

Regional Analysis of Freight Movement by Vehicle Classification

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Abstract : The surface transportation of freight is particularly vulnerable to storm and hurricane disasters, while at the same time, it is the primary transportation mode for delivering medical supplies, fuel, water, and other essential goods. To better plan for commercial vehicles during an evacuation, it is necessary to understand how these vehicles travel during an evacuation and determine if this travel is different from the general public. The research investigation used Florida's statewide continuous-count station traffic volumes, where then compared between years, to identify locations where traffic was moving differently during the evacuation. The data was then used to identify days on which traffic was significantly different between years. While the literature on auto-based evacuations is extensive, the consideration of freight travel is lacking. To better plan for commercial vehicles during an evacuation, it is necessary to understand how these vehicles travel during an evacuation and determine if this travel is different from the general public. The goal of this research was to investigate the movement of vehicles by classification, with an emphasis on freight during two major evacuation events: hurricanes Irma (2017) and Michael (2018). The methodology of the research was divided into three phases: data collection and management, spatial analysis, and temporal comparisons. Data collection and management obtained continuous-co station data from the state of Florida for both 2017 and 2018 by vehicle classification. The data was then processed into a manageable format. The second phase used geographic information systems (GIS) to display where and when traffic varied across the state. The third and final phase was a quantitative investigation into which vehicle classifications were statistically different and on which dates statewide. This phase used a two-sample, two-tailed t-test to compare sensor volume by classification on similar days between years. Overall, increases in freight movement between years prevented a more precise paired analysis. This research sought to identify where and when different classes of vehicles were traveling leading up to hurricane landfall and post-storm reentry. Of the more significant findings, the research results showed that commercial-use vehicles may have underutilized rest areas during the evacuation, or perhaps these rest areas were closed. This may suggest that truckers are driving longer distances and possibly longer hours before hurricanes. Another significant finding of this research was that changes in traffic patterns for commercial-use vehicles occurred earlier and lasted longer than changes for personal-use vehicles. This finding suggests that commercial vehicles are perhaps evacuating in a fashion different from personal use vehicles. This paper may serve as the foundation for future research into commercial travel during evacuations and explore additional factors that may influence freight movements during evacuations.

Keywords : evacuation, freight, travel time, evacuation

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