TRC Scholars at SRC 2016

Quantifying the Effects of Oxidized Biodiesel on Particulate Matter and NOx Emissions from a Light-Duty Diesel Engine.

Jack Reed (Britt Holmen) 11:15am in the Jost Foundation Room, 422.

Biodiesel is a renewable fuel source that, over recent years, has become a widely accepted alternative to conventional petroleum diesel fuel when blended on a volumetric basis. It is derived from plant oils or animal fats by the process of transesterification that converts triglycerides in the feedstock into fatty acid methyl esters, or FAMEs. Biodiesel composition is linked to the properties of the feedstock source (i.e., animal fats or plant oils), and the composition has a significant effect on emission levels of specific pollutants from diesel-fueled vehicles. Biodiesel has been reported to reduce carbon monoxide, hydrocarbon, and particulate matter emissions, but increase NOx emissions.

A number of fuel quality studies in recent years have documented an alarming number of fuel samples dispensed at retail stations that fail the oxidation stability requirement set by the American Society for Testing and Materials (ASTM). However, there is insufficient evidence regarding the quantification of emissions of oxidized biodiesel from light-duty diesel vehicles. The FAMEs in biodiesel have two important effects on fuel storage properties. There is higher inherent oxygen content in the fuel as well as the presence of double bonds that are relatively easily oxidized by contact with air in the headspace of a fuel tank. This research compares the oxidized and unoxidized biodiesel fuel PM and NOx emissions from the Transportation Air Quality Lab Volkswagen engine. Data analysis aims to relate emission differences to the detailed chemical composition of the FAMEs and oxidation byproducts in the starting fuel.

Spatial Accessibility, Perceived Barriers, and Visitation in National Park System

Xiao Xiao (Robert Manning) 11:30 Chittenden Room

Spatial accessibility is important for national parks management because it influences connections and relevancy between national parks and all population. Although visits to national parks are increasing, racial/ethnic minority groups are relatively underrepresented in national parks compare to Whites, and inadequate accessibility to national parks may be one of the reasons for this issue. This study examines spatial accessibility to national parks from different geographic locations across the United States, and assesses the equality of spatial accessibility of national parks for different racial/ethnic groups. Study also estimate the effects of spatial accessibility and factors associated with marginality, subculture, and discrimination hypotheses on visitation to national parks among racial/ethnic groups. Study results suggests the accessibility to national parks varies greatly in different geographic areas, large metropolitan areas tend to have higher levels of accessibility to national parks than none-core rural areas. Moreover, Blacks and Hispanics generally have higher levels of accessibility to national parks than Whites, especially within 5km and 25 km distance radius. Study results also show that spatial accessibility can be an important factor to explain differences of visitation rates between Hispanics and Whites, however, it has no impact for explaining the differences of visitation between Blacks and Whites. Subculture related factors are the primary reasons for the lower visitation rates of Blacks. Study results help the NPS understand the spatial structure of national parks, provide visual information to visitors about proximate national parks and recreation opportunities, and identity effective management strategies to enhancing visitation of racial/ethnic minority groups from different geographic areas.

An examination of equitable access to inter-regional travel

Hannah Ullman (Advisor: Lisa Aultman-Hall)   POSTER 19A- 10-11:30a

While accessibility is defined by the spatial convenience of destinations or services available to an individual (Páez et al, 2012), mobility is the speed and ease of traverse one experiences through various modes of transportation that are used to arrive at a desired destination (Rogalsky, 2009). Accessibility and mobility in urban settings are well-researched topics in the transportation equity conversation. However, the study of inter-regional, especially in rural planning and policy, is often left out of research due to the lack of applicable data. There are many underserved groups in transportation including those disadvantaged by accessibility to transit service, access to automobiles and ability to walk or bicycle due to location, safety or physical disability. These factors often correlate with race, income, gender, age, disability, and immigration status.

The concepts of accessibility and mobility are framed by the idea that in rural areas, both are necessary for a decent quality of life and that by having less of the two, underserved groups tend to have fewer job opportunities and have a harder time reaching essential services. To achieve a higher quality of life, individuals must build up their social capital, where arguably transportation to both local *and* inter-regional locations with services and activities helps create bonding and bridging capital, and that neither *just* local nor *just* regional accessibility and mobility can serve all the needs that underserved groups have. This study uses 1) survey data from the Vermont Agency of Transportation, the National Household Travel Survey, and Ohio Department of Transportation; as well as in-depth interviews in Vermont to gauge the gap between low- and high-income individuals' use of long-distance travel to achieve a higher quality of life. This poster presents preliminary results from the quantitative datasets and the design for the qualitative data collection using interviews.

Using Mobile Apps to Analyze Long Distance Travel Data

Benjamin Kaufman (Advisor(s): Lisa Aultman-Hall) Poster 27C – 2:00-3:30p

Abstract:

Traditionally, travel behavior data have been collected using phone or web-based surveys that require respondents to recall their travel behavior over the past couple of months. The focus of these studies has often been on urban and regional daily travel, leaving a gap in our understanding of how people travel long distances. An increased ability to understand long distance (>100miles) travel allows us to better map human behavior, analyze the impacts of transportation on the environment, and predict future travel based on our changing world. Mobile technology offers new potential for the collection of travel data.

This study aims to develop an algorithm to extrapolate information on long distance trip origins and destinations from mobile device applications. Challenges arise in minimizing the amount of data needed, differentiating between layovers at airports from true stops, and obtaining data while users have inconsistent cell service. For this study, GPS data were collected from 10 volunteers over a period of 3 to 5 months using the Moves™ app, a physical activity diary by developer ProtoGeo Oy. Another dataset was generated through interviews with the volunteers to identify actual long distance trips they made to serve as a comparison tool when testing the new algorithm's accuracy. These two sets of data are compared using various frequencies of data selection from the Moves dataset to determine an optimal algorithm. The algorithm developed will return data that maximizes privacy for participants, accuracy of long distance travel and minimizes data requirements and missed trips. The new algorithm will aid in facilitating future data collection methods by decreasing user burden for long distance travel surveys. Next steps include expanding the test dataset to include more participants over longer periods of time and analysis of long distance travelers' mode choices.