OAK RIDGE National Laboratory



POPULATION DYNAMICS

Population, place, and movement intelligence—from local dynamics to global scales

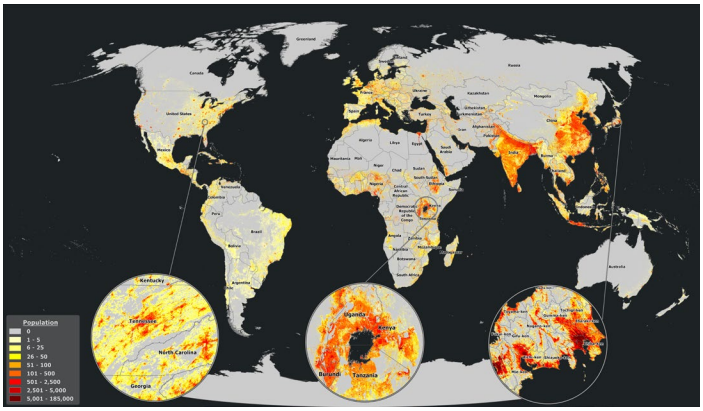
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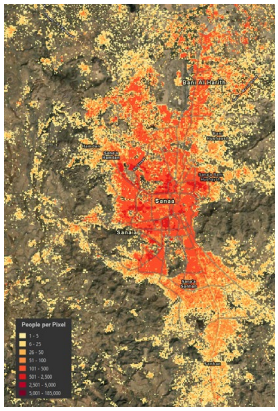
Deliver enhanced, global-scale understanding of human populations and their environments to enable timely, mission-ready insights for safe, secure, and resilient communities.

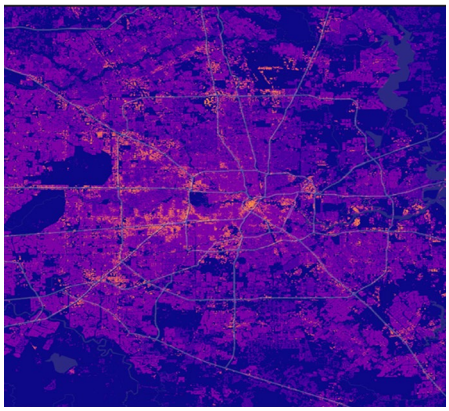
ORNL is a world leader in population dynamics, advancing high-resolution global population datasets, demographic characterization, and AI-driven modeling at scale. Together, ORNL's Human Geography and Location Intelligence groups provide population, place, and movement insights for national security decision support.

IMPACT

- Proven history of informing missions for the U.S. government, international partners, and humanitarian organizations for natural disasters, epidemic response, emergency operations, border security, and critical supply-chain monitoring
- Enabling consequence assessment and collateral damage estimation, providing high-resolution population exposure and vulnerability insights for planning, targeting, and risk mitigation
- Advancing human-environment interaction analysis at high spatiotemporal resolution, linking past, present, and future to model population change, migration, and mobility
- Strengthening information environments and crisis intelligence through semantic data fusion, knowledge graphs, and spatially explicit disinformation analysis that connect heterogeneous geospatial sources and reveal actionable relationships faster







ORNL KEY DIFFERENTIATORS

World-renowned decision support platforms with a legacy of real-time data and trusted technology

- **LandScan Global, Mosaic, and PDT** are high-resolution datasets that serve as the foundational standard for operational planning and analysis across the GEOINT community. Powered by AI, this ecosystem captures local sociocultural and economic dynamics at a global scale, enabling near real-time situational awareness, consequence assessment, and collateral damage estimation.
- **PlanetSense** harnesses archived and real-time open-source data, analytics, and visualization to generate geospatial intelligence for disaster response and critical infrastructure resilience.
- Other featured capabilities include **MapSpace** for land-use modeling, **SONET** for harmonizing point-of-interest data and building knowledge graphs, **HumoNet** for realistic human mobility simulation, and **TraKit/CORSAIR** for scalable mobility analysis and predictive movement modeling.

Multidisciplinary teams answer questions about the world with speed and precision

- The **Human Geography Group** reveals the dynamic human landscape—from global to building scale – to identify vulnerable populations and characterize them through key demographic attributes, enabling the assessment and prediction of impact.
- The **Location Intelligence Group** advances mobility science, place-based characterization, and semantic data fusion to model patterns of life, understand how places function, and integrate heterogeneous geospatial sources for mission-ready insights from weather events, geopolitical conflict, and policy change.

National laboratory-scale science and computing

- Applies ORNL leadership computing, AI, and geospatial sciences expertise to transform diverse data into timely, mission-relevant decision support on populations, places, and human movement.
- Drives automation and AI integration to advance human-environment analysis, enabling faster, scalable, and more adaptive insights into population dynamics and operational environments.

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