

Machine Learning Enabled Creation of Radio Environment Maps Using Real-Time Coverage Maps



Carlos Crespo, Manuel Suarez, Satheesh Bojja Venkatakrishnan
Florida International University
sbojjave@fiu.edu

BACKGROUND

- Radio Environmental Mapping (REM) - creation of a visual representation of how Radio Frequencies (RF) behave in an area.
- REMs - Important for determining best deployment location of base stations, antennas, access points and repeaters
- Data from REMs – identifies signal strength, helps improve spectrum efficiency and Quality of Service of Cellular Devices
- Our Goal: Creating REMs utilizing real-time data through Broadband MapUS and with simulated coverage maps made with Altair WinProp.

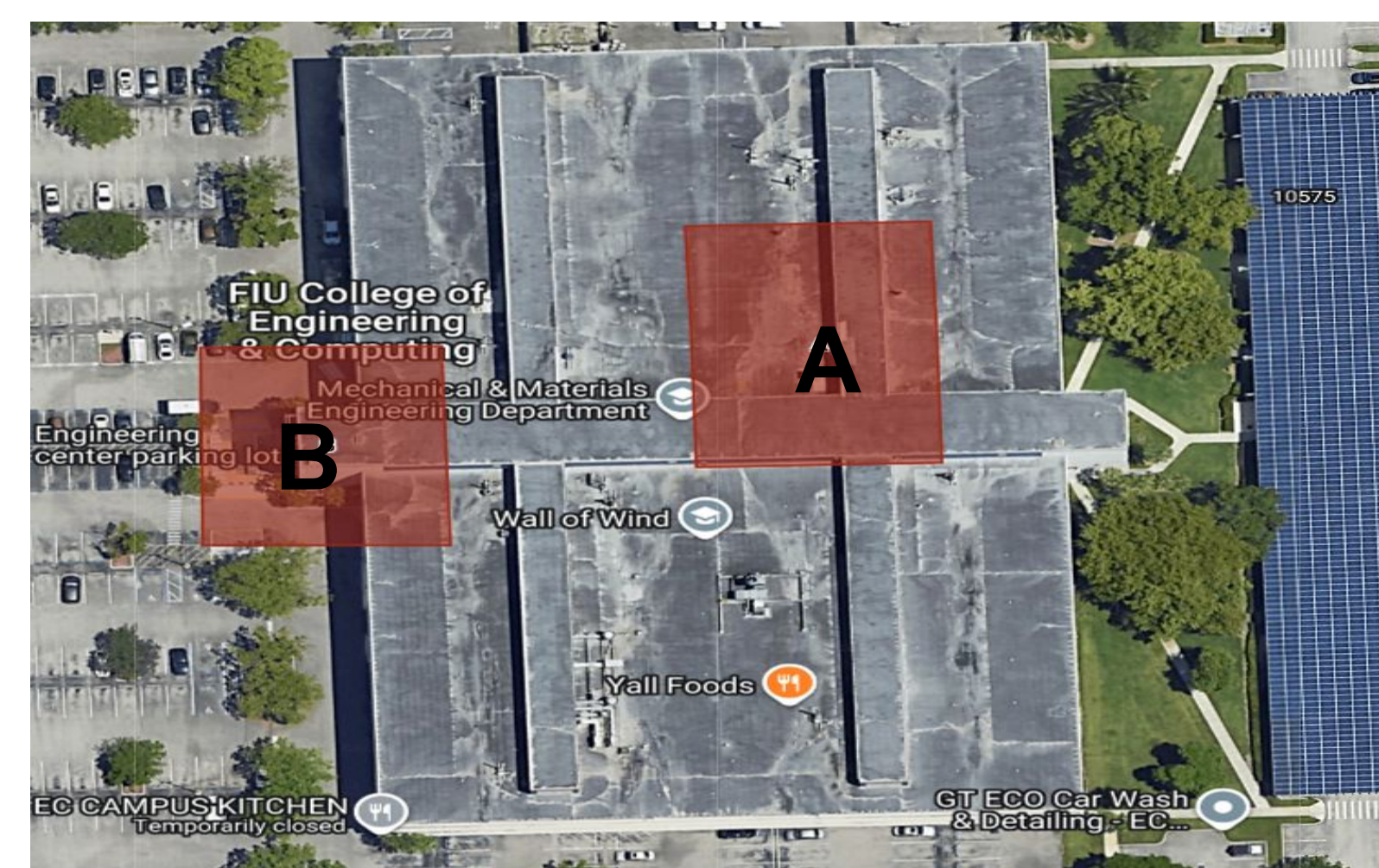
RESEARCH QUESTIONS

1. How can we use Radio Environment Maps (REMs) for improved spectrum efficiency?
2. Can we train an algorithm/AI to create dynamic REMs using our data?

METHODS AND MATERIALS

- Materials:
 - 3 Samsung Galaxies, each connected to a different carrier.
 - AT&T
 - Verizon
 - T-Mobile
- Methods:
 - Gathering indoor and outdoor data using SigCap.
 - Information gathered from FIU Engineering Campus and FIU Modesto A Maidique Campus (MMC).
 - Simulating coverage maps using Altair WinProp.

RESULTS

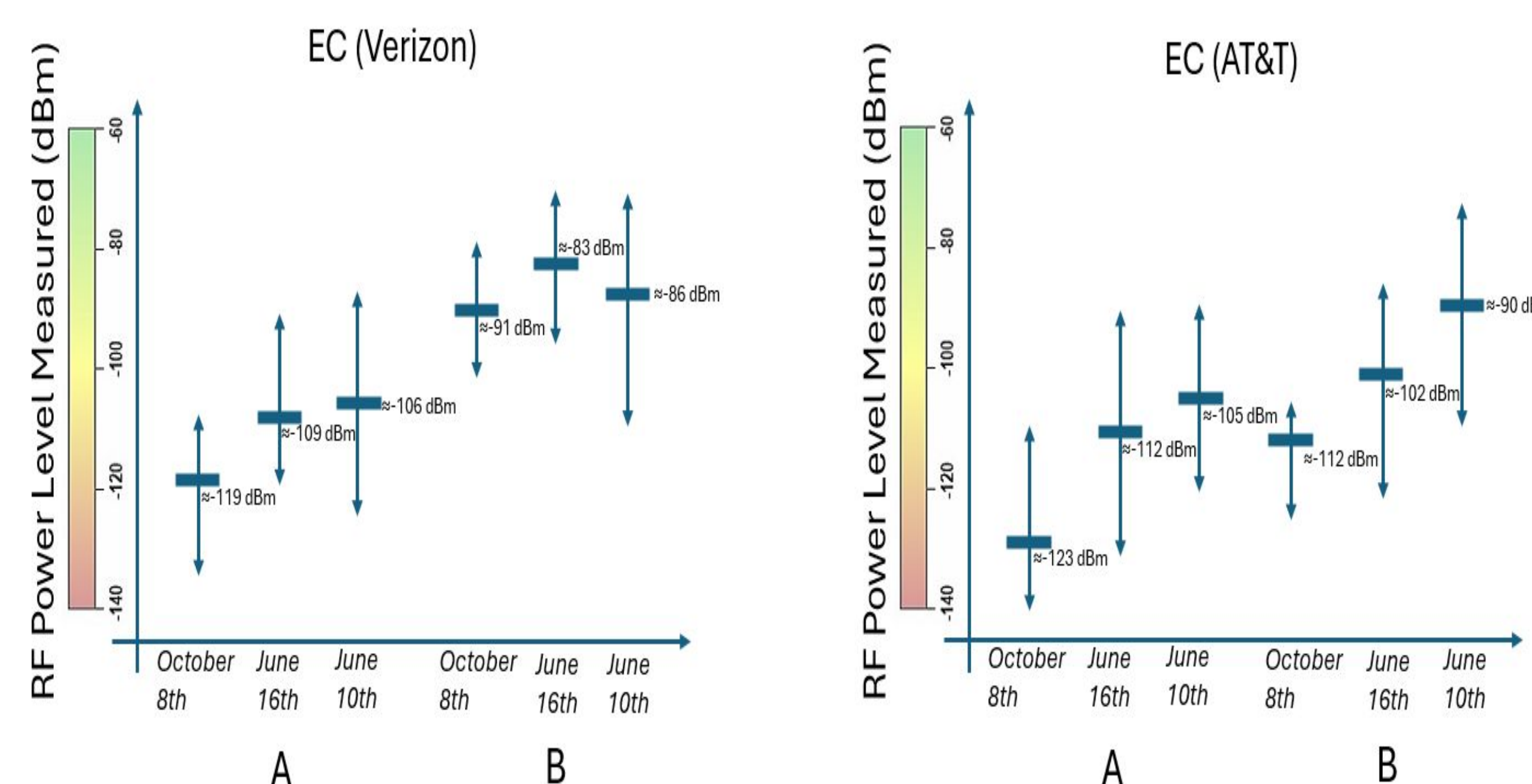


Analysis Area (Satellite View of Engineering Center)



October 8th Data AT&T

October 8th Data Verizon



RSPR for AT&T and Verizon Over Different Days



Simulated Coverage Map Made Using Altair WinProp



NEXT STEPS

- Finding documentation for cell towers in the area surrounding FIU.
- Improve our simulation model.
- Expand our simulation to include MMC.

CONCLUSION

What we want to accomplish, is a reliable way of making REMs using the data from Broadband MapUS to validate our simulation models. We have collected data and performed simulations for the FIU Engineering Center and its neighboring area. We want to expand our data collection and simulations to include FIU's MMC campus. Before expanding, however, we want to improve our simulation work using antenna data sheets to build our components in WinProp. This is something we have yet to do because we are hoping to find official documents pertaining to cell tower installations in the FIU area.

ACKNOWLEDGEMENTS

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REFERENCES

CellMapper. (n.d.). *Cellular Tower and signal map*. <https://www.cellmapper.net>