

Deployment of Ground Observing Network (GONet) Cameras to Study Chicago's Light Pollution

Amir Sabljic, David Rivera, Anyah Thompson, Dynasty Robinson, Yesi Estremera, Ari Barker, Alayna Barba, Abel Habtemichael, Brianna Bukowski, Jessica Myers, Salome Habtemichael, Janet Bawuah, Thane Gesite, Eli Lopez, Grace Crim, Jack Morgan, Duncan Yuen

Our Purpose



The purpose of this project is to collect data on light pollution through GONets (Ground Observation Network). We are interested in this project because light pollution has environmental and health effects on humans. The hope is to discover which lighting is best for humans and the environment as well as shielded and effective.



Chicago Skyline

GONets can be used to keep track of which city buildings are contributing the most to Chicago's light pollution. By examining the points of brightness coming from Chicago's skyline at different points at night, we are able to determine which buildings do not turn off their lights at night.

Field Tests and Use

Stratonaut Backyards

Each Stratonaut took home a GONet and deployed at the same time, allowing us to compare the light pollution reaching different places throughout the area.

Indiana Dunes

The Stratonauts ventured to the Indiana Dunes to get a look at a dark sky. We deployed GONets at the Dunes as well as at the Planetarium to quantify the difference in sky brightness. This was also a test for performing field deployments.



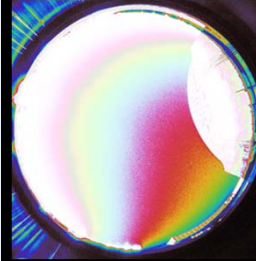
Little Red Schoolhouse/Citywide Deployment

In an effort to help the Little Red Schoolhouse Forest Preserve reach urban night sky status under the International Dark Sky Association's standards, we deployed our GONets at multiple sites throughout the preserve as well as in and around the Chicagoland area. This experiment allowed us to quantify the amount of light pollution reaching the preserve in comparison to the other sites.



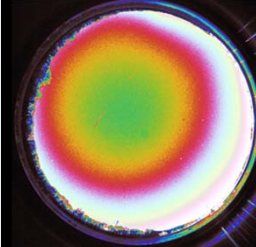
Data

Coordinated Deployment Results



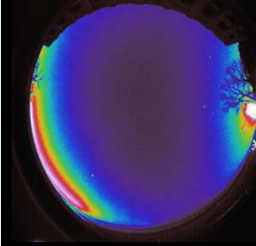
Adler Planetarium

On two different nights the Stratonauts deployed GONet cameras in coordination with deployments in other locations to compare the quality of the night sky across the region.



Little Red Schoolhouse

On November 16 the Stratonauts along with students from the Little Village based YOLO (Youth Organization for Lights Out) and Field Museum made GONet observations from the Indiana Dunes at the same time as taking readings from the Adler Planetarium.



Indiana Dunes

On December 21 we collected readings from Little Red School House Forest Preserve along with readings from multiple GONets across the Chicago region. By comparing the night sky from many different locations at once we can quantify the quality of the night sky.

The images above are from three GONet cameras at different locations. The top and bottom images are from the same time from the roof of the Adler and Indiana Dunes. The middle image is from Little Red School House. The same color gradient has been added to each image allow a to a comparison of the sky quality at each location.

The gradient ranges from black for the darkest sky (not seen in these images), through the rainbow to white for the brightest night sky. To be able to see the Milky Way the sky must be green or darker.

Conclusion

Seeing the results of our investigation, we were encouraged by the results from Little Red Schoolhouse Woods. While not as dark as the sky at the Indiana Dunes, the result were still much better than expected given the woods' close proximity to the city of Chicago. Given this result, we believe that Little Red Schoolhouse woods has a good chance of receiving an Urban Dark Sky Place designation. The images we recorded will provide them with the data that needed to receive this designation. The designation would give the location international recognition as a location in an urban area dedicated to providing visitors with an improved view of the night sky. We also believe that we can use the data to encourage improvements to local lighting policy across the city to reduce the amount of light that these locations produce.



Further Study

The hope is to one day do a larger scale deployment and work directly with researchers to use the GONet to identify the issues associated with light pollution. In addition, Far Horizons and the Adler Planetarium plan to combine these ground observations with high resolution images from a high altitude balloon through the project Mission Nitelite.

Acknowledgements

Ken Walczak, Chris Bresky, Jesus Garcia, Cynthia Tarr, Brandon Pope, Kim Dupczak, Becky Selzer.