



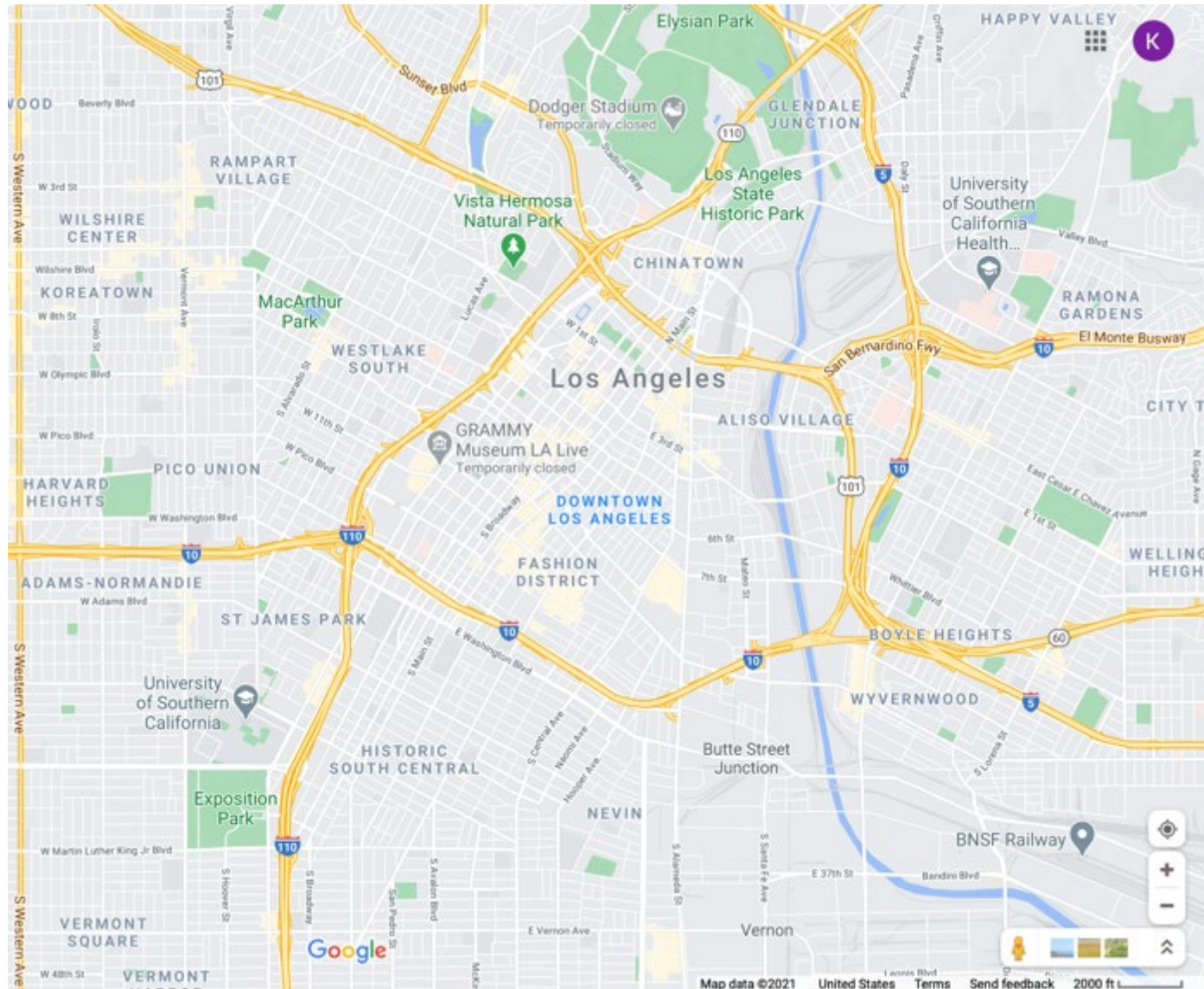
Regional Modeling and Simulation for Vertiport Location Assessment

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NASA Ames Research Center

Presentation to Community Integration Working Group
Public Acceptance Panel
March 4, 2021

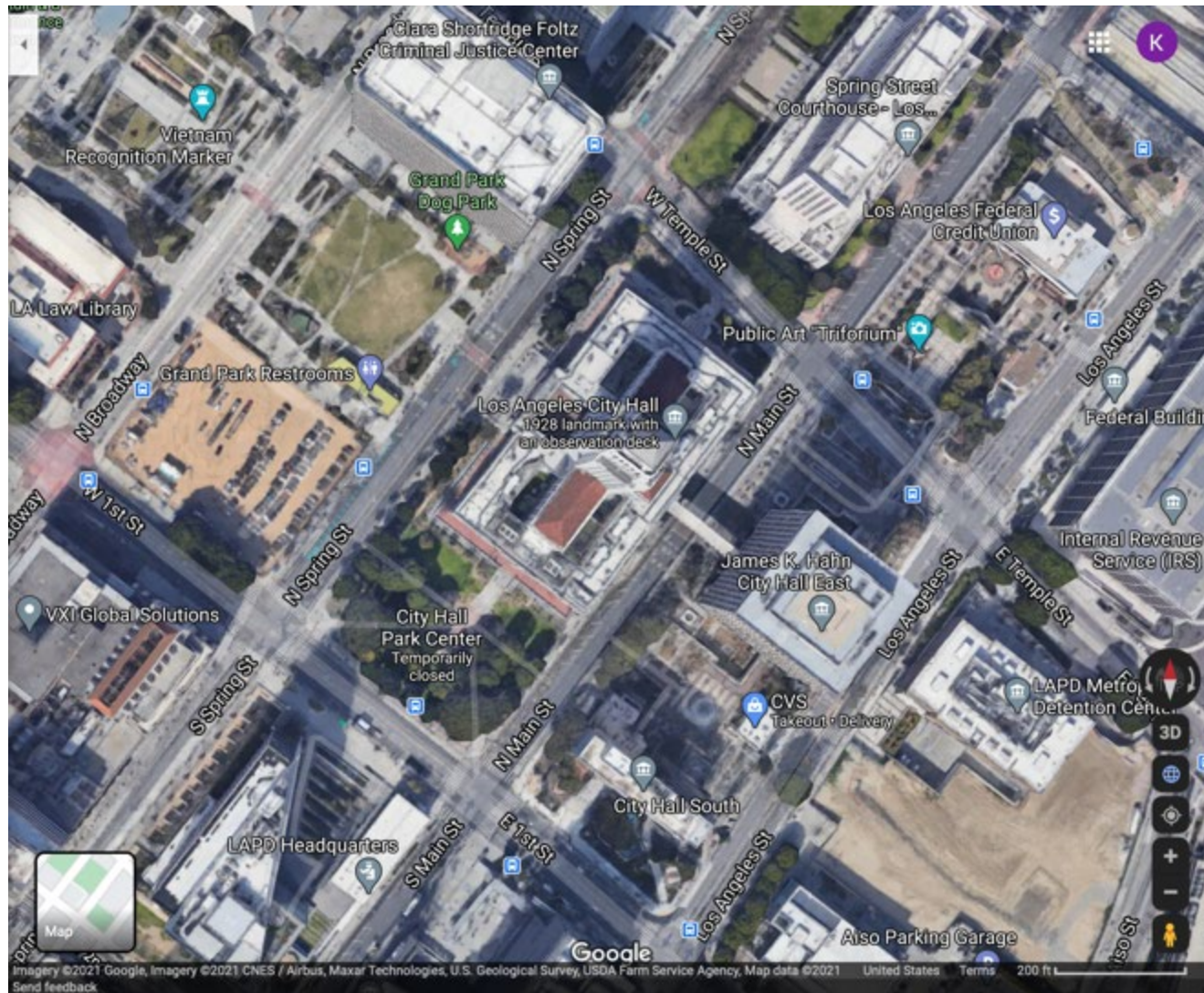


Motivation



Where can a vertiport be placed near Downtown Los Angeles?

Motivation



Can we assess the suitability of a vertiport near Los Angeles Mayor's Office?



Advanced Air Mobility

- Research - safety and convenience, viability, infrastructure, scalability, traffic management, and public acceptance
- Benefits - mobility, commutes and deliveries, and decreased emissions and noise, and perhaps congestion

NASA

- ATM-X and AAM Project, AMIO*
- ConOps, Technical Challenges, Reference Implementations, Interoperability
- Series of simulations for UAM airspace management, high-tempo information exchange, connecting partners, and preparation for flight tests

*ATM=Air Traffic Management, AAM=Advanced Air Mobility, AMIO=AAM Mission Integration Office₄

Current Interest



- Three types of motivated entities
 - Regional
 - Vertiport developers
 - Vehicle manufacturers
- Researchers
 - Noise modeling
 - Surface mobility data
 - Ground congestion information
 - Vehicle flight route structure



Regional Modeling Tool

Vertiport Suitability

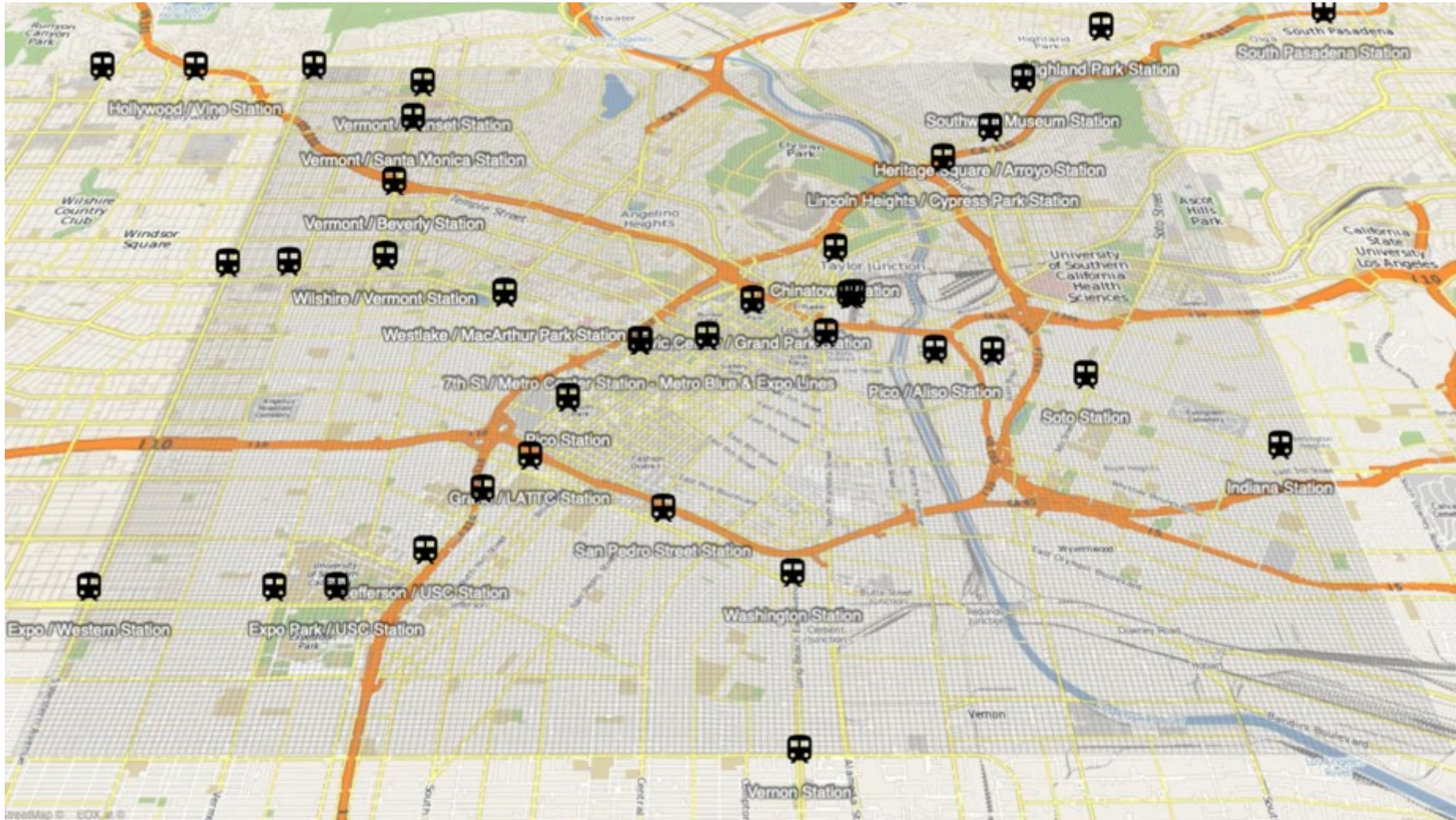


- Region/city parameters
- Zoning, environmental impact, intermodal systems, etc.
- Importance of attributes (rewards and penalties)
- Algorithmic aggregation and thresholding
- Location suggestions and vertiport selection
- Open architecture

Zoning Attribute



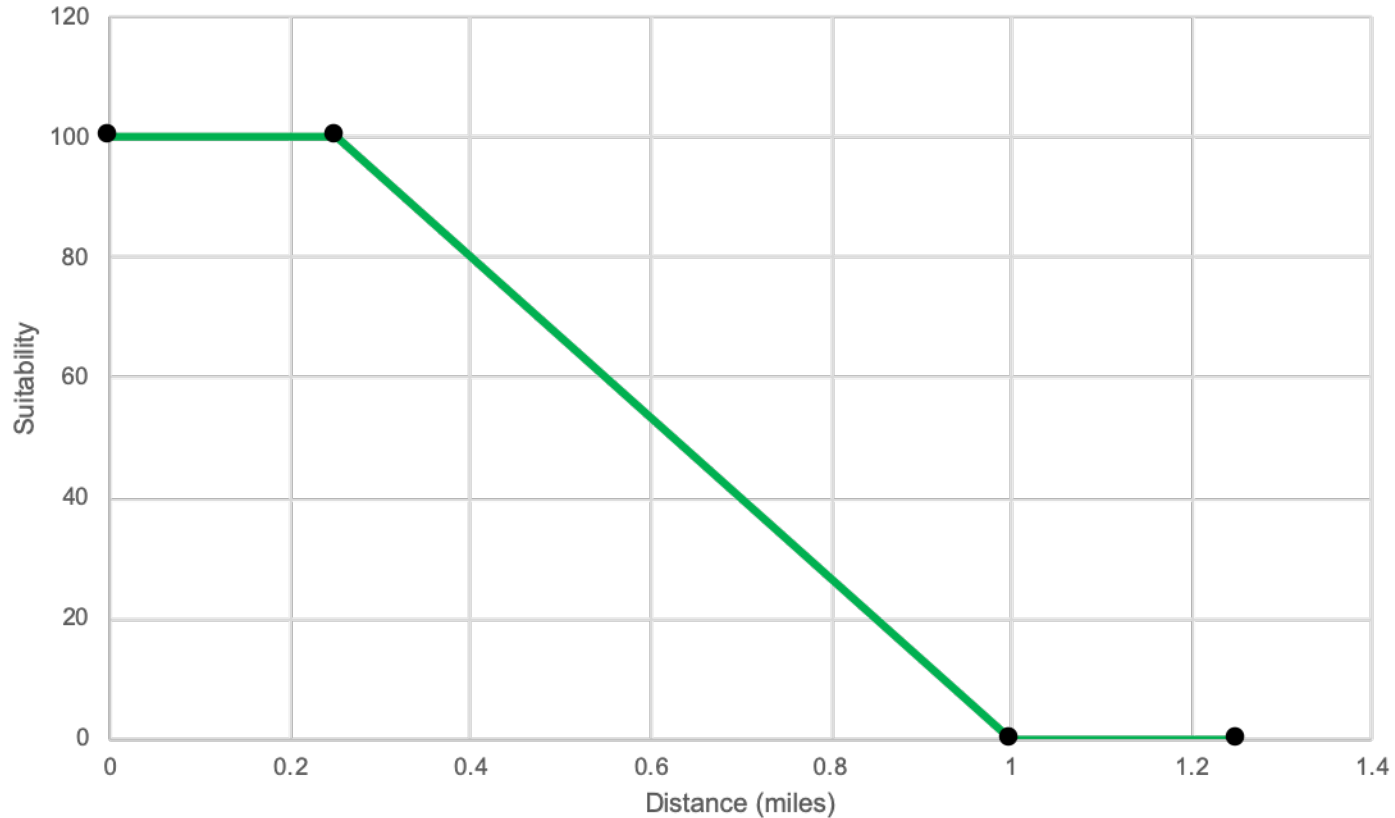
Intermodal Systems



Grid (7x7 miles), each cell (~55 meters or ~185 ft)

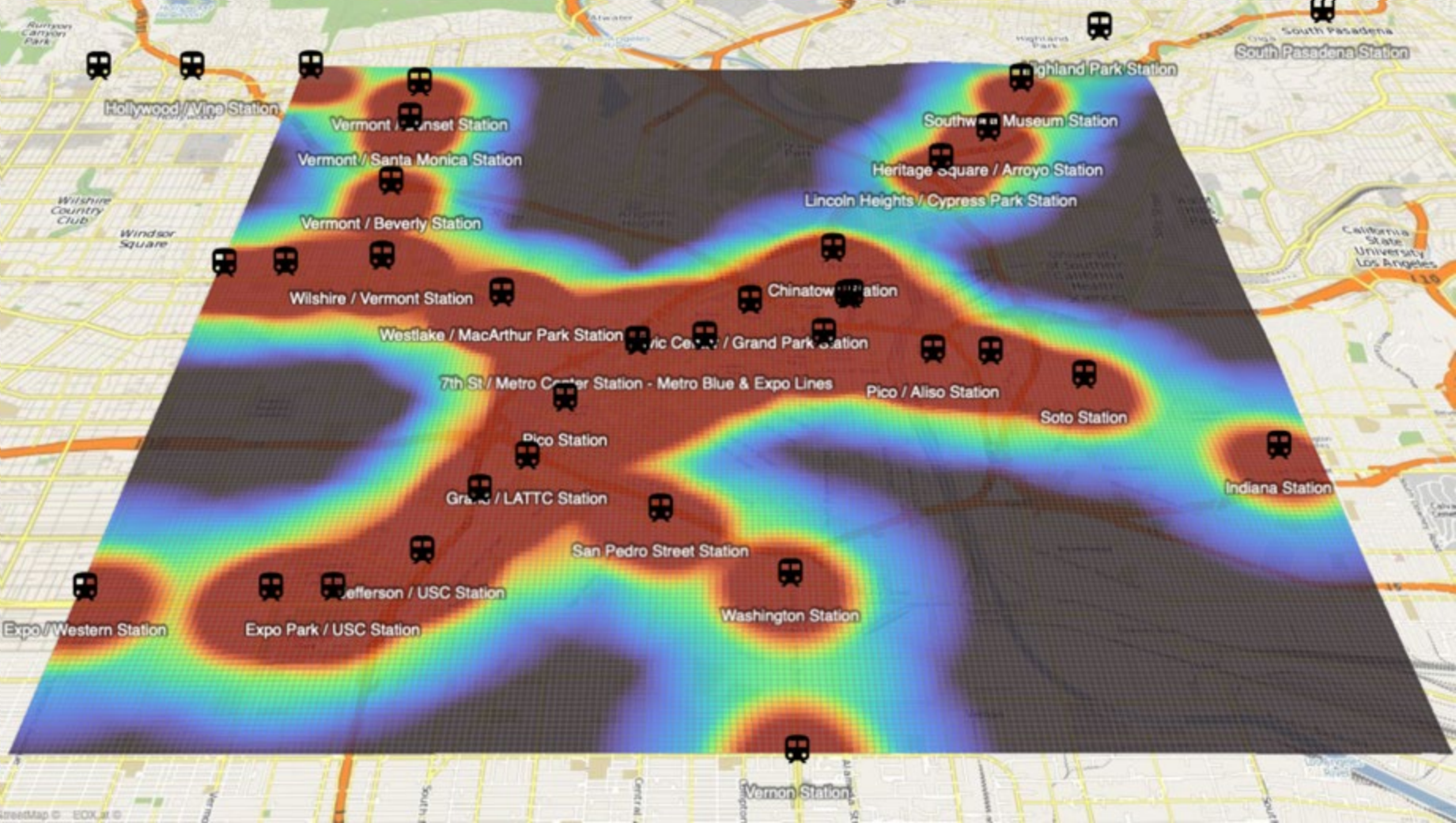


Train Station Criterion (A_i)

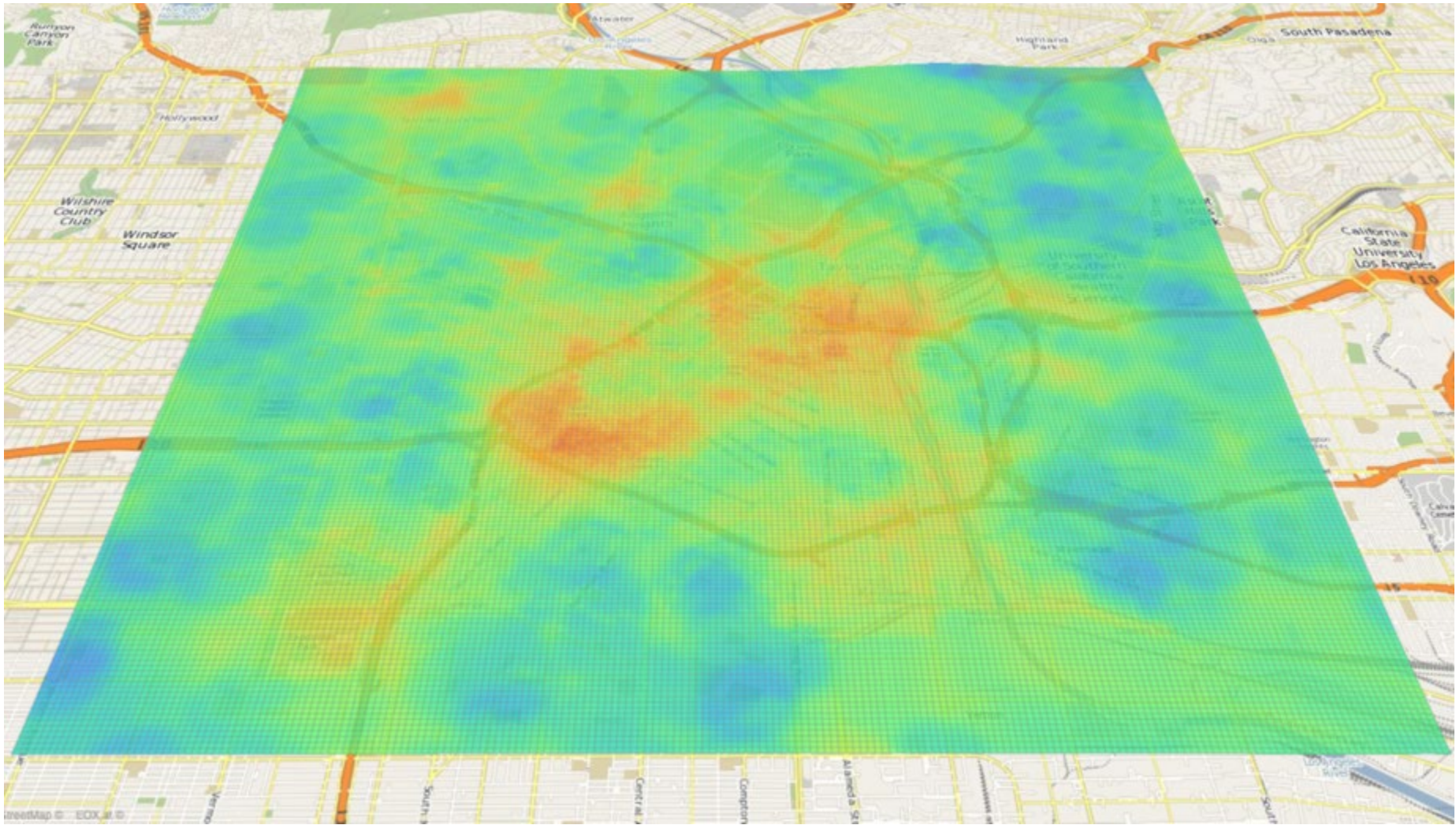


Importance of attribute as a function of distance
(or as a function of time)

Intermodal Systems

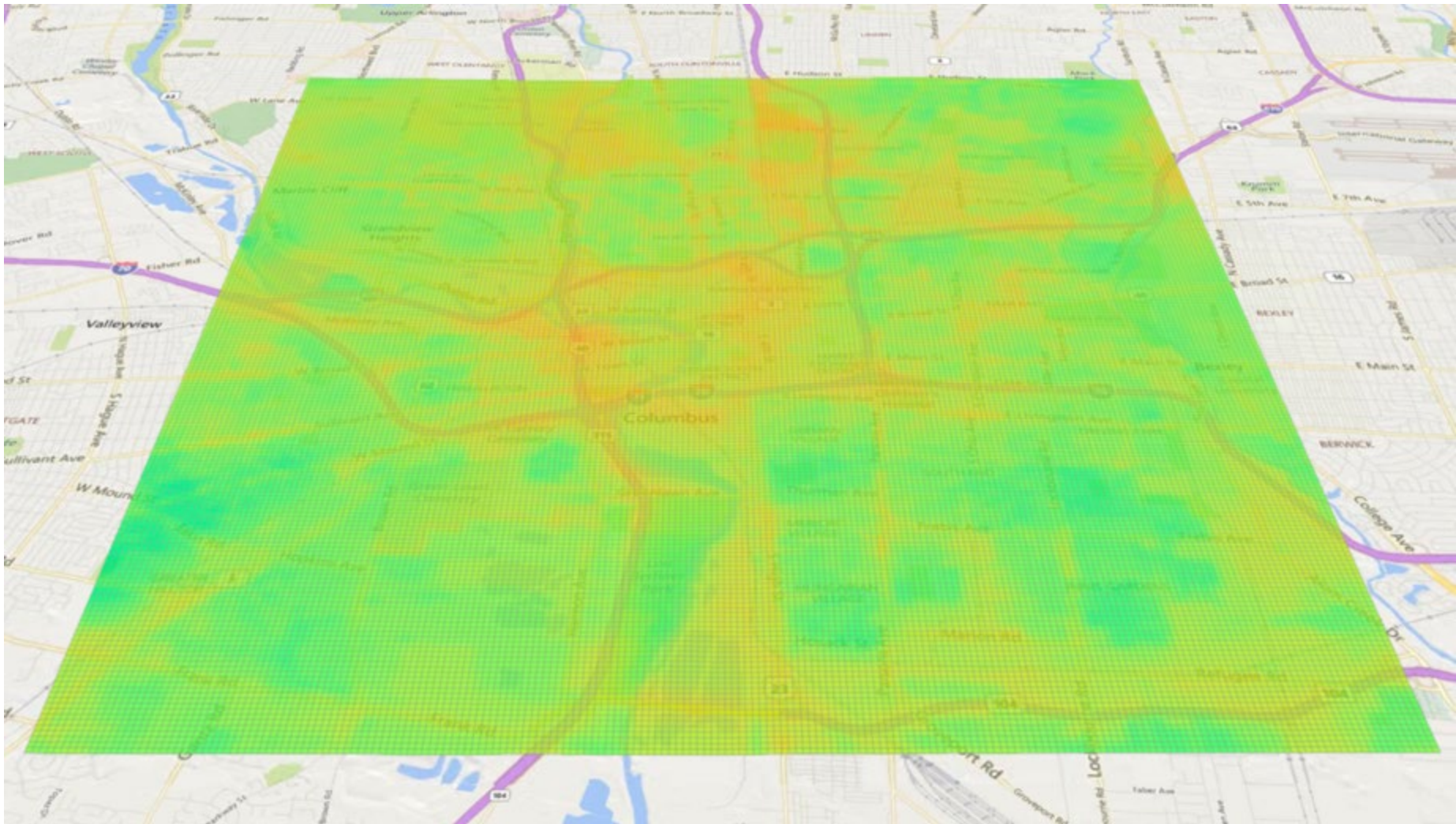


Composite Suitability



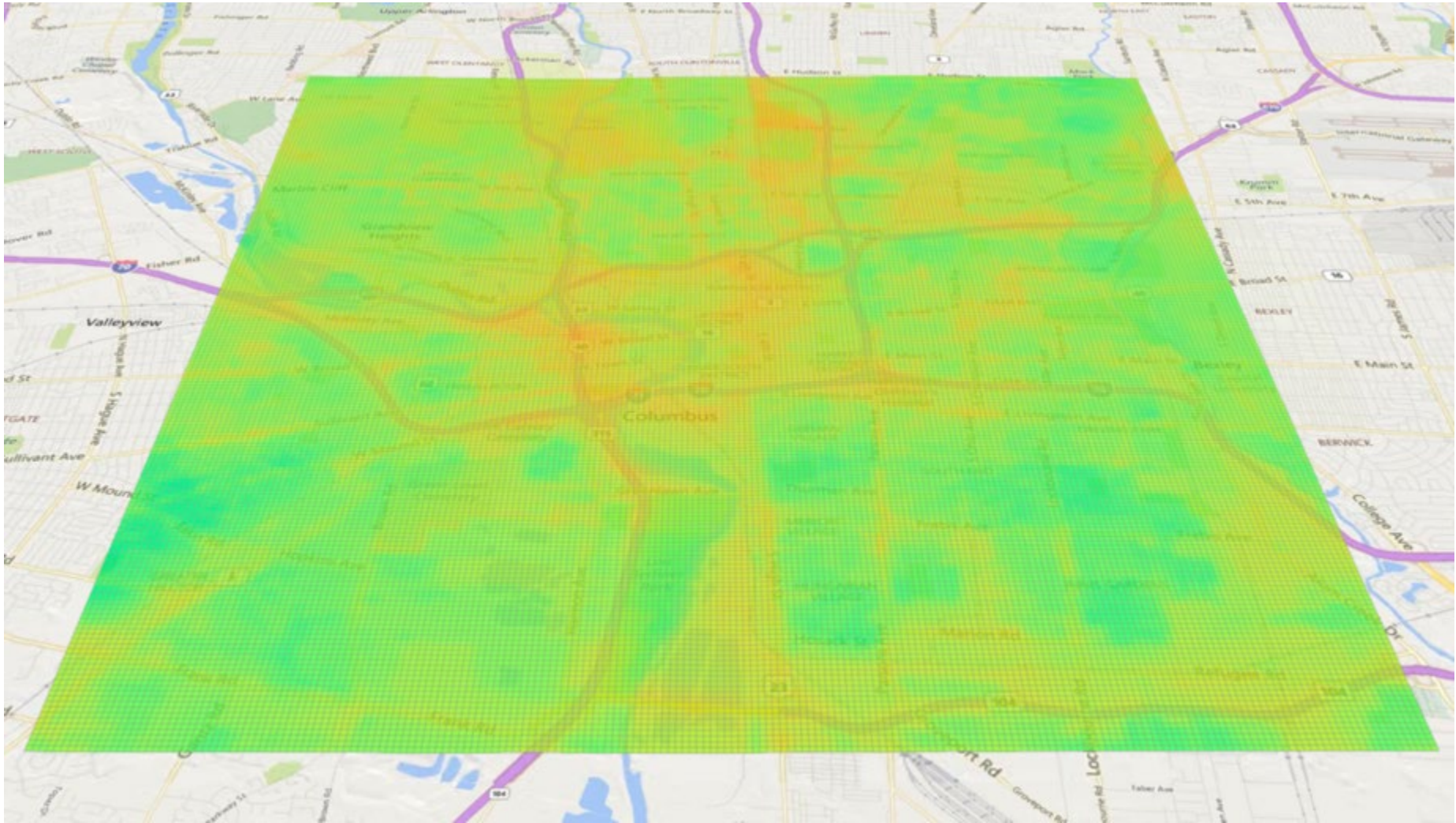
Los Angeles, CA

Composite Suitability



Columbus, Ohio

Final Result



Seven locations sent to City of Columbus Planning Department all considered acceptable. “Pleasantly surprised!”



Regional Simulation Tool

Vertiport Assessment and Mobility Operations System (VAMOS!)

Flight of UAM Vehicles

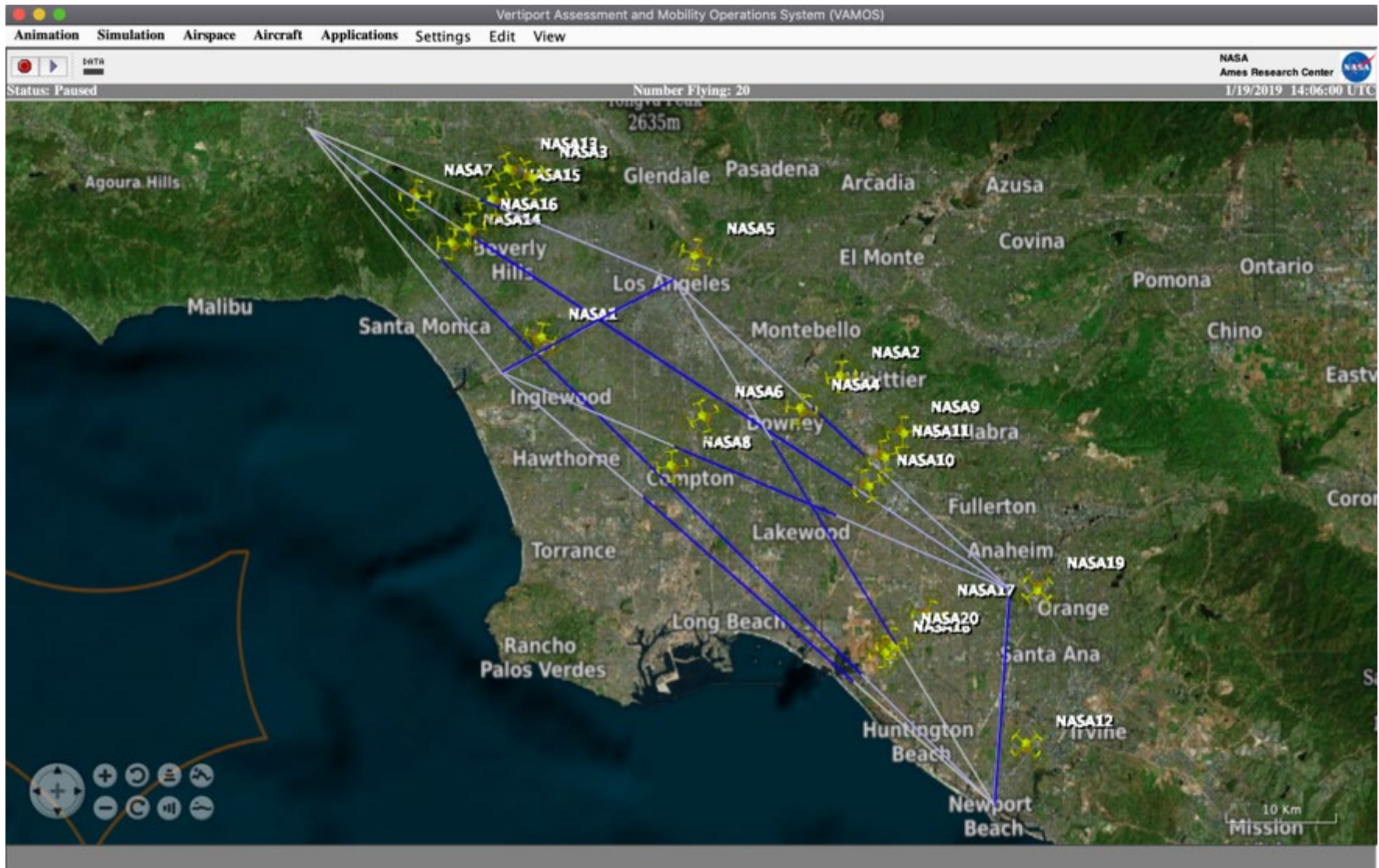


- Selected vertiport locations
- Route structure between locations
- Simulation of vehicle flight (models, winds, etc.)
- Impact on environment (noise, etc.)
- Assess frequency and density
- Reiterate, as necessary!



Final Result

Multiple Vertiport Locations and Vehicle Flight in Los Angeles

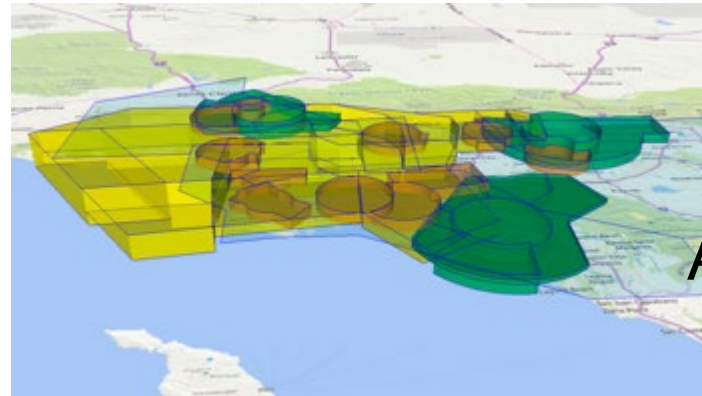


Modeling with WorldWind; Simulation can connect to TestBed

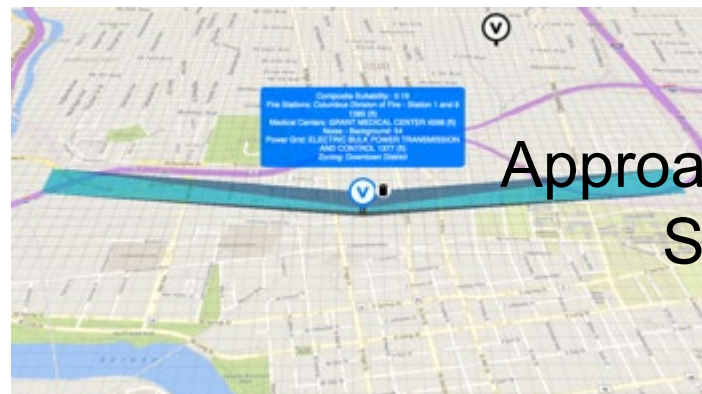
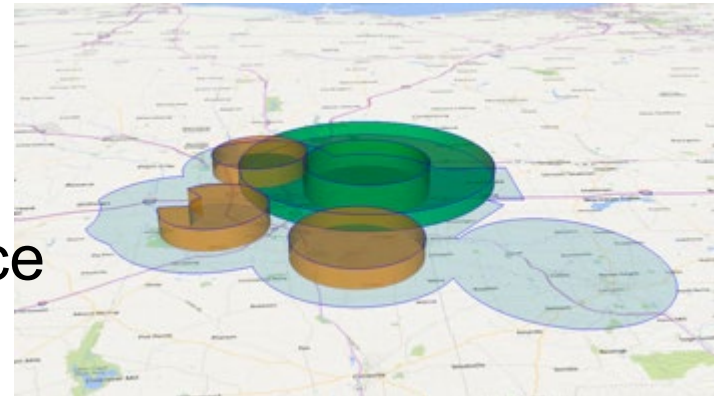
Additional Data Displays



3D
Buildings



3D
Airspace



Approach/Departure
Surfaces

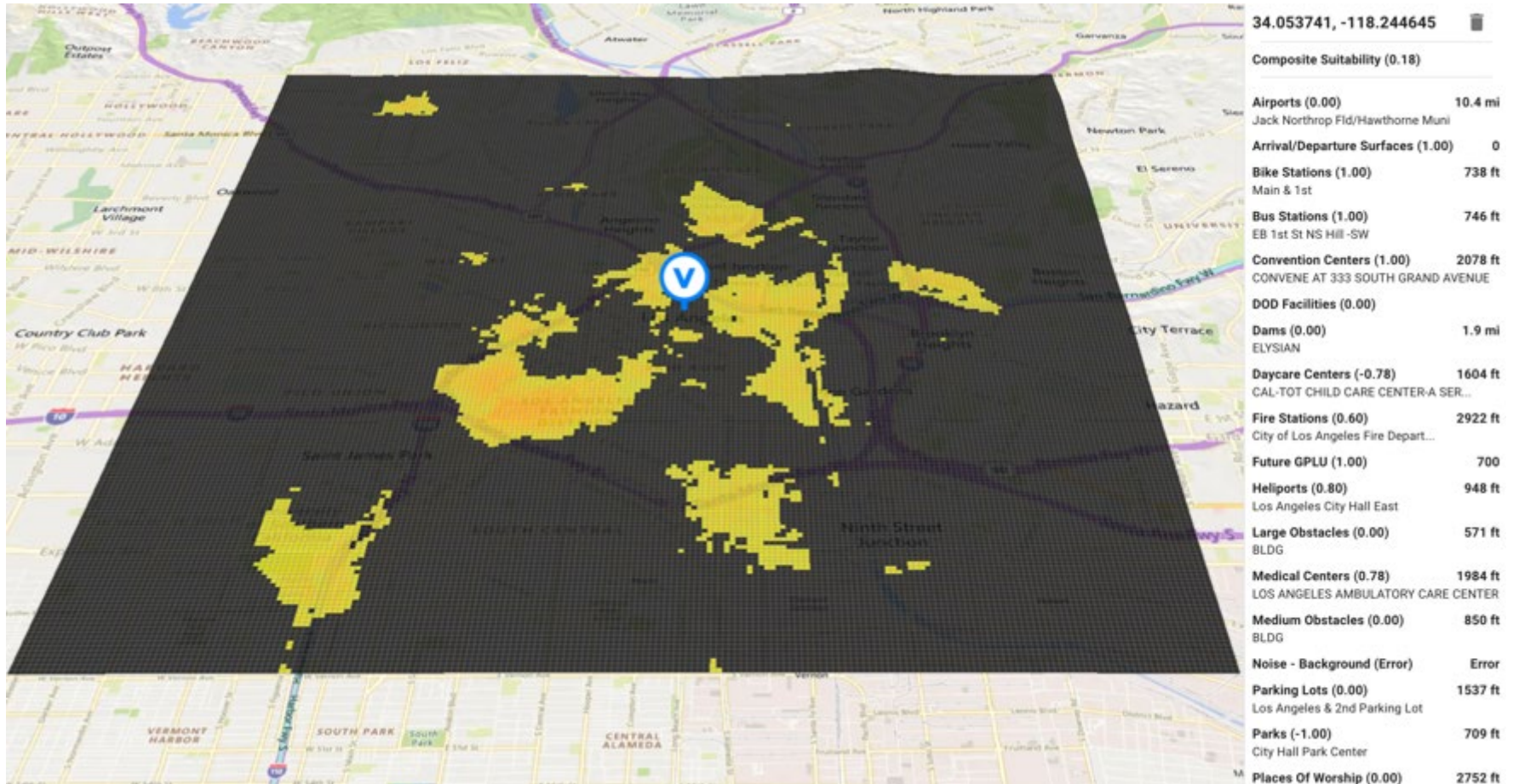


Ongoing work...



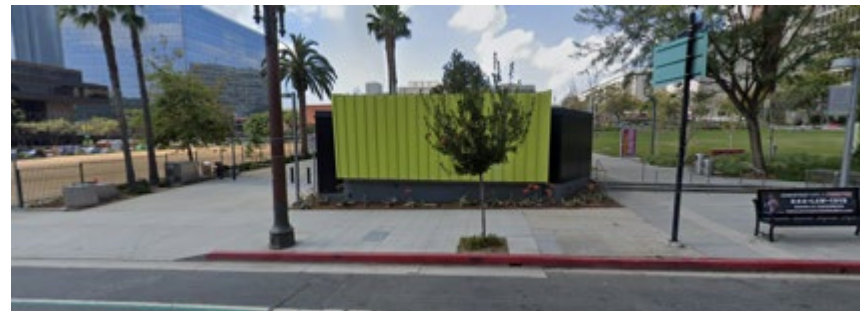
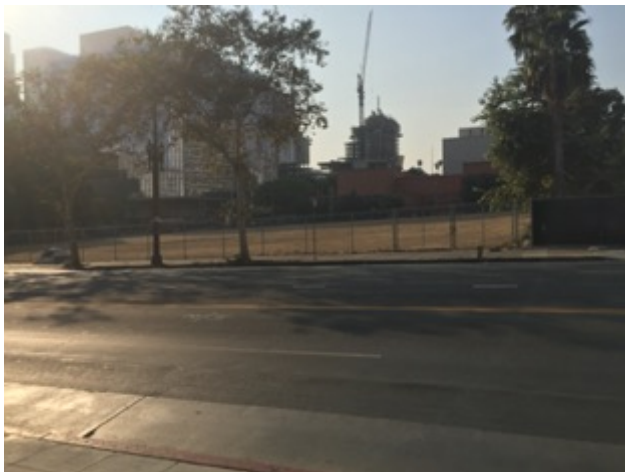
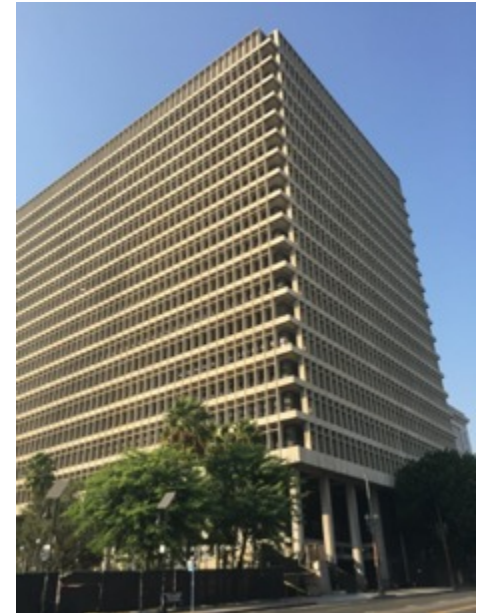
- CONUS-based experience
 - Go anywhere within the US
 - On-Demand data availability
- Temporal data handling
 - Specific data sets: congestion, demand, etc.
 - Display and compute capability
- Iterative intelligence
 - Integration of modeling and simulation tools
 - User in the loop
- Patent pending...

Composite Suitability Threshold



It is undesirable to place a vertiport between N. Spring St. and N. Broadway, downtown LA

Solution



It is NOT a good location for a vertiport



Bibliography

- Underlying map data © OpenStreetMap contributors
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Questions?

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