



## Physical Anthropology Section - 2014

### H116 Utilizing Open GIS Software to Map the Deaths of Undocumented Border Crossers

Caitlin Vogelsberg, MS\*, Michigan State University, Dept of Anthropology, 354 Baker Hall, East Lansing, MI 48824

After attending this presentation, attendees will better understand the utility of Open Geographic Information Systems (OGIS) in the field of forensic anthropology for mapping the recovery location of many individuals over a large geographic area.

This presentation will impact the forensic science community by highlighting the advantages of GIS mapping software when dealing with a large number of human remains, many of them skeletal and incomplete, over a long period of time.

The Pima County Office of the Medical Examiner (PCOME) investigates all unattended and suspicious deaths, among others, for 12 of the 15 counties in Arizona. Of those 12, five counties are located either along the U.S.-Mexico border or directly north of them and are known to have active migrant routes. In total, these five counties cover over 27,000 square miles, most of which are sparsely populated and contain harsh desert and mountainous terrains. Since 2001, over 2,100 undocumented border crossers have perished in the Sonoran desert within the PCOME's jurisdiction. It is the goal of the PCOME to identify these individuals and eventually make possible the return of their remains to their family. Over the past decade, the identification rates at the PCOME have averaged 64% (or approximately 1,300 individuals) with most of these identifications primarily being made through facial recognition or fingerprint comparison.<sup>1</sup> The majority of the nearly 800 unidentified remains cases are either skeletonized or significantly decomposed, so that other techniques, such as DNA comparisons, must be used for identification. Oftentimes, these types of cases are not complete bodies or skeletons either due to animal scavengers consuming and scattering the remains or due to insufficient recovery techniques.

To fully comprehend the magnitude of deaths occurring in the Sonoran desert, the PCOME partnered with Humane Borders, Inc., a local Non-Governmental Organization (NGO), to develop a free, open, source, online mapping system to "grant access to high-quality downloadable spatial data regarding migrant deaths."<sup>2</sup> The end result, which can be accessed at [www.humaneborders.info](http://www.humaneborders.info), provides three mapping tools to plot the deaths of undocumented border crossers in southern Arizona. All three are available to the public in both English and Spanish. The first mapping tool allows for either a case-specific search by a decedent's name, or more generalized searches using such criteria as year of death, manner of death, decedent sex, or a combination of the available parameters. The second provides a spatial bounding-box to search for a known decedent or group of individuals within a specific geographic area as defined by the user. The third mapping tool is structured so that an individual case can be mapped using the PCOME case number to determine its location relative to landmarks or other cases in the area. It is this last tool that is most useful to the PCOME in the search for other potentially related cases within the vicinity of any particular set of remains.

Before the creation of OGIS, remains found in different locations or at different times could only be re-associated through blind genetic profile matches performed periodically within the DNA laboratories' internal database. However, a search conducted using the OGIS platform can identify other cases for direct genetic comparison, so that the remains may be re-associated in weeks or months rather than years, and ideally before the remains are released for cremation or returned to the family. Since the launch of the software in May 2013, two cases have been determined to be associated by PCOME Forensic Anthropologists, and DNA testing is in progress to prove if they are indeed from the same individual. As more cases become available on the OGIS website, many additional sets of remains are expected to be tentatively re-associated before being sent for DNA testing.

In conclusion, the use of geographic technology within the field of forensic anthropology opens up a new pathway for dealing with such disasters as that seen in southern Arizona. In addition, these resources are useful for other jurisdictions experiencing an increase in migrant deaths; not only for those investigating the deaths, but also for the families of the missing migrants searching for information.

#### References:

1. Pima County Office of the Medical Examiner Annual Report, 2012.
2. Arizona OpenGIS for Deceased Migrants. Tucson, AZ: Humane Borders, Inc., 2013, <http://www.humaneborders.info> (accessed 22 July 2013).

#### Undocumented Border Crossers, Migrant Deaths, Open GIS