NATIONAL SECURITY SCIENCES

Human Dynamics Modeling and Simulation

Supporting the health, safety, and security of human beings around the world

High-resolution population data is essential to effective disaster prevention and response—understanding how many people may be in danger from a weather event or natural disaster, who might be impacted by a resource scarcity or other anthropogenic activities, and how to efficiently deploy limited resources in response to a crisis.

For nearly 25 years, ORNL's Geospatial Science and Human Security Division has delivered annual release of global, ambient, high-resolution population counts for estimating population at risk. Our capabilities span planet-level population data, neighborhood and settlement patterns, and building-level population densities—providing a full spectrum of population and human location intelligence to support national security partners and the humanitarian community.

Planet-level population trends and patterns—Delivering annual snapshots of global population estimates that provide insights into national scale population health, regional displacements, and refugee movements over time

Building-level population activity—Capturing population activity at the building level—with diurnal distinctions—by leveraging ORNL's unique population and built environment datasets and high-performance computing capabilities

Socioeconomic patterns and practices—Identifying socioeconomic settlements and neighborhoods from geospatial data and capturing local sociocultural practices and economics at the facility level

Pattern-of-life analysis—Uncovering normal patterns of life and discovering changes or anomalous events resulting from social or economic disturbances

Predicting human activity and risk—Advancing the ability to predict populations vulnerable to anthropogenic crises or natural disasters; simulate urban population fluctuations; and anticipate nefarious activities

Understanding populations today, analyzing changes over time, and predicting future dynamics to increase community resilience in the face of:

Delivering unique datasets, interactive platforms, and novel insights on human populations through:

Multi-modal Remote Sensing

Spatial Demography

Computer Vision

Machine Learning

Natural Language Processing

HPC-enabled Data Science

LandScan

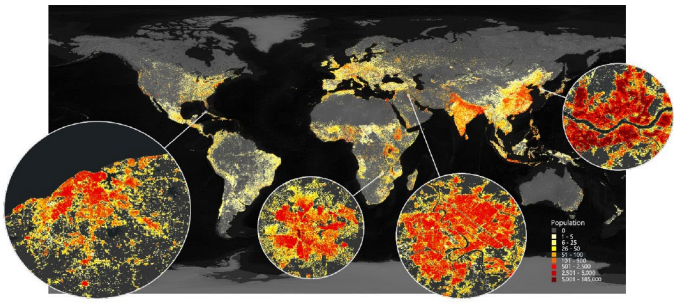
ORNL's suite of LandScan datasets provide realistic, high-resolution, annually updated population distribution information to help consequence assessment, emergency response, and disaster recovery efforts around the globe.

PlanetSense

The PlanetSense platform exploits open-source data to gather geospatial intelligence in support of national security. PlanetSense seamlessly integrates archived data with dynamic location intelligence information, runs sophisticated data analytics algorithms and visualization tools, and generates geospatial intelligence in real time.

WorldSTAMP

WorldSTAMP includes data integrated from more than 30 authoritative sources of global data—including datasets from the World Bank, United Nations, and World Health Organization. ORNL applies advanced analytics to identify trends, patterns, anomalies, and changes in national landscapes and populations in support of geospatial intelligence missions.



Population Density Tables

ORNL's Population Density Tables report ambient building occupancy estimates of people/1000 ft^2 for day, night, and episodic events at regional, national, and subnational levels across the planet. The PDT database has been used for emergency preparedness and response, population mapping, and environmental and socioeconomic applications.

Global Building Intelligence

The Global Building Intelligence framework estimates characteristics such as size, purpose, occupancy, construction, and location for any building on the planet. Knowing building characteristics with this level of granularity and this kind of geographic coverage has critical implications for national security, human security, and geospatial intelligence-related activities including emergency response, tactical planning, and urban growth.

UrbanPop

ORNL's UrbanPop model simulates realistic full populations with detailed demographic, cultural, and economic characteristics, as well as residential and workplace information. These demographically and spatially detailed population datasets have been used in several studies, from determining the effect of hurricane Sandy on residential populations within New York to understanding the effects of electricity outages on economically vulnerable populations in the Knoxville (TN) Metro Area.

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