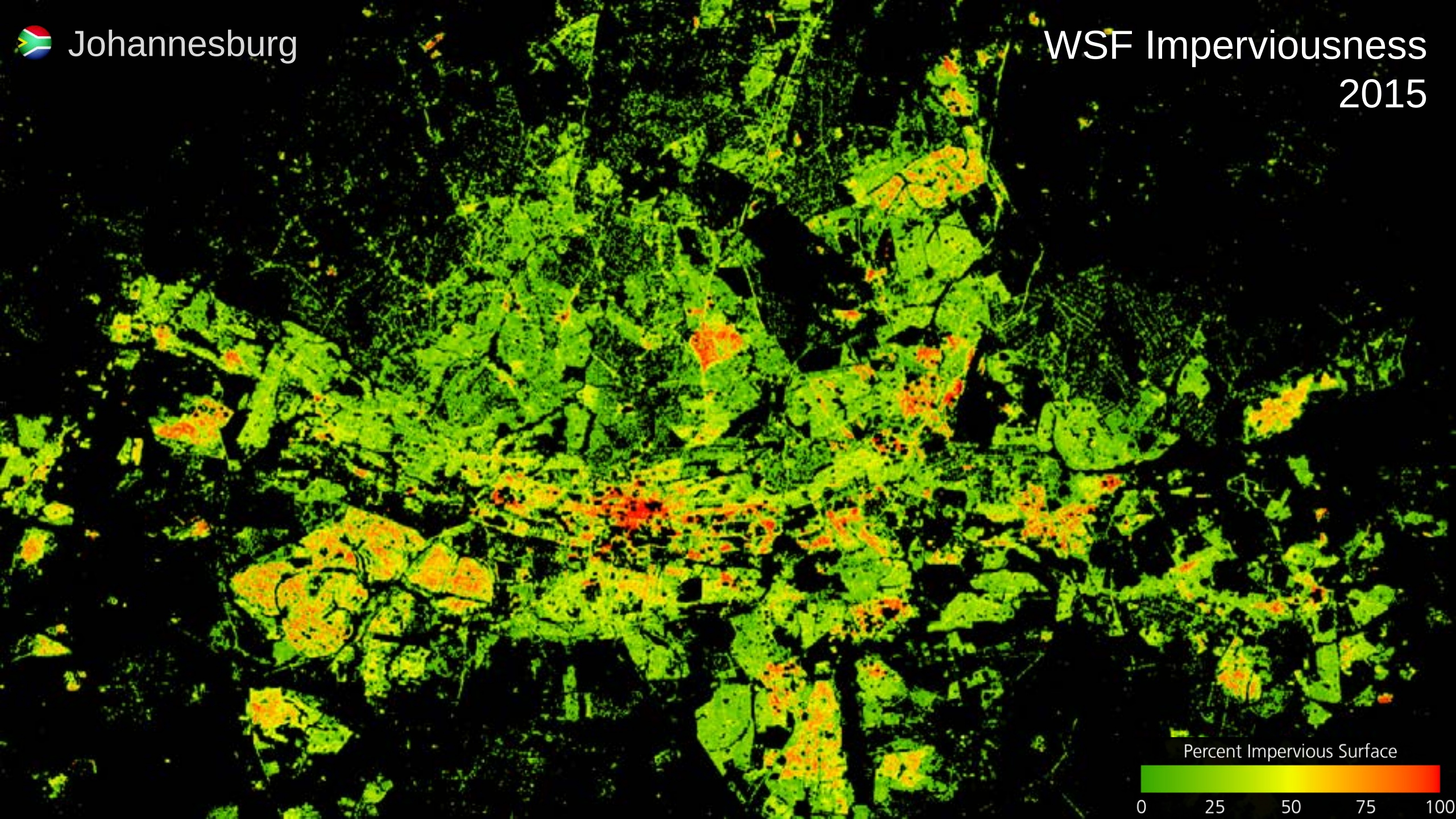
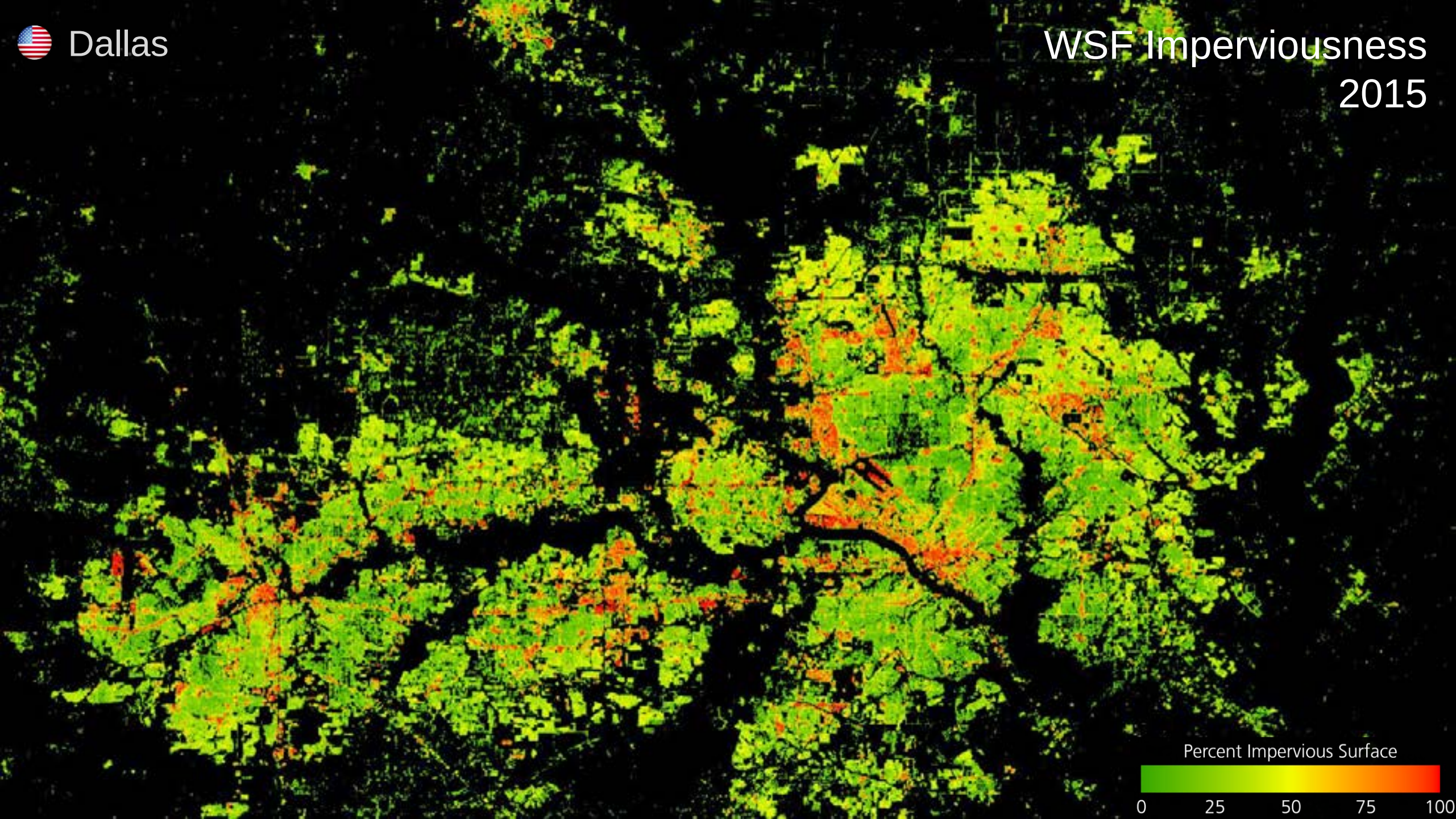

Johannesburg
WSF Imperviousness
2015
Percent Impervious Surface
0
25
50
75
100


Dallas
WSF Imperviousness
2015
Percent Impervious Surface
0
25
50
75
100

World Settlement Footprint 3D

Global estimation of **built-up height** at **12m** spatial resolution.

The WSF 3D is derived on the basis of a **joint analysis** of data from the **TanDEM-X Digital Elevation Model** and the underlying **Synthetic Aperture Radar** images, **Open Street Map** information, multispectral **Sentinel-2** imagery, and the **World Settlement Footprint 2015**.

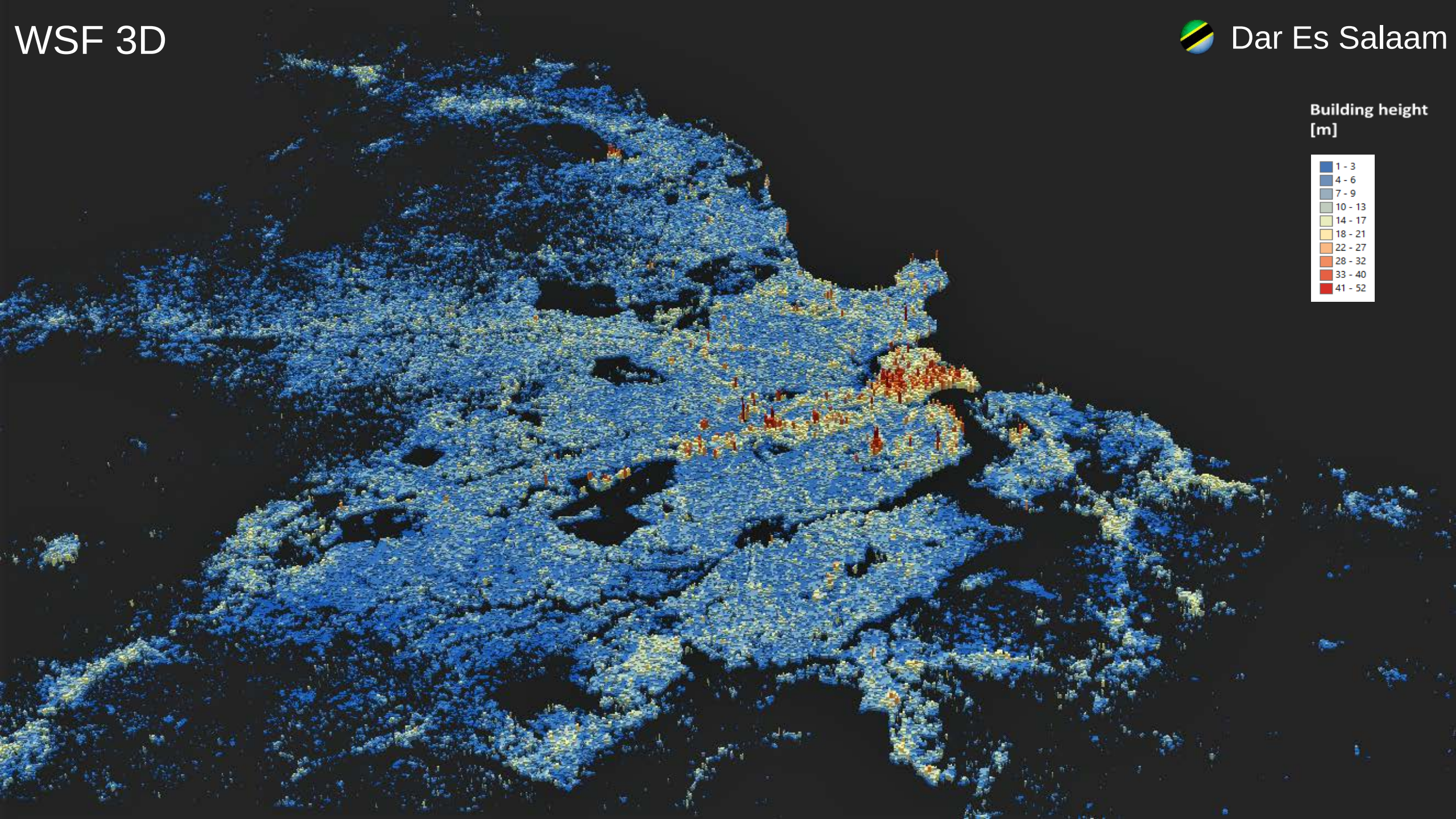
The innovative WSF 3D data facilitates systematic environmental, socioeconomic and climatologic analyses requiring information on vertical and horizontal settlement extent, built-up density, and urban morphologic characteristics.

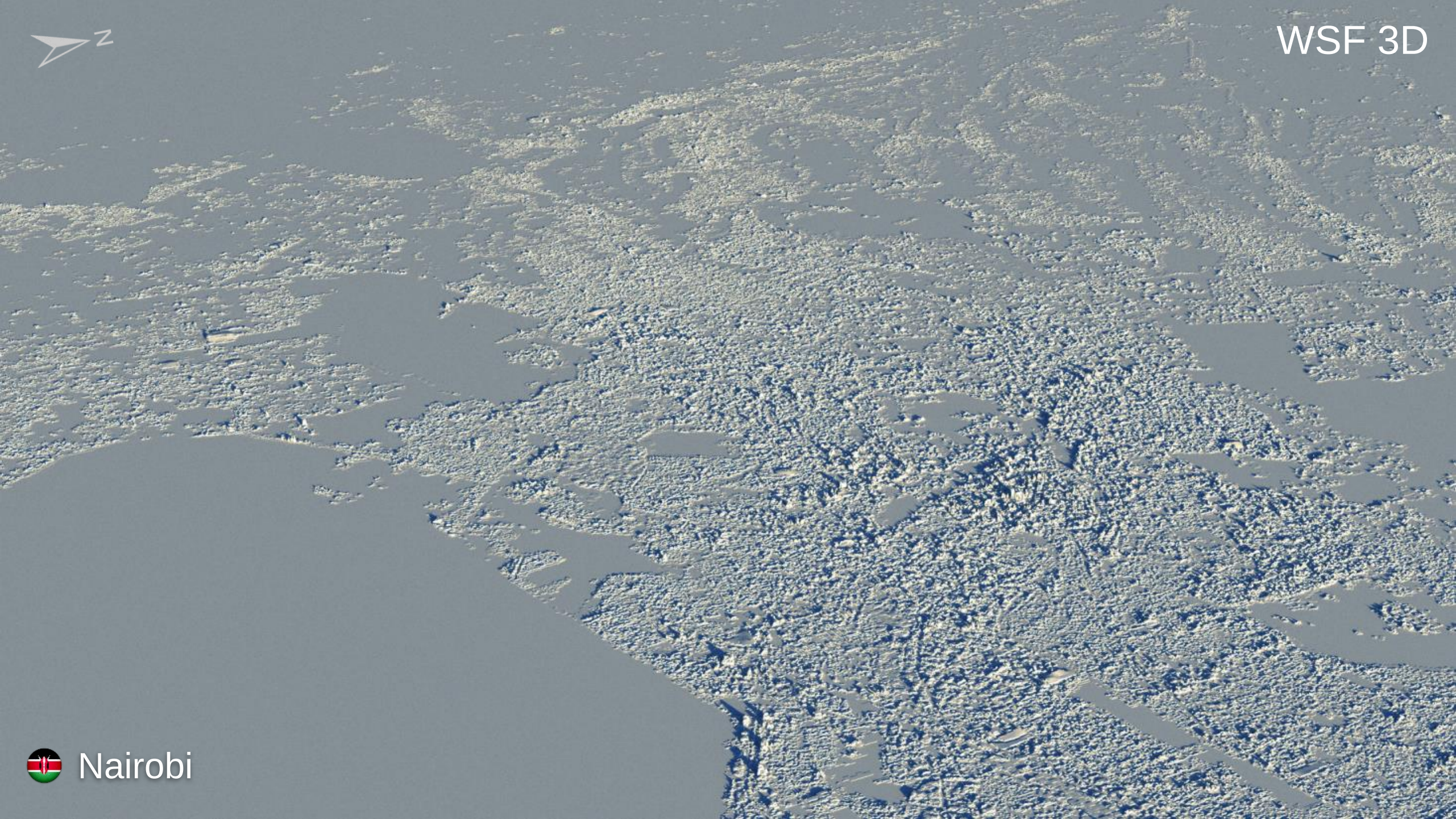
More details: https://doi.org/10.3390/rs12152391

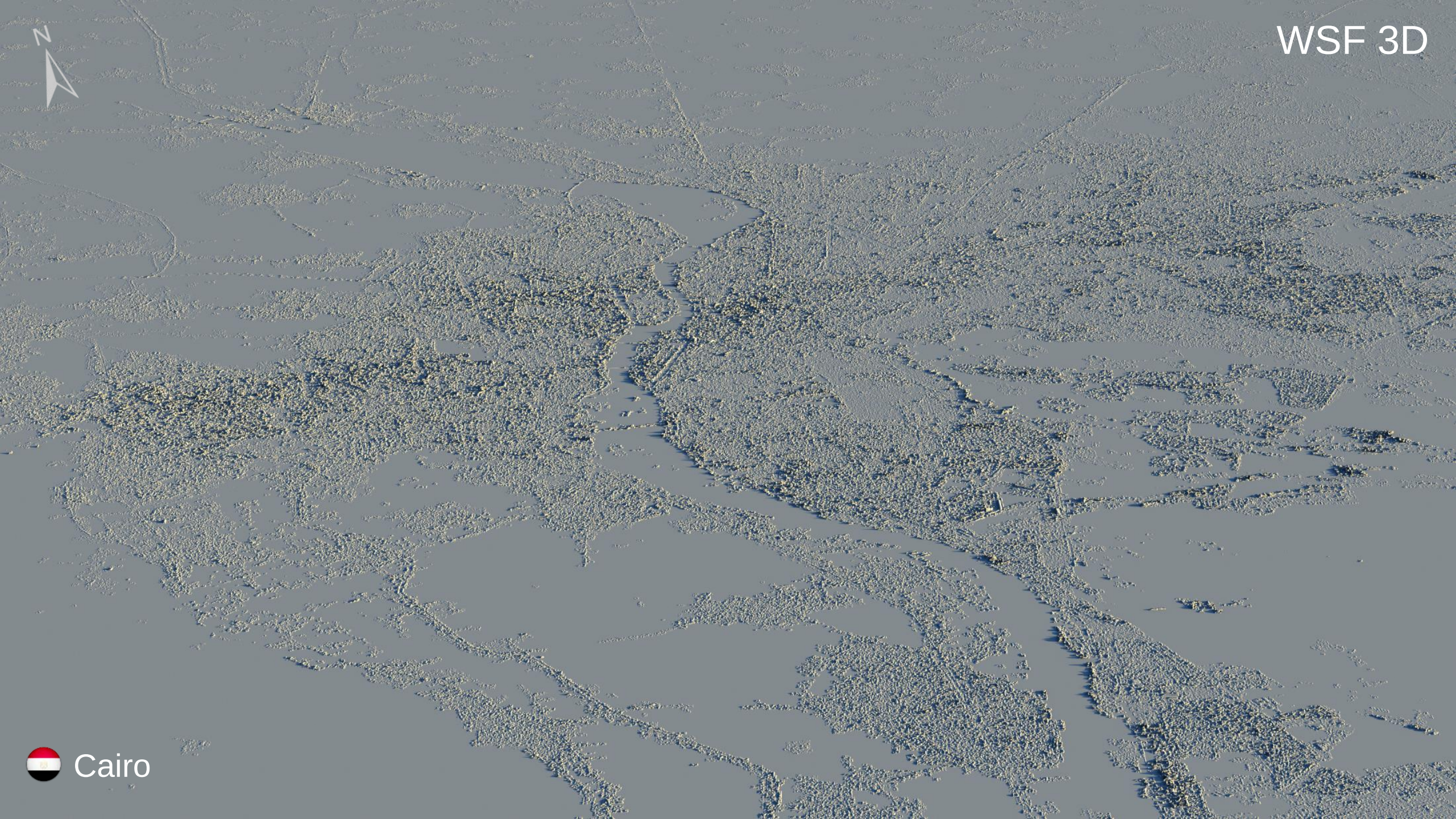
DLR

WSF 3D

Dar Es Salaam




WSF 3D
Nairobi


N
WSF 3D
Cairo

World Settlement Footprint Population

WSF Population aims at a global estimation of the **distribution of population** on a **yearly** basis from **1985 to 2015**.

The product will be generated via the joint exploitation of information on **imperviousness** (WSF Imperviousness) and **building height** (WSF 3D) in combination with **census data** (UN and World Bank statistics).

A reliable understanding of human population density is fundamental for the implementation of efficient government policies and, in turn, the allocation of financial resources, intervention planning and quantification of people at risk.

More details: https://doi.org/10.1016/j.rse.2019.111353

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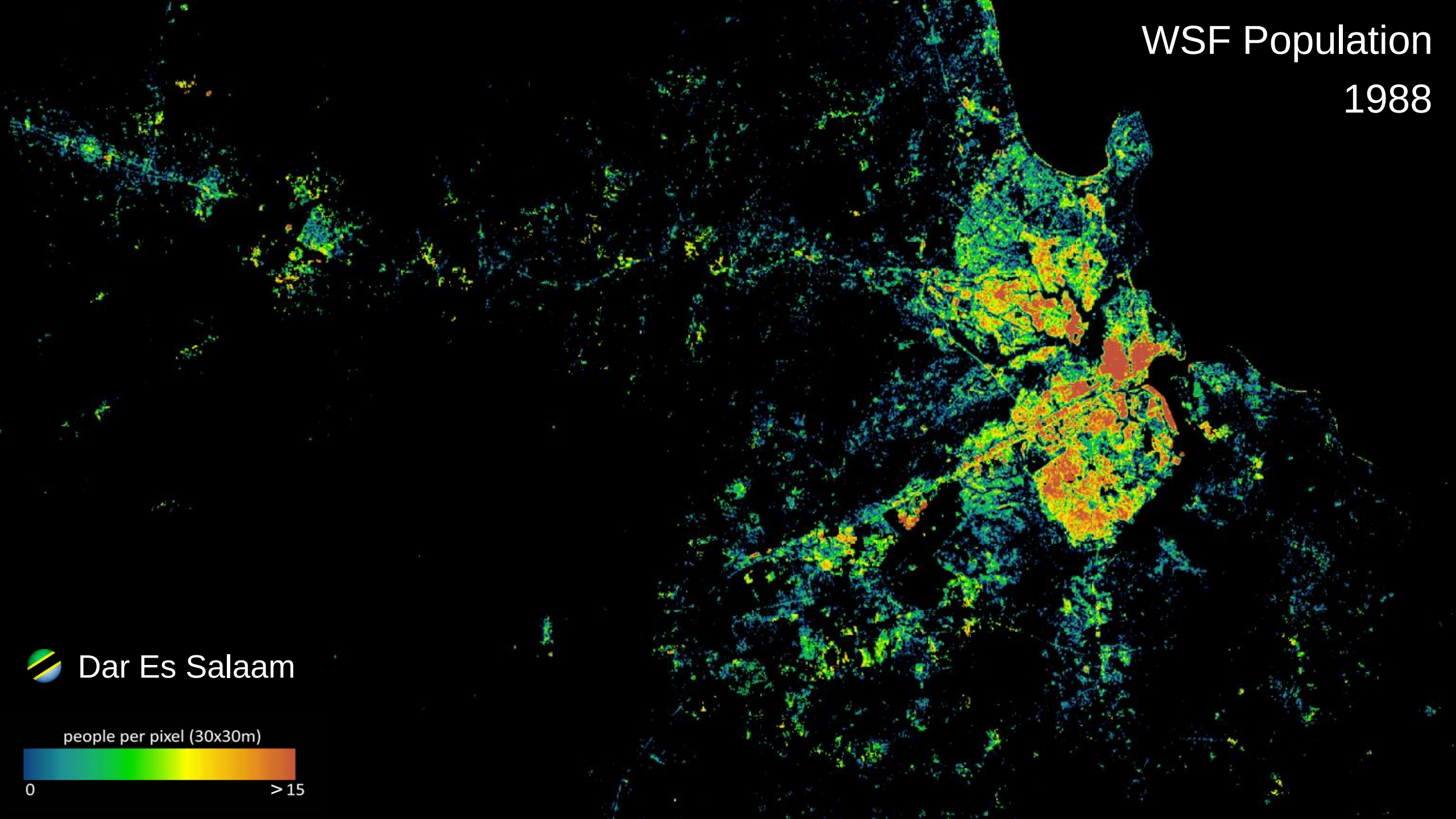
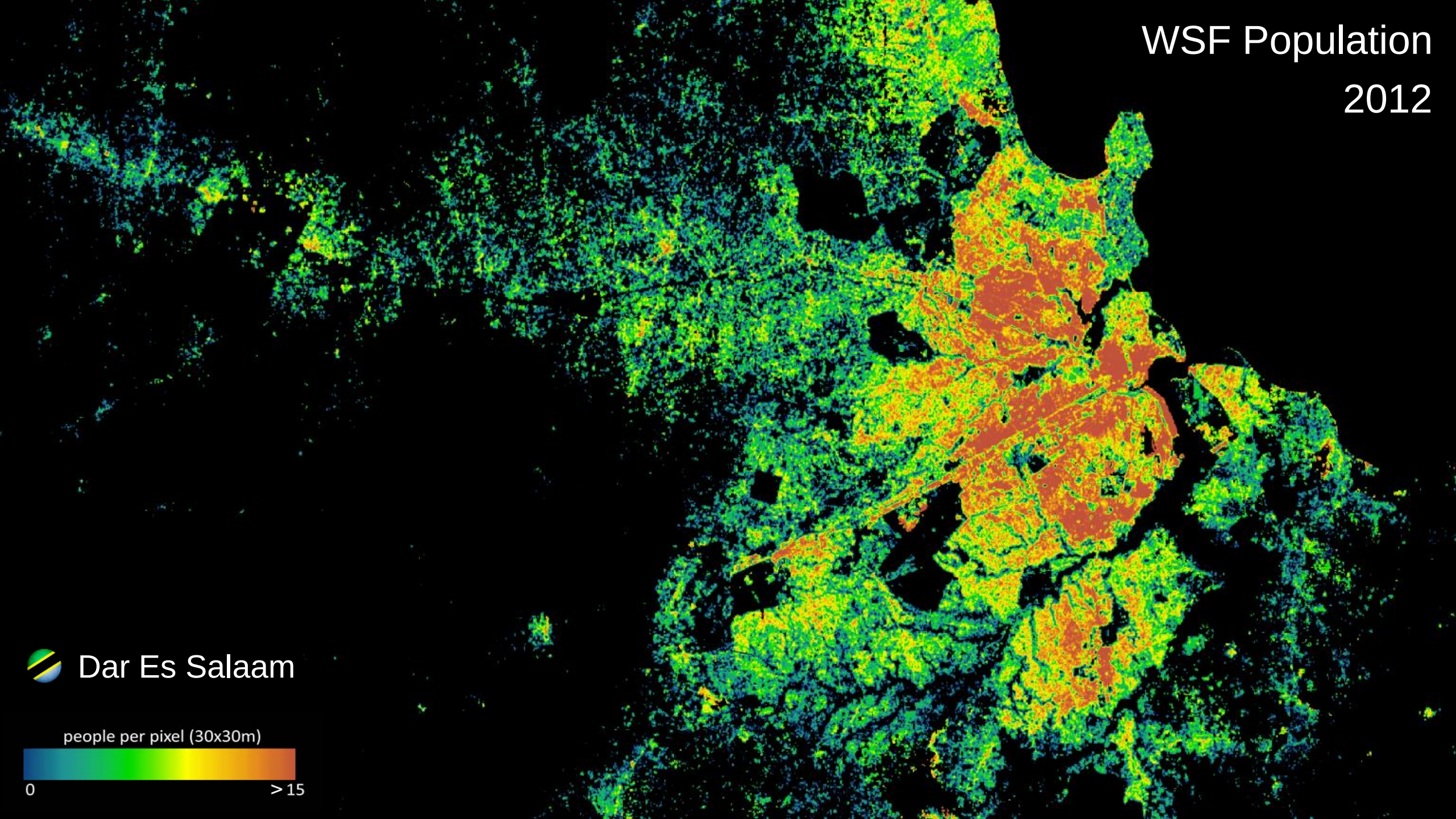

WSF Population
1988
Dar Es Salaam
people per pixel (30x30m)
0
> 15


WSF Population
2012
Dar Es Salaam
people per pixel (30x30m)
0
> 15

Thanks a lot for your attention

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