

Transportation Secure Data Center (TSDC)

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OVERVIEW: SECURE ARCHIVAL OF AND ACCESS TO REAL-WORLD DATA

Many applications need detailed real-world data:

- Emissions/air quality modeling
- Transit planning
- Travel-demand modeling
- Congestion-mitigation research
- Vehicle energy/power analysis
- Climate-change impact studies
- Evacuation planning

Recent increases in global positioning system (GPS) use

- Studies frequently collect GPS data
- Valuable time and location details
- Controls needed to protect study participant anonymity

The TSDC enables legitimate data use while preserving privacy

- First priority is privacy; the second is to maximize usability within privacy constraints for secondary applications
- Data collectors are relieved of burden to respond to individual data sharing requests; users have a central source from which to access data
- An advisory group, including data providers and users from industry, academia, and government, gives input and provides oversight



DATA HANDLING AND ACCESS



SECURE STORAGE

- Co-located with another secure data center
- Data archived and backed up

DATA PROCESSING

- Standardize formatting (household, vehicle, and point data)
- Quality control
- Add reference information (road network, economic, demographic, and land-use data)

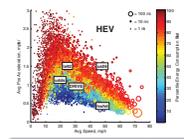
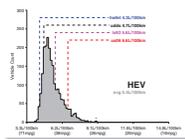
DOWNLOADABLE CLEANSED DATA

- Public website with simple user registration
- Trip summaries and second-by-second speed data (with no latitude and longitude details)

EXAMPLE DATA AND USES

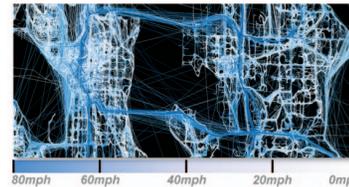
REAL-WORLD FUEL ECONOMY

- Speed traces derived from GPS add-ons to regional transportation studies provide great insight into real-world driving conditions.
- Simulation results of over 13,000 trips (shown on the right) highlight both the limitations of industry standard cycles and the sensitivity of powertrain efficiency to driving style.



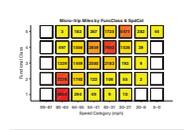
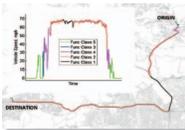
SPEED VISUALIZATION

- Overlaid lines representing 470,000 trips in the Puget Sound Regional Council's Traffic Choices Study (PSRC TCS) prior to filtering.
- Spurious lines highlight erroneous GPS point readings that are corrected during quality-control processing.
- Trips are colored by speed with dark road segments representing high-volume traffic corridors.



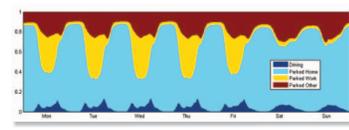
DRIVE DATA BY ROAD TYPE

- NREL has developed the capability to map-match raw GPS data to vehicle path of travel using externally developed road layers by integrating spatial reference information with logical sequencing.
- This allows NREL to aggregate drive data by road type and quantify the potential impacts of advanced technologies such as green routing, route connected controls, and wireless power transfer to improve the efficiency of commercial and personal transportation.



LONGITUDINAL TRAVEL PATTERNS

- The PSRC TCS collected 18 months of data from approximately 400 vehicles in the Seattle area to evaluate responses to time- and location-variable road tolling.
- The plot to the right shows an average week of travel behavior for the study participants.
- This dataset has been used extensively in the economic analysis of advanced vehicle technologies—such as plug-in hybrid electric and battery electric vehicles—to estimate consumer operating costs and the fraction of miles achievable in charge-depleting mode.



CURRENT TSDC FOOTPRINT (Data to be added as available)



TSDC NATIONAL DATASETS

- Puget Sound Regional Council
- Atlanta Regional Commission
- Southern California Association of Governments
- Texas Department of Transportation



CONTROLLED ACCESS TO DETAILED SPATIAL DATA

- Interested users must complete application process
- Analysis description
- Terms of use and confidentiality legal agreements
- Remote connection to secure environment
- Multiple firewalls; data transfer prohibited; user may request aggregated results
- Standard software tools provided
- For database query, GIS visualization, and statistical analysis
- Users may request additional tools and reference information

CONTACT INFORMATION

- To apply for spatial data access
- To discuss contributing data
- To ask further questions

Email: jeff.gonder@nrel.gov
www.nrel.gov/vehiclesandfuels/secure_transportation_data.html

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