Adopt-a-Pixel3Km

A 2025 case study of *Plymouth, Minnesota*

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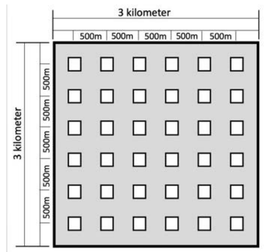
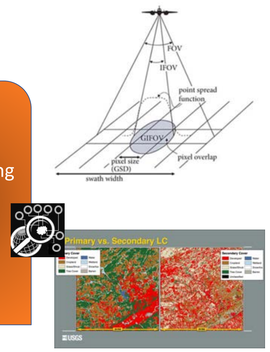
Image chips from Landsat Time-Series

AaP3Km methods



remote Sensing ground to Satellite platforms



Sample an area on Earth

Discussion/Summary

In this study, the limitations and benefits of remote sensing data versus in field data were analyzed using Plymouth, Minnesota as a case study. While remote sensing datasets such as ESRI, World Cover, and Dynamic world can dramatically reduce time consumption in research, and are able to generally predict land coverage data in large areas of land, their accuracy falls short at smaller scales. All three datasets had multiple instances in which they misidentified land coverage types, and also had discrepancies amongst each other. They would consistently fail to identify areas with tree canopy within urban areas, highlighting their lack of detail. Comparing the remote sensing data to land cover images taken at each of the 37 points, three datasets each had their own specific flaws.

While the World Cover dataset sometimes indicated tree coverage in urban areas, Dynamic world and ESRI had the exact opposite problem, and would indicate urban coverage when there were tree canopies.

However physical field surveys also proved to have its shortcomings. Not only was it time consuming, but many images were lost in the process as well. Furthermore, it only gave a sense of a very small portion of land rather than a more zoomed out focus. None of these problems arose with the remote sensing data, although physical observations still proved to be more accurate.

Conclusions/Recommendations

The conclusion of this project is that while the use of remote sensing data for large scale observations is very useful, when it comes to finer details in smaller areas, there tend to be some discrepancies between remote sensing data and the ground truth. Thus, while remote sensing is an incredible tool it must be used with caution. Furthermore, through the use of the GLOBE earth observer app, I found that in field data collection is a much more reliable method, although it is a lot more time consuming. A balance must be found between remote sensing data and in field collection.

References

- Nelson, P.V., Low, R., Kohl, H., Overoye, D., Yang, D., Huang, X., Chellappan, S., Azam, F.B., Carney, R.M., Falk, M., Garriga, J., Schelkin, L., Boger, R. and Schwerin, T. (2024) 'GLOBE Observer: A Case Study in Advancing Earth System Knowledge with AI-Powered Citizen Science', Citizen Science: Theory and Practice, 9(1), p. 33. Available at: https://doi.org/10.5334/cstp.747.

-Image chips from Landsat Time-Series adapted from

https://clarype.users.earthengine.app/view/lstimeseries#run=true;lon=-123.2789281012384;lat=44.565731066646144;from=01-01;to=12-31;index=NBR;rgb=SWIR1%2FNIR%2FGREEN;chipwidth=3;

Community Chronicles Background

My area of interest is located in Plymouth, Minnesota. The observed areas include schooling areas, playfiends, woodlands, and residential areas. While historically, this metropolitan city has been dominated by tree nature and greenery, in recent decades the city has become more urbanized, due to a spiking population and a demand for housing. Thus, previously forested areas have now become neighborhoods and developed into playfields. While 37 different sites were analyzed throughout the city, 9 of them couldn't be accessed due to their location being on private property. Moreover, of the locations that were visited, 15 images were lost due to issues with the GLOBE earth observer app. Most of the points throughout the study were located in residential areas.

I wonder if remote sensing based data accurately reflects the ground truth of Plymouth's environment.

Result Summary

This study compared remote datasets from all 37 points, including ESRI, Dynamic World, World Cover, Tree Canopy Coverage, and Landsat, to analyze their accuracy. The datasets are generally able to provide an accurate sense of land coverage throughout the AOI, with a majority of the coverage being urban land or tree/grassland. However, there are some discrepancies between the datasets and the actual satellite imagery.