Adopt-a-Pixel3Km

A 1984 - 2025 case study of *San Diego, CA USA*

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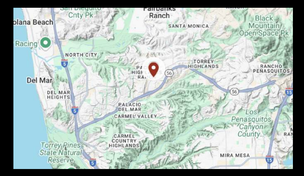
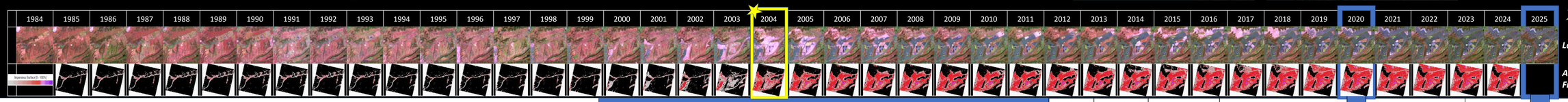
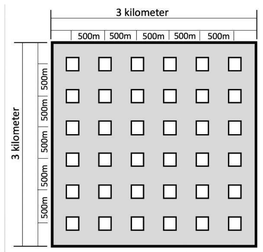


6	12	18	24	30	36
5	11	17	23	29	35
4	10	16	22	28	34
3	9	15	21	27	33
2	8	14	20	26	32
1	7	13	19	25	31

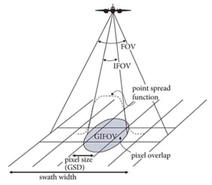


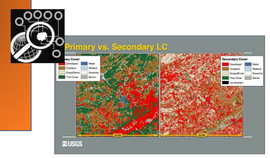
AaP3Km methods



Sample an area on Earth

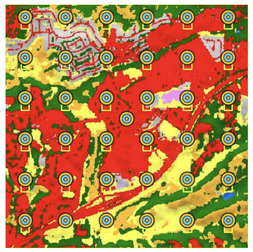
remote Sensing ground to Satellite platforms

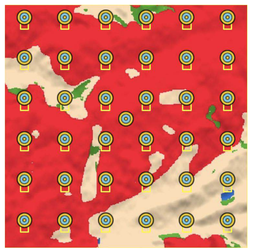




3km

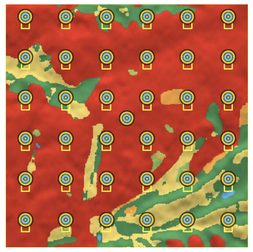
2020 State I (World Cover 10m)

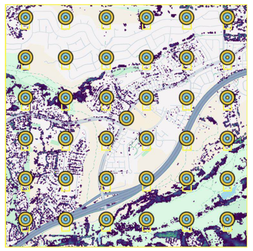




2020 State II (ESRI 10m)

2020 State III (Dynamic World 10m)





2020 State IV (Meta 1m Tree Canopy)

Conclusions and Recommendations

In relation to my goal, to investigate the degree of similarity between my field observations and remote sensing data in my area, the data show a majority of matches in dominantly built-up areas and dominantly wild areas. About 90% of the 37 points investigated matched between remote sensing data and field observations. Remote sensing data can provide a wealth of knowledge but different sources, as seen in my research, provide differing levels of detail and suitability towards one's goals. Three of my field observation locations were not within the desired 100x100m area, and many others were not centered at the desired point, which explains discrepancies between field observations and satellite data from CEO. These location differences were caused by limitations such as private property lines and safety in areas of wild and dense vegetation. The photos collected exhibit a successful investigation of land cover categorization similarities and prompt further research on the differences between more land cover datasets and the AOI over time.

References

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Forest - Meta/WRI Global Canopy Height. Global Canopy Height, Tolan et al. (2023). "Sub-meter resolution canopy height maps using self-supervised learning and a vision transformer trained on Aerial and GEDI Lidar"
Land Cover - WorldCover 10m. European Space Agency (ESA) WorldCover 10m - 2020.
Land Cover - Dynamic World. Dynamic World, Near real-time global 10 m land use land cover mapping - Brown et al. (2022)
Land Cover - ESRI 2017/2024. Impact Observatory for Esri. © 2021 Esri Karra, Kontgis, et al. "Global land use/land cover with Sentinel-2 and deep learning." IGARSS 2021-2021 IEEE International Geoscience and Remote Sensing Symposium. IEEE, 2021.
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Community Chronicles Background

My area of interest (AOI) was developed recently, with the houses, shopping center, and schools built within the last twenty years. This is clear in the images from the Landsat Time-Series and Annual National Land Cover Dataset (NLCD) from the time of disruption, where color from satellite imagery changes and percent fractional impervious surface drastically increases, respectively. Wild spaces remain in the canyons, but construction has continued to transform empty fields and shrub-covered land into suburban housing developments.

Descriptive statistics

37 points in the 3km grid were examined, with 3 observation sites outside of the 100x100 meter area around the point (33, 34, 36). 25 of 37 points contained built-up land cover, and the dominant vegetation in non-built-up areas was bush/scrub.

I wonder how closely remotely sensed land cover data will match my field observations.

Result Summary

At 34 of the 37 points, remote sensing datasets (2020) predominantly matched my GLOBE Observer field observations (2025) and my manually-categorized data from Collect Earth Online (CEO). Vegetation and built-up areas were accounted for in the same or recognizably similar proportions in the remote sensing data when compared to the CEO data. At three points, 18, 27, and 33, remote sensing sources conflicted with each other as well as field observations or CEO data. 25 of the 37 points contained at least partially built-up areas, which were mainly categorized as completely built-up by remote sensing sources despite some human-placed vegetation.

Discussion Summary

Overall, land cover data from remote sensing sources was accurate when compared to field observations and manually-categorized CEO data. The Dynamic World 10m and ESRI 10m datasets have fewer details than the World Cover 10m dataset, which tends to better capture the land cover in detail, such as capturing the trees in a residential area. This led to generalized categorization in built-up areas where Dynamic World and ESRI categorized the entire area as built-up, but in many cases vegetation, tree cover, or other features were clearly present from field observations and shown in World Cover 10m, and sometimes in the 1m Tree Canopy data as well. In these cases, remote sensing data was correct for parts of, but not the entire, 100x100m area. As seen from the Landsat Time Series images starting in 1984, and the NLCD Fractional Impervious Surface images starting in 1985, the 3 km area has gone from completely undeveloped to almost completely built-up, with shrub-covered canyons remaining the only unchanged areas over forty years. This rapid development has been captured by remote sensing at the majority of the points examined, with the exceptions of the points that are in disagreement. Disagreement points have the opposite issue, where remote sensing data categorizes the area as built-up, however the area is covered in natural vegetation.