

# Modelling and forecasting African Urban Population Patterns for vulnerability and health assessments (MAUPP)



C. Linard, Y. Forget, M. Gilbert (SpELL, ULB)  
E. Wolff, T. Grippa (ANAGEO)



M. Shimoni, J-F. Lopez (SIC-RMA)



A. Tatem, A. Sorichetta, J. Steele, J. Nieves (DGE-US)

# Population at risk is key

## Risk assessment

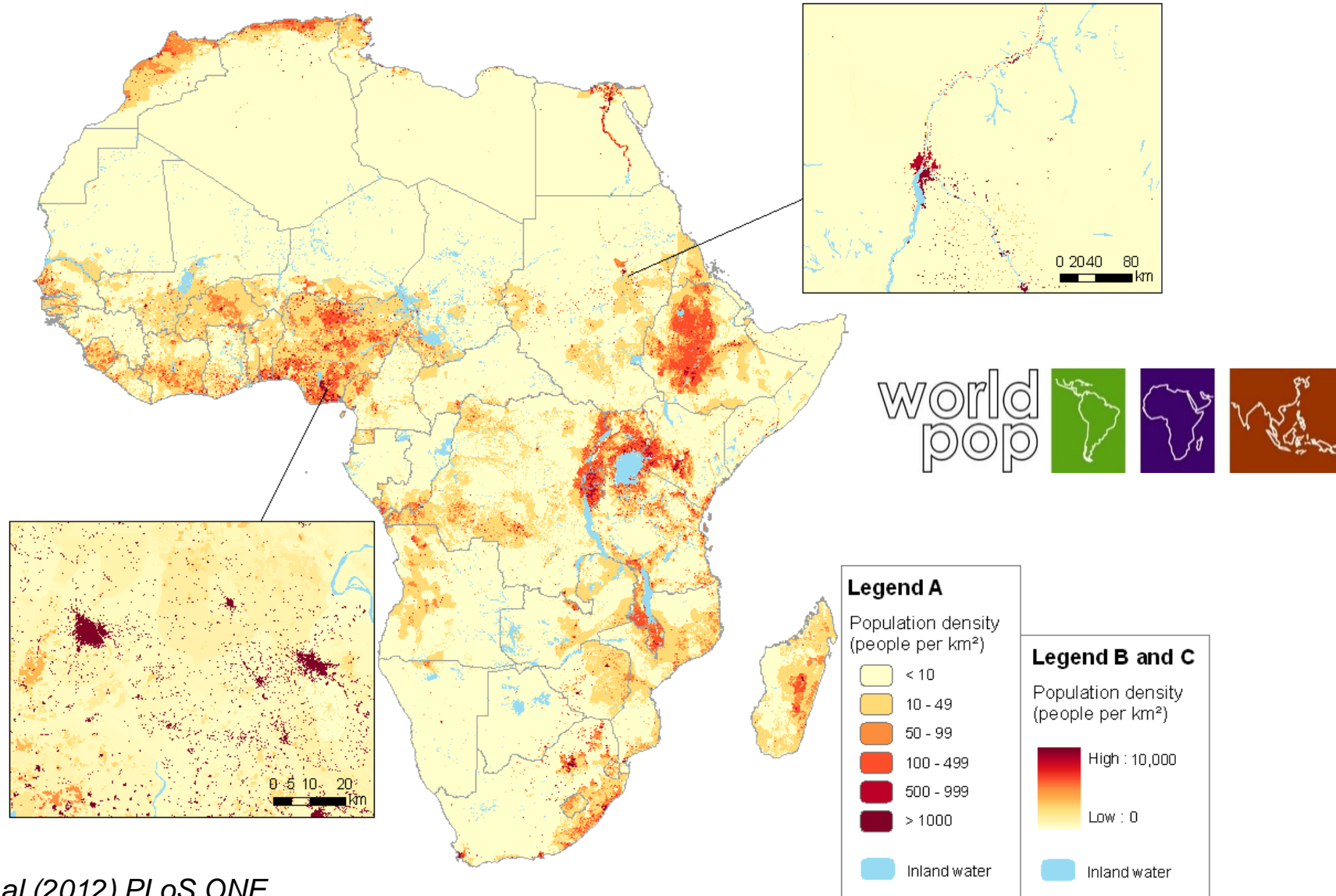
Risk = P(occurrence).Impact

Impact = f(Hpop)

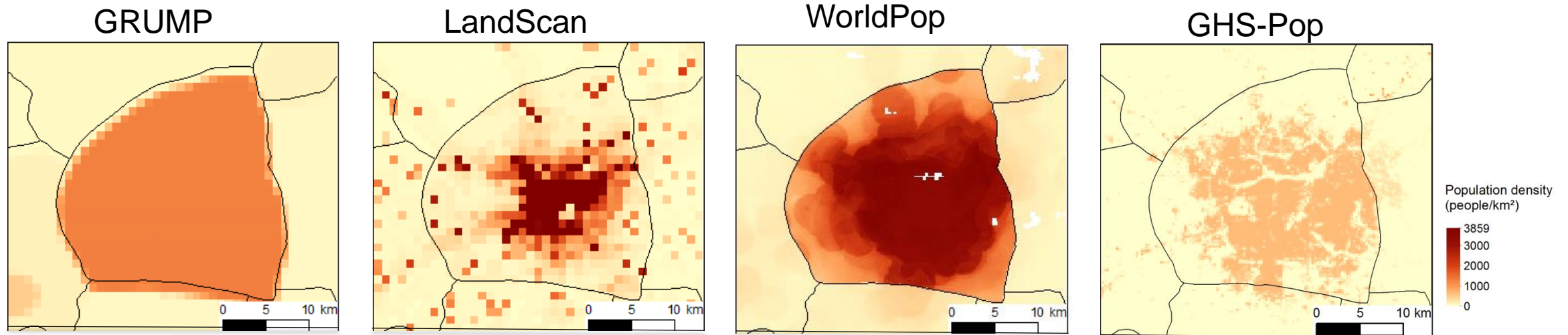



Source of image: S. Vanhuyse

# Existing large-scale population distribution datasets



# Low intra-urban variations in population densities



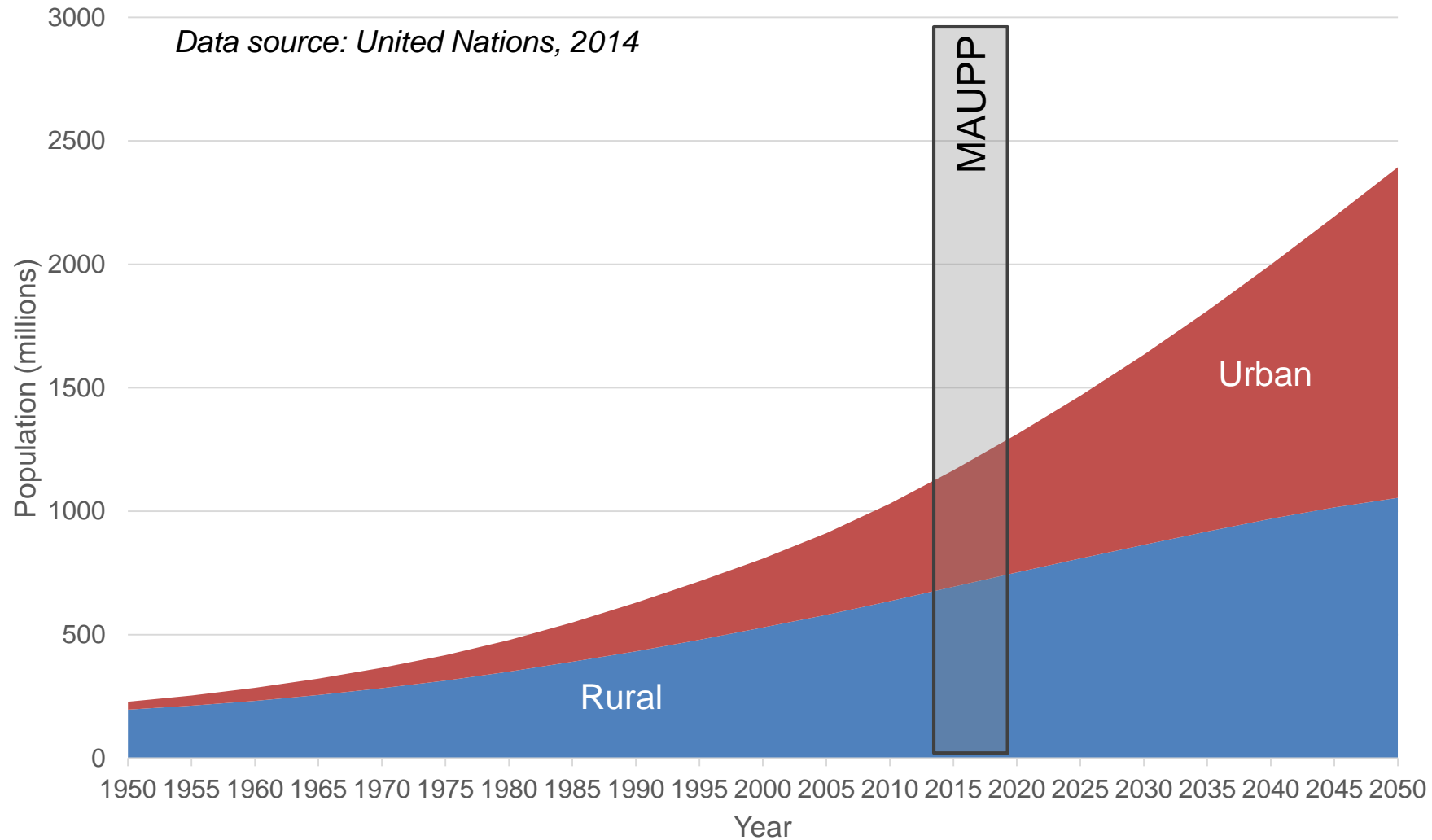


How can intra-urban predictions of population densities be improved using remote sensing?

## Challenges

- Heterogeneity of the build-up structures, and corresponding pop. density
- Similarity between the man-made materials and the natural environment
- Lack of good quality training datasets

# Urban pop. growth is fast in Africa



# Objectives

Improve our spatial understanding and forecast of urbanization and urban population distribution through the use of remote sensing and spatial modelling

Produce an urban expansion model for African cities

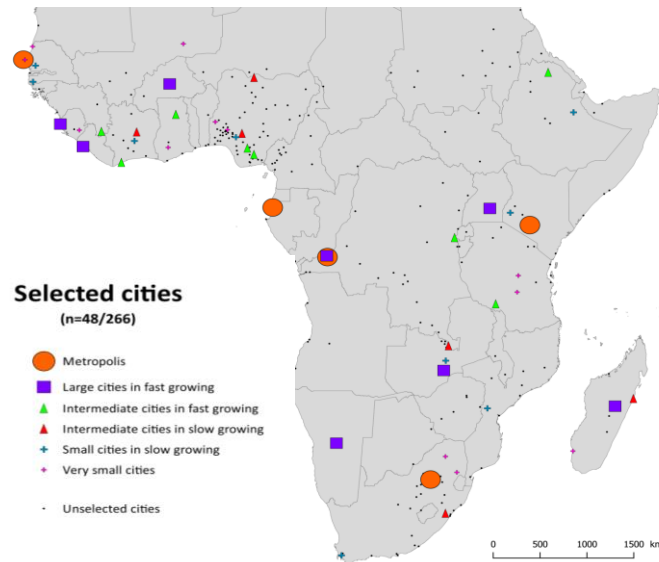
Understand and predict intra urban variations in human population density



Integration into human population distribution model & forecast

## HR (30-100 m)

- 48 cities in sub-Saharan Africa
- Multi-temporal built-up density layers
- High resolution population datasets



## VHR (< 5 m)

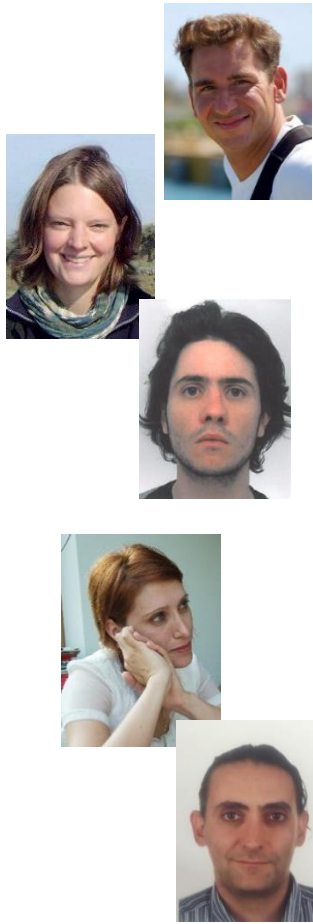
- 2 cities: Ouagadougou and Dakar
- Land cover and land use maps
- Detailed intra-urban population datasets



Interplay



# The team



## SpELL

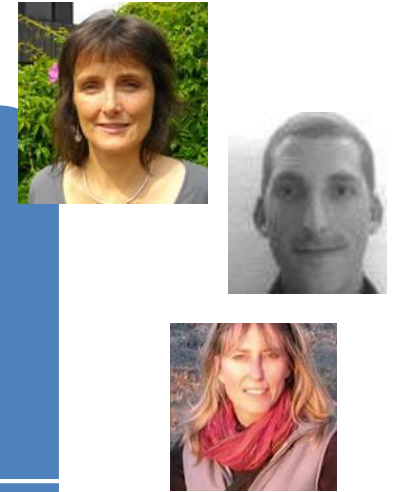
- Large-scale human pop. in Africa
- Urban extent modelling
- Spread models
- Spatial epidemiology (animal diseases)

ULB

## ANAGEO

- VHRRS & OBIA applied in Africa
- Urban morphology and dynamics in Africa
- Geographical understanding of urban dynamics

ULB



MAUPP

## SIC-RMA

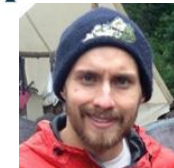
- RS signal processing
- Integration from different sensors
- Large data volume processing

## DGE-US

- Human pop. distribution, demography and mobility
- Spatial epidemiology (human diseases)



UNIVERSITY OF  
**Southampton**



# Advanced mapping of urban population patterns in sub-Saharan Africa

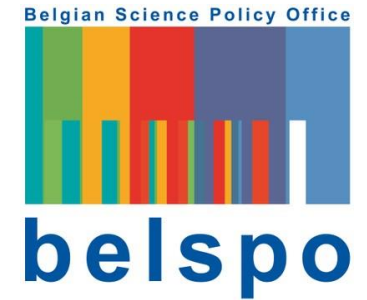


- **9:00 - 9:30 : Introduction**
  - Welcome from APHRC | Caroline Kabaria, APHRC
  - The MAUPP Research Project | Catherine Linard, UNamur, Belgium
  - Monitoring Urban Trends in Africa using Spatial Data: UN-Habitat's Experience and Future Prospects | Dennis Mwaniki, UN-Habitat
- **9:30 - 11:00 : Built-up mapping in SSA: challenges and opportunities offered by remote sensing**
  - Fusion of SAR and Optical Data for Built-Up Mapping in Sub-Saharan Africa | Yann Forget, ULB, Belgium
  - Mapping Land Cover and Land Use at Very High Spatial Resolution | Taïs Grippa, ULB, Belgium
- **11:30 - 12:30 : Modelling Urban Population Patterns**
  - Modelling Intra-Urban Population Distribution Using Freely Available Datasets | Jessica Steele, Uni. Southampton, U.K.
  - The Added-Value of Very High Resolution Imagery for Mapping Population Distribution: Examples of Dakar and Ouagadougou | Taïs Grippa, ULB, Belgium
- **14:00 - 15:30 : Large-Scale Settlements and Gridded Population Datasets**
  - Urban Growth and Population Distribution Changes | Yann Forget, ULB, Belgium
  - Global Mapping and Characterization of Settlements in Space and Time | Sergio Freire, European Commission's JRC, Italy
  - WorldPop: Mapping Population Distributions, Demographics and Dynamics | Andy Tatem, Uni. Southampton, U.K.
- **16:00 - 16:30 : Remote Sensing for Monitoring the SDGs**
  - Prospects for Global Monitoring of the SDG Slum Indicator with Earth Observation | Richard Sliuzas, Uni. Twente, NL
- **16:30 - 17:00 : Round table**

# Acknowledgements



African Population and  
Health Research Center



Further information:



[maupp.ulb.ac.be](http://maupp.ulb.ac.be)