



A102 NamUs Location Data: Cluster Analysis of Migrant Deaths at the Texas-Mexico Border From 1990 to 2017

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Learning Overview: The goal of this presentation is to identify significant spatiotemporal clustering of migrant deaths along the Texas-Mexico border with SaTScan™ software, direct search and recovery efforts based on those clusters, and assess how informative the location data reported on the National Missing and Unidentified Persons System (NamUs) is.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing an example of the application of SaTScan™ and ArcGIS® software utilizing Space-Time Scan Statistics (STSS) to detect migrant mortality clusters and assess the accuracy of publicly available locational data from NamUs.

Migrant deaths in Texas drastically increased in 2012, eclipsing the other United States-Mexico border states, and remain high to this day.¹ Local law enforcement, medical examiner's offices and contract pathologists, academic and humanitarian institutions, and United States Customs and Border Patrol (USCBP) face unique challenges in locating and recovering these remains. Specifically, a majority of land in Texas is privately owned (over 95%) and therefore not regularly patrolled by local law enforcement without permission by landowners.¹ Further, there is not systematic collaboration in search and recovery practices because jurisdiction is divided along county lines, of which there are 254 in Texas.¹

Implementing spatiotemporal analyses of migrant death recovery sites could overcome the challenges to search and recovery efforts ongoing in Texas. STSS can direct efforts by indicating geographic and/or seasonal patterns in death clusters. The goal of this research is to detect significant spatiotemporal clustering of unidentified deceased migrants found along the Texas-Mexico border between 1990 and 2017.

Methods: A research area of 31 Texas counties was defined, in which the county was along the border or contained a USCBP check point, constituting ostensibly a second border.¹ NamUs case report data dating from 1990 to 2017 were obtained from these counties where the case notes indicated the unidentified decedent was a probable migrant (i.e., physical description, anthropological analysis, or recovery context).² These parameters yielded a total of 659 cases.

Locational data was derived from three different fields within the Circumstances section of each of the reports: (1) auto-generated coordinates through a Google® Maps link, (2) Global Positioning System (GPS) coordinates directly entered by a case manager, or (3) county centroid coordinates based on the location remains were found. All GPS coordinates were converted into decimal degrees for consistency. ArcGIS® 10.6.1 was used to calculate the centroid coordinates.² A file was prepared with ArcGIS® 10.6.1 containing case, date found, and location data for analysis in SaTScan™ v.9.6.^{2,3}

SaTScan™ performs STSS with a 3D circular window, the base of the window representing the geographic space and the height corresponding to time.³ SaTScan™ identifies significant spatiotemporal clusters in the Texas border region if, for a specific time period, that area has a higher proportion of migrant cases compared to the remaining geographical areas.³ The spatial window size was set to not exceed 10% of the study area to ensure smaller cluster phenomena could be detected as well as indicate temporal trends, such as clustering in particular seasons.

Results/Conclusions: Significant spatiotemporal clusters were found with Google® Maps and county centroid coordinates, specifically centering near West Texas around El Paso County, Southwest Texas around Maverick county, and South Texas around Brooks county. However, identifying meaningful clusters was contingent on the accuracy of location data available through NamUs. The location data was of mixed scale and therefore cases were not necessarily comparable when trying to identify areas with high mortality incidences. None of the significant clusters' dates corresponded to a season or was narrow enough to be associated with USCBP border securitization activity. No significant clustering was detected using case manager's GPS coordinates, which was likely due to relatively few data being available ($n=75$). The clusters are more likely indicative of documentation behavior by local law enforcement, USCBP, medical examiners, or contract forensic pathologists in the region.

Reference(s):

1. Gocha, Spradley, and Strand. 2017. Bodies in limbo: Issues in identification and repatriation of migrant remains in South Texas. In *Sociopolitics of migrant death and repatriation: Perspectives from forensic science*, eds. Latham, and O'Daniel, 143-156. Cham: Springer.
2. ESRI. 2018. ArcGIS 10.6.1. Redlands, CA. <https://www.esri.com> (19 March 2019).
3. Kulldorff 2018. *SaTScan User Guide* 9.6. <http://www.satscan.org> (19 March 2019).

NamUs, SaTScan, Cluster Analysis