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Leveraging the California Highway Incident Processing System for Traffic Safety Policy and Research

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Issue

Accurate data on crashes and other traffic incidents are critical for analyzing the rates, costs, and causes of crashes, and for evaluating the effects of safety policies and engineering solutions. There are two official sources of data on traffic incidents in California: 1) the Statewide Integrated Traffic Records System (SWITRS),¹ managed by the California Highway Patrol (CHP), which includes post-processed data on traffic incidents leading to human injury or death; and 2) Caltrans' Performance Measurement System (PeMS),² which includes data on traffic incidents as well as traffic counts, lane closures, and other information. Both databases draw from CHP incident reports that describe the location, conditions, and other important details and observations surrounding each incident. Traffic safety researchers rely heavily on both databases, but each has limitations. PeMS data are limited to state highways. Incident data can take months to appear in SWITRS and may omit crucial information.

In 2015, the Road Ecology Center at UC Davis developed a third method, the California Highway Incident Processing System (CHIPS). CHIPS is a currently private database that assembles incident data from the CHP's real-time incident reporting website during the short time the incident reports are available. CHIPS is a promising new source of information for traffic safety researchers and policymakers. Through case studies, the Road Ecology Center research group examined three ways in which CHIPS can be used to improve understanding of road conditions and highway safety, and support data and policy analyses.

Key Research Findings

The CHIPS database is more complete than other available sources. The PeMS database only contains 63% of the traffic incidents available in CHIPS even though they share the same source. This may be because PeMS is limited to state highways, while CHIPS covers many major roads and offers a much broader spatial coverage (Figure 1). Certain incident types such as fatalities are also greatly under-reported in PeMS. In the SWITRS database, 44% of the records lack location data, and many of those with geospatial coordinates incorrectly show the incident occurring in the ocean. This makes finding a one-to-one correspondence between SWITRS and CHIPS incident records difficult.

The CHIPS database allows for timely analysis using real-time data. UC Davis researchers used CHIPS to provide insight into the traffic impacts of the COVID-19 pandemic and California's "shelter-in-place" orders. The real-time nature of CHIPS enabled researchers to analyze traffic data almost immediately and show the immediate impacts of the shelter-in-place orders on traffic crashes and injuries.

CHIPS can inform efforts to reduce wildlife-vehicle conflict. CHP officers create incident reports related to live or dead animals on the roadway. CHIPS includes close to 75,000 of these records of wildlife observations and wildlife-vehicle collisions. Wildlife-vehicle conflicts pose a danger to both wildlife and human drivers. CHIPS data can be used to identify hotspots for these interactions and plan solutions to reduce these conflicts.

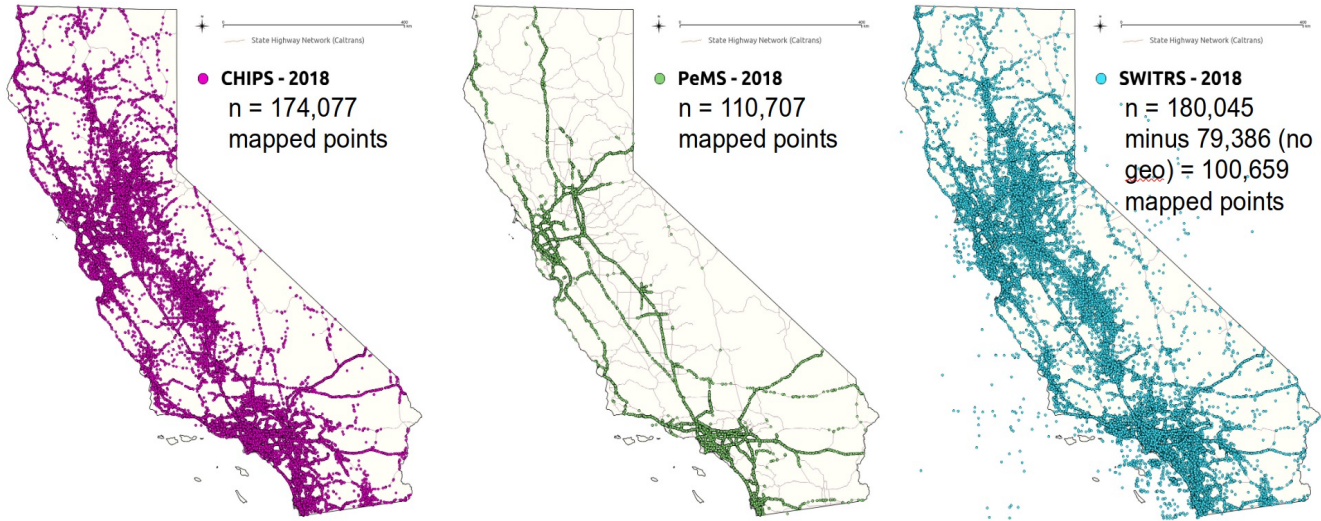


Figure 1. Maps of the spatial distribution of 2018 incidents in CHIPS, PeMS, and SWITRS. PeMS data is only available on state highways, and SWITRS has many incident points in the Pacific Ocean.

CHIPS could help researchers connect traffic incidents with the health outcomes of those involved. The ability to track crash victims from the incident scene to the hospital and connect health outcomes with the conditions that led to the incident is important for evaluating the effectiveness of traffic safety policies. However, California does not have a system that integrates these data. CHIPS could potentially be combined with the SWITRS database and cross-walked with trauma treatment datasets to achieve this connection.

Policy Implications

Transportation researchers and policy makers should have the best data available to identify issues and make decisions, and this research shows that the CHIPS database has more records available than PeMS and more complete and accurate data than SWITRS. A combination of SWITRS and CHIPS may provide a more complete and reliable data source than either one individually, though linking these

data has not yet been achieved. For CHIPS to be more widely adopted by the research community, the system would need long-term financial support (it is currently not funded) as well as some additional tools such as a publicly available, interactive data portal to make accessing these data easier for researchers and decision makers.

More Information

This policy brief is drawn from the white paper, “Leveraging the California Highway Incident Processing System for Policy and Research,” prepared by David Waetjen and Fraser Shilling from the Road Ecology Center, University of California, Davis. The white paper can be found here: www.ucits.org/research-project/2020-02/

For more information about the findings presented in this brief, contact David Waetjen at dwaetjen@ucdavis.edu.

¹ <https://www.chp.ca.gov/programs-services/services-information/switrs-internet-statewide-integrated-traffic-records-system>

² <http://pems.dot.ca.gov/>

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