

(13-220413-A) **Comparison of Atmospheric Observations to High-resolution Fossil Fuel and Biogenic CO₂ Flux Models for Auckland, New Zealand**

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The largest city in New Zealand, Auckland is home to roughly 1.5 million people -- one third of New Zealand's population. Despite a large urban population, the city contains a significant amount of green space that can act as a carbon sink to offset anthropogenic fossil fuel emissions. Here we present a high resolution (street segments and buildings, hourly) bottom-up inventory of Auckland's fossil fuel carbon dioxide emissions from a variety of data sources. We use these emissions estimates in combination with the UrbanVPRM land surface model to estimate the net carbon balance of the Auckland region. We compare this carbon balance estimate with atmospheric observations of CO₂, CH₄, CO, and ¹⁴CO₂ collected from *in situ* sensors and flasks across the city as part of the CarbonWatch NZ project. CarbonWatch NZ uses atmospheric observations and modeling to assess New Zealand's progress toward its obligations under the Paris Agreement and New Zealand's Zero Carbon Act.

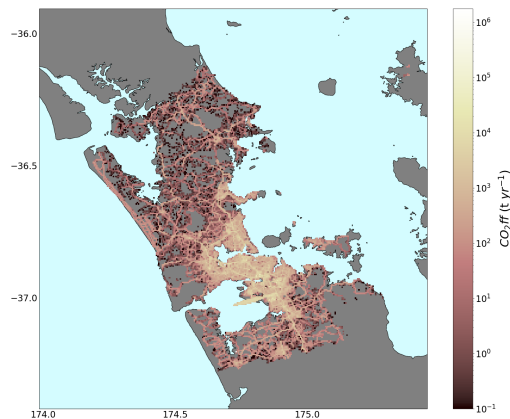


Figure 1. Mahuika AKL - a high resolution fossil fuel CO₂ emission inventory for Auckland, New Zealand.

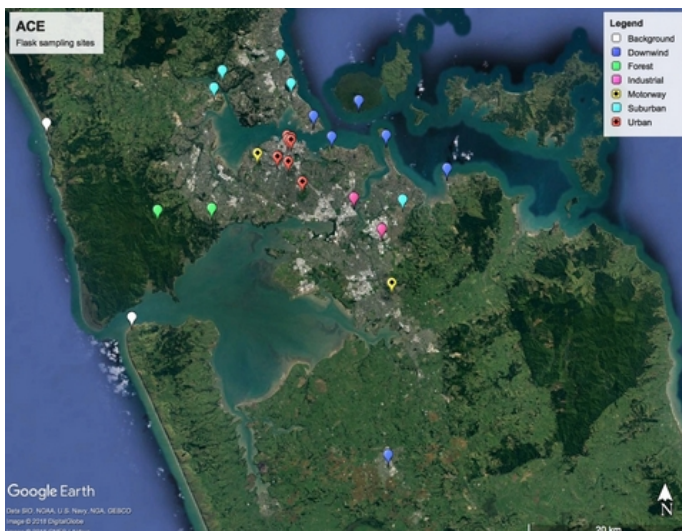


Figure 2. Flask and *in situ* sampling sites.