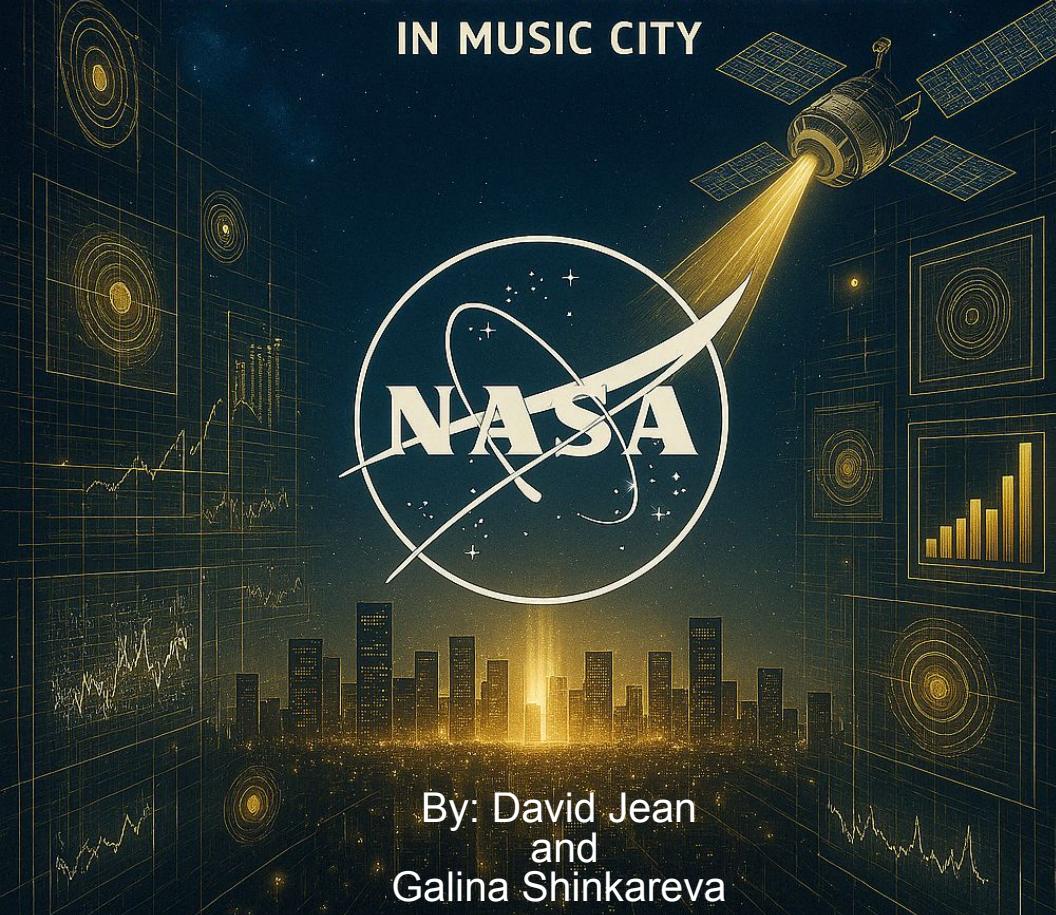


LIGHTS IN THE DARK

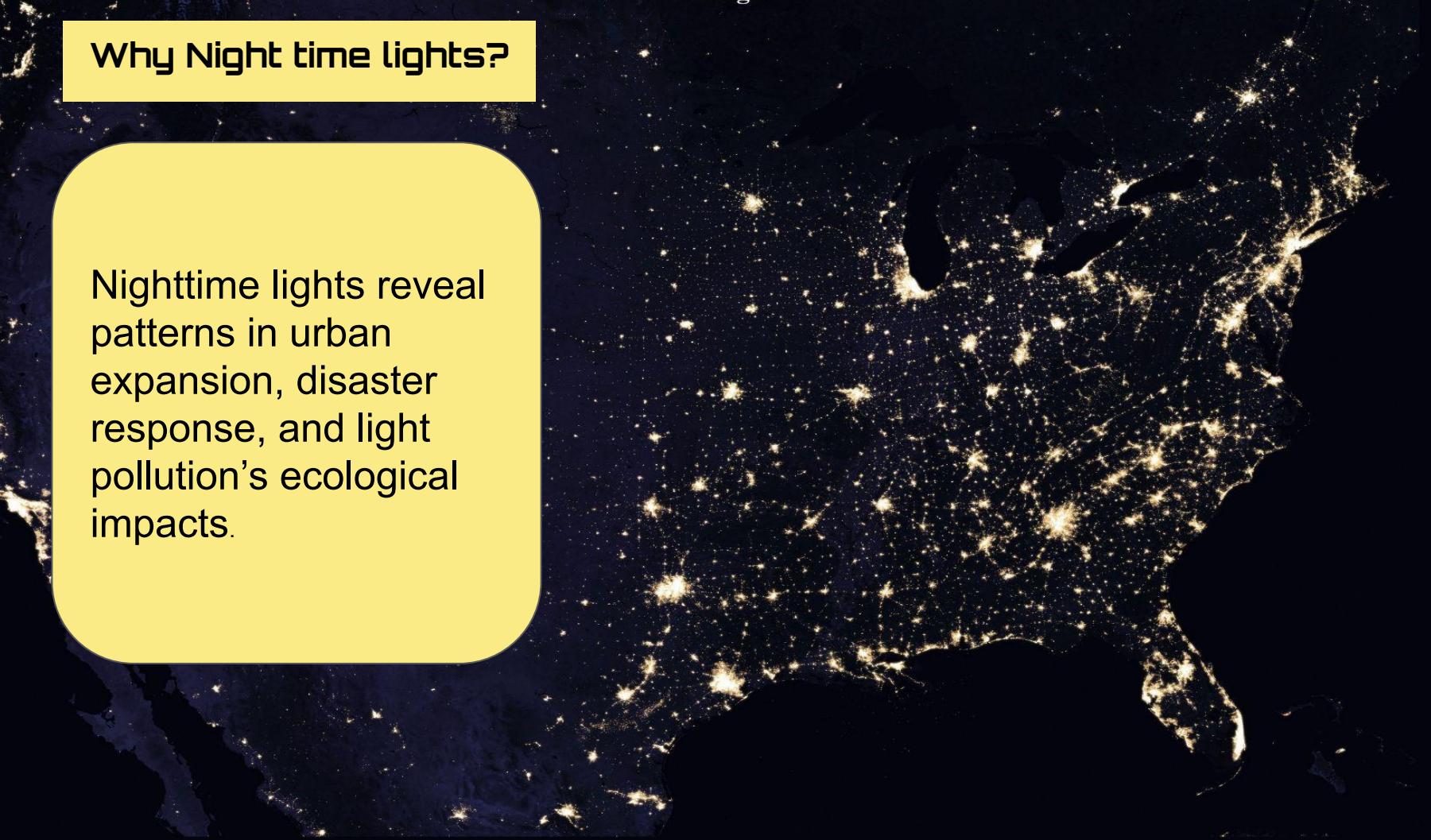
TRACKING URBAN LIGHT POLLUTION IN MUSIC CITY



By: David Jean
and
Galina Shinkareva

Why Night time lights?

Nighttime lights reveal patterns in urban expansion, disaster response, and light pollution's ecological impacts.



VIIRS BLACK MARBLE DATA (nW/cm²/sr)

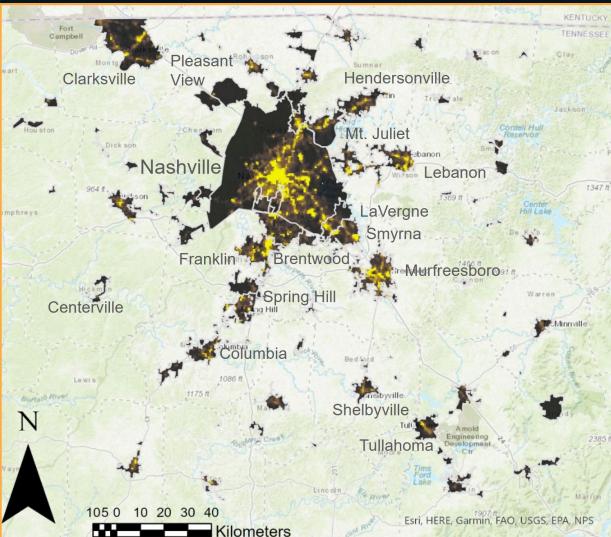
BlackMarbleR (R)
[Clip Region Around Nashville]

PYTHON ANALYSIS

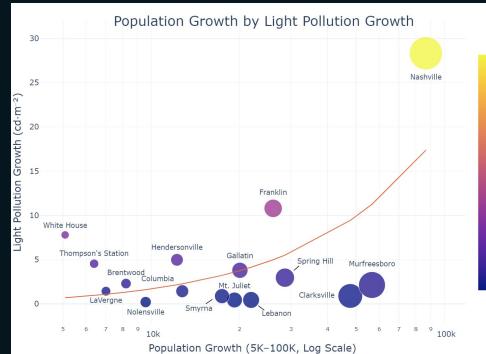
- Filter radiance > 3 nW/cm² /sr
- Convert to luminance: cd/m² = radiance × 10⁻⁵ × 683
- Merge with land area (sq mi)
- Merge with population data
- Calculate:
 - Light per capita (cd/m² + people)
 - Light per square mile (cd/m² + are)

MAPPING & VISUALS
(Plotly, ArCGIS Pro)

Workflow

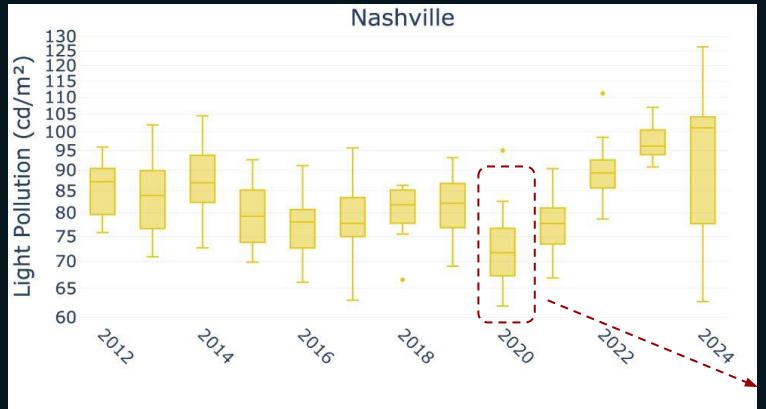


Top 10 Towns by Light Pollution Growth		
Town	Absolute Growth	Percent Growth (%)
Nashville	28.32	33.04
Cornersville	11.3	284.02
Franklin	10.79	47.96
White House	7.79	59.79
Hartsville	5.05	39.59
Hendersonville	4.98	35.21
Thompson's Station	4.54	29.11
Ashland City	3.8	80.56
Gallatin	3.79	52.96
Goodlettsville	3.68	22.72



Spatio-Temporal light pollution changes

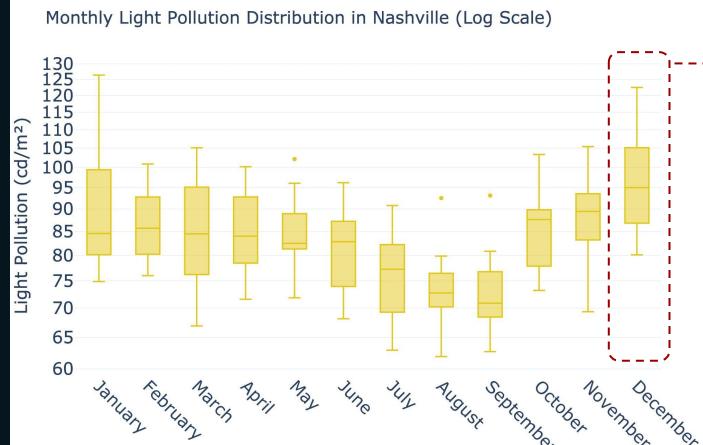
Yearly trends



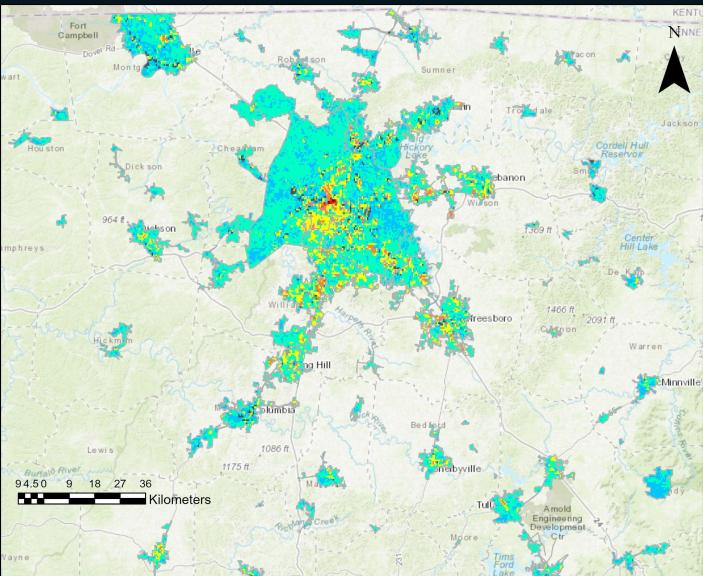
Music City lights are getting brighter over the past decade, especially in the downtown area.

COVID restrictions

Monthly trends



Christmas lights!



Conclusion

- Light pollution has increased **230%** across Middle Tennessee since 2012
- Growth isn't just population — it's **land use, infrastructure, and behavior**
- VIIRS Black Marble + Python/R/ArcGIS enabled **precise, scalable monitoring**
- Satellite data offers a **powerful lens** for policy, planning, and ecology

