

Tracking Post-Aerial Bombing Recovery Using Nighttime Lights

Zeal Shah, Jay Taneja

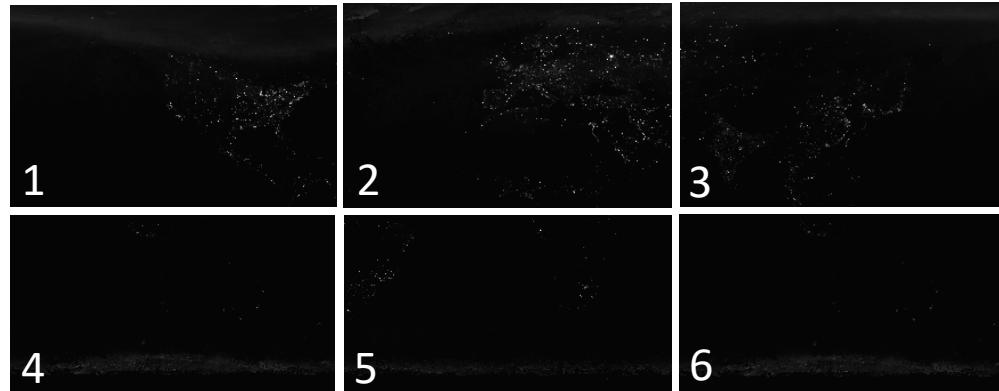
Interesting Applications

- Tracking electrification in Vietnam
[https://www.researchgate.net/publication/277675344 Tracking Electrification in Vietnam Using Nighttime Lights](https://www.researchgate.net/publication/277675344_Tracking_Electrification_in_Vietnam_Using_Nighttime_Lights)
- Spatial characterization of electrical power consumption patterns
[https://www.researchgate.net/publication/262407141 Spatial characterization of electrical power consumption patterns over India using temporal DMSP-OLS night-time satellite data](https://www.researchgate.net/publication/262407141_Spatial_characterization_of_electrical_power_consumption_patterns_over_India_using_temporal_DMSP-OLS_night-time_satellite_data)
- Detecting post-storm power outages <https://ieeexplore.ieee.org/document/6553428>
- Measuring the progress of a recovery process after an earthquake
<https://www.sciencedirect.com/science/article/pii/S2212420917302868>
- Can Human Development be Measured with Satellite Imagery?
<https://andrewhead.info/assets/pdf/satellites-and-development.pdf>
- Mobile phone data's potential for informing infrastructure planning in developing countries <https://arxiv.org/abs/1907.04812>

And many more.....

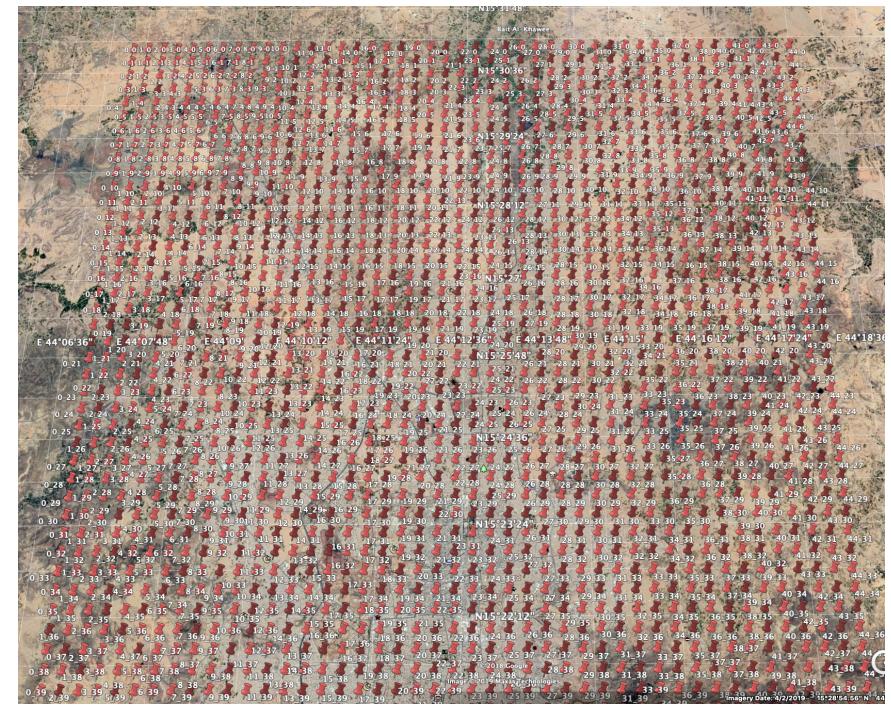
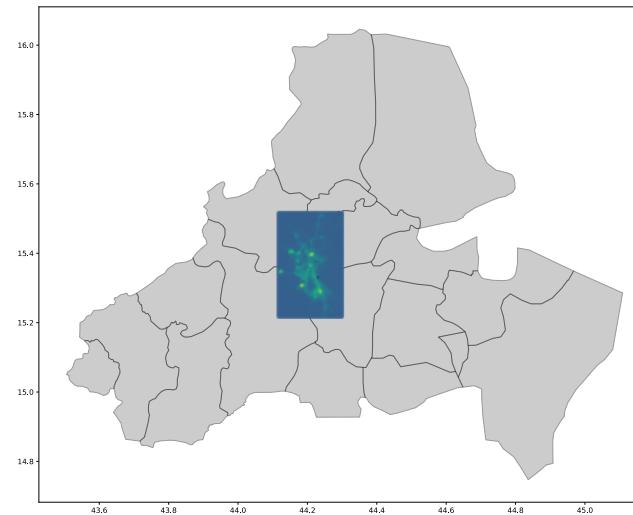
Open Source Product Summary

- **Data Source:** Visible Infrared Imaging Radiometer Suite (VIIRS) Day/Night Band (DNB)
- **Produced by:** Earth Observation Group and NOAA
- **Format:** set of 6 geotiff image tiles
- **Tiles of Interest:** 2 & 5 for Africa, 3 for India
- **Pixel Resolution:** $\approx 500m \times 500m$
- **Information:** Average Radiance in nanoWatts/cm²/sr
- **Frequency:** Monthly



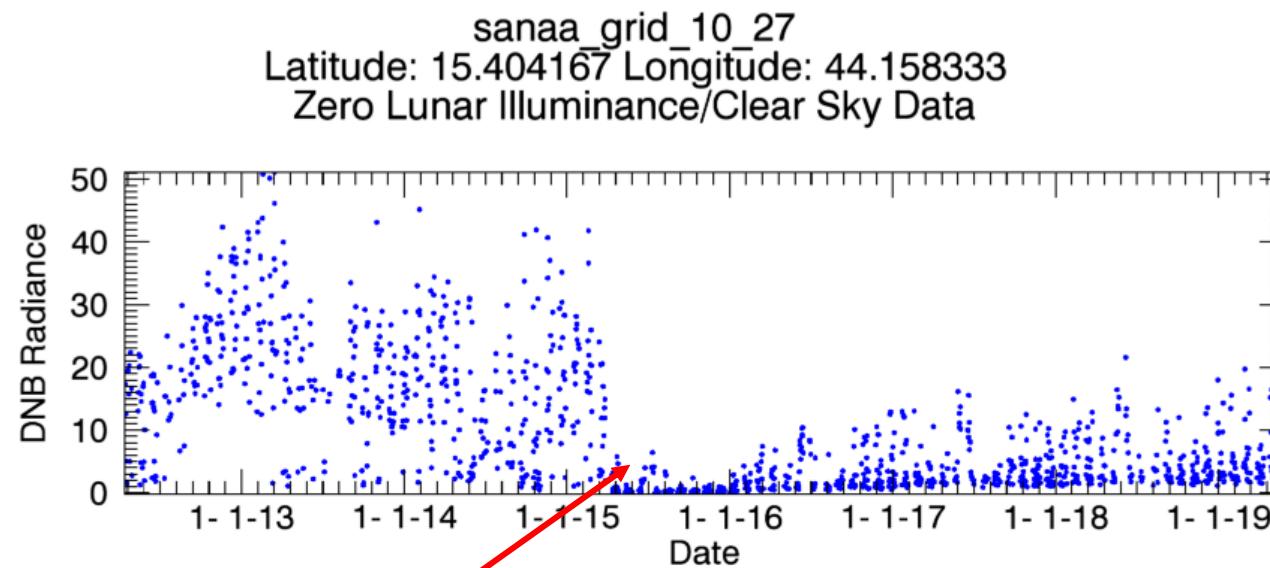
Data Summary

- **Location:** Sana'a, Yemen.
- Daily composites from 2012 to 2019
- 3800+ data points
- Aerial Bombing on **March 26, 2015**



Visualizing Radiance Over Time

sanaa_grid_10_27 (near city center)



Sudden drop in radiance
due to aerial bombing!

Snapshots in Time

Jan-Feb 2015
(Pre – Bombing)



April 2015
(Post – Bombing)

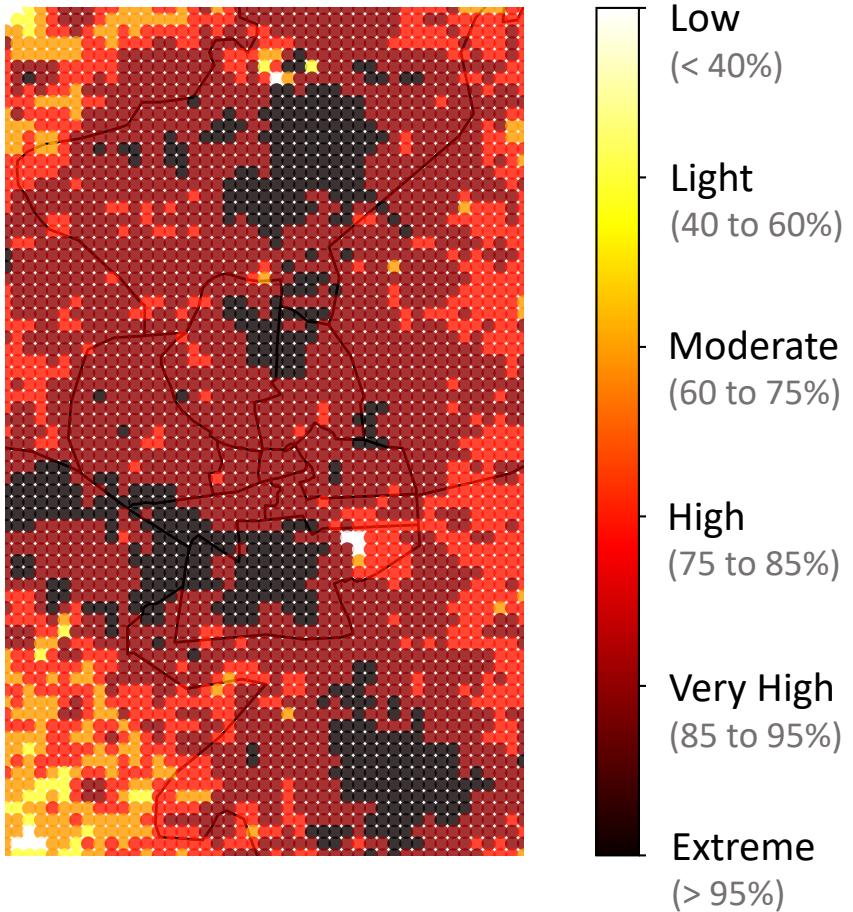


Jan-Feb 2019
(Present State)

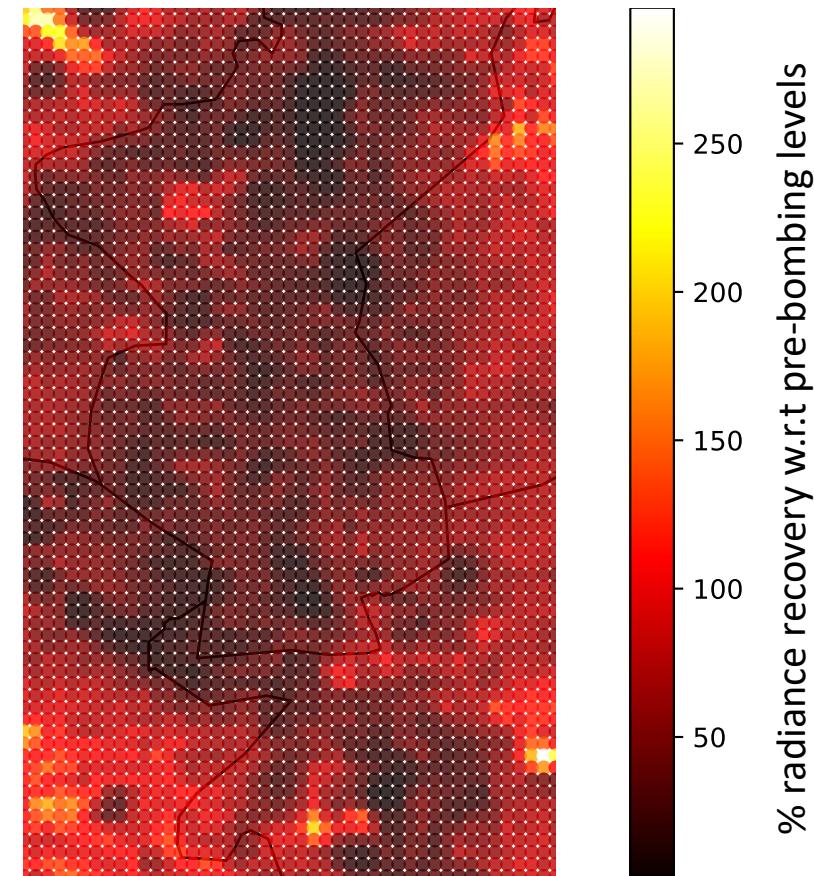


Damage & Recovery

- **Damage:** % drop in post-bombing radiance relative to pre-bombing radiance levels.



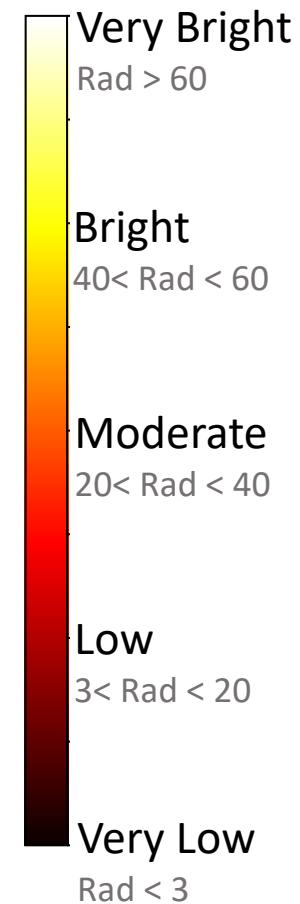
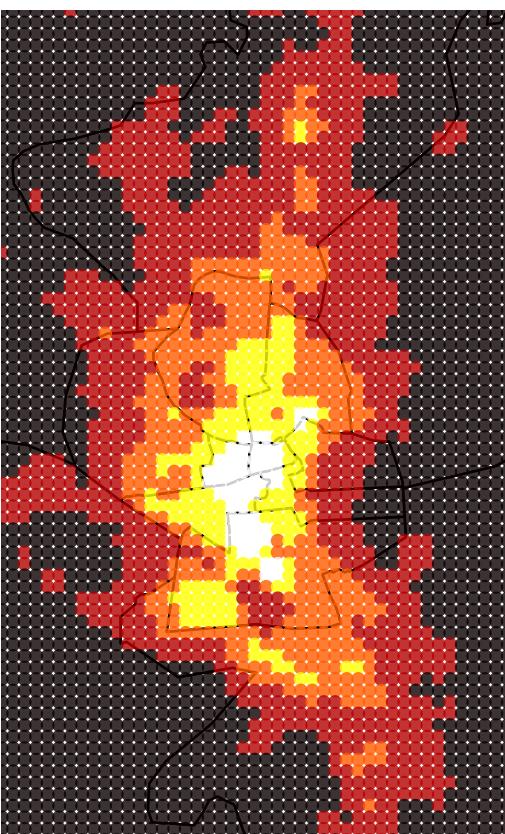
- **Recovery:** present day radiance levels with respect to pre-bombing radiance levels.



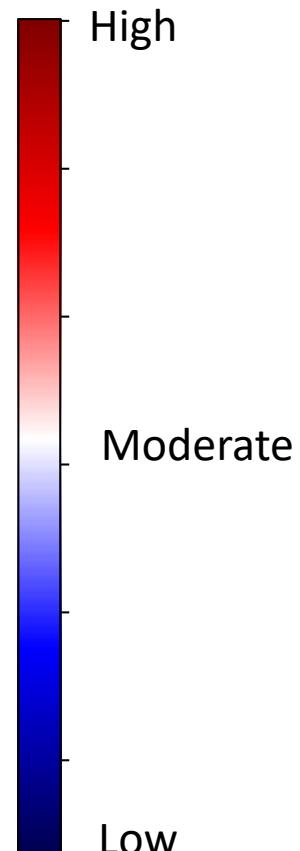
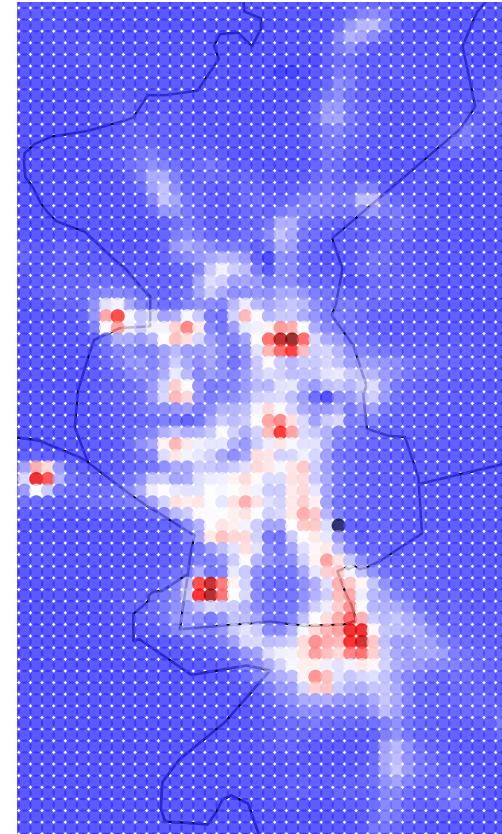
Rate of Recovery

Rate of recovery: average monthly increase in radiance post-bombing.

Pre – Bombing Radiance

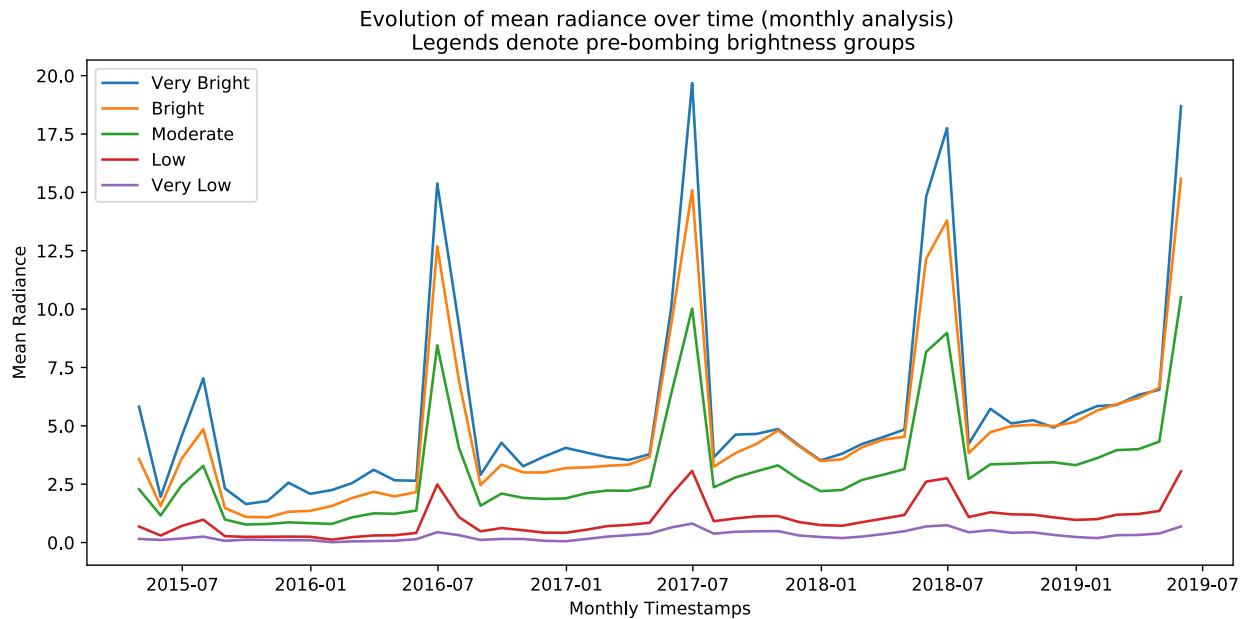


Rate of Recovery

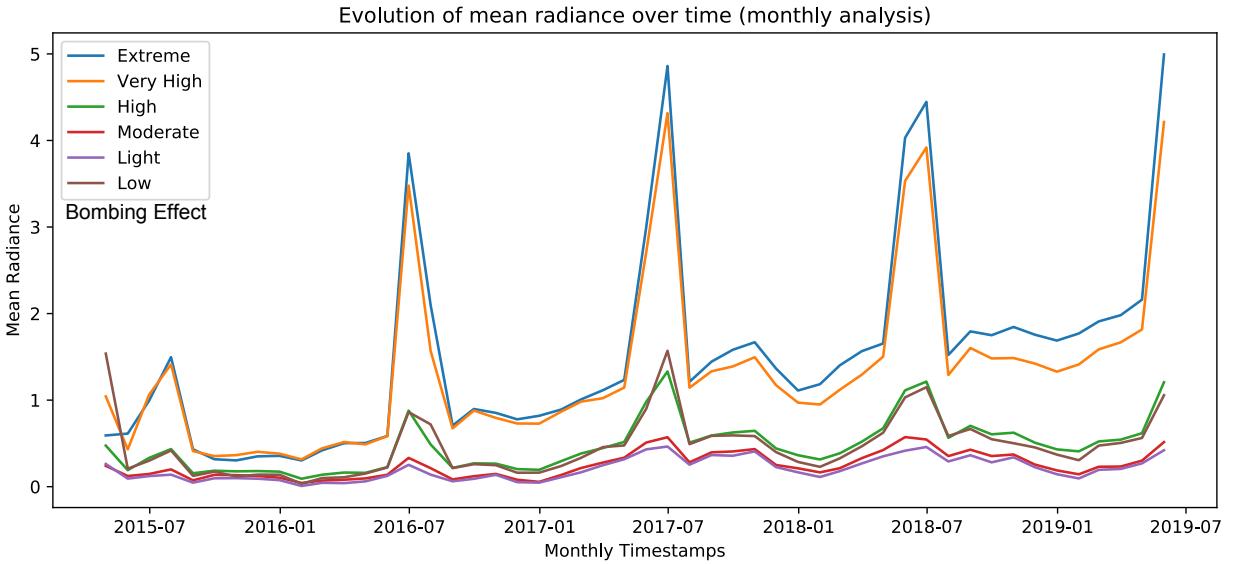


Tracking growth

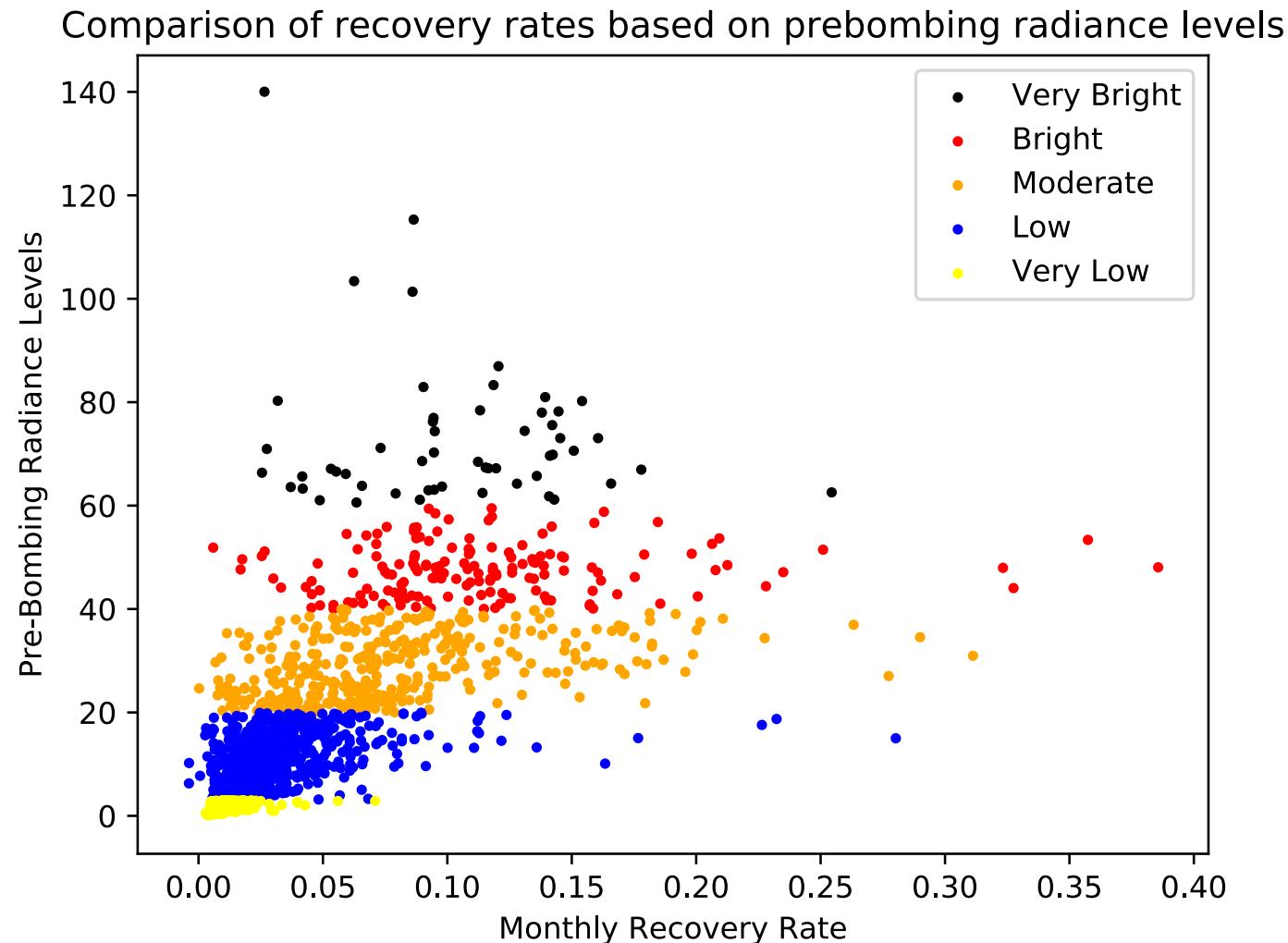
- Grouping by pre-bombing radiance levels.



- Grouping by damage magnitude.



Can we find better growth patterns?



Thank you!

Email id: zshah@umass.edu