

Conflict in the Donbass

Mapping the War in Eastern Ukraine

Background

In 2014, Russia annexed Crimea from Ukraine and began a hybrid warfare campaign in Eastern Ukraine. The Russians used a combination of conventional and unconventional tactics to support pro-Russian Separatists in the Donetsk and Luhansk Oblasts, commonly referred to as the Donbas region. While the annexation of Crimea went relatively smoothly, the conflict in the Donbas quickly ground to a stalemate between the Russian supported separatists and the Ukrainian government. Despite two attempts to negotiate a ceasefire, known as the Minsk Protocol and Minsk II, the conflict remains active and violent. In other words, these agreements have been ceasefires in name only.

The goal of this project is to more accurately depict the boundaries of the battlefield in the Donbass region. Prior efforts to measure the impact of the conflict in Ukraine have placed a line of contact based on political boundaries between raions (admin level 2). The conflict, of course, has not occurred along these neatly drawn boundaries. Therefore, using publicly available open source data, the goal of this project is to measure the real zone or zones of conflict between Ukrainian and Separatist forces and the impact of the conflict on the Donbas Region.



Methods

After cleaning the dataset to remove imprecise or erroneous entries, the data was imported into ArcGIS using the latitude and longitude coordinates within each entry. Using the spatial analyst tool, violent incidents hotspots were calculated using kernel density for points of 1,000m and a search radius of 30,000m. There was no weighting by casualties or form of violence. This procedure was run on the entire dataset and on each year separately. Each raster produced by the kernel density tool was classified into quantiles. The annual graphics are displayed below. The overall dataset was used to calculate population at risk and the population loss by raion.

To generate the change in conflict map, the 2014 raster was subtracted from the 2017 raster using the raster calculator tool. The resulting raster shows the difference in absolute terms between observed violent incidents between the first year of the conflict, 2014, and the most recent year data is available, 2017. The resulting raster was then classified to display areas of significant decreased violence in shades of blue and areas of increased violence in shades of red.

Finally, the project concluded with calculations of population change within the high and moderate intensity areas of violence. The areas considered high and moderate intensity were determined by reclassifying the highest and second highest quantile within the overall dataset raster. The area of each raion considered high or moderate intensity was then calculated by using the tabulate area tool. The data was then exported to Excel. For each raion, the area of high risk was divided by the total area of the raion to produce the percentage of area at high risk. The raion level population data was then multiplied by the percentage of the raion considered high risk resulting in the population at high risk per raion. The same procedure was conducted for moderate risk areas.

This population data is represented in this presentation in two ways. First, the data was aggregated to the Oblast level (admin level 1) and displayed in a table. Second, the data was presented as a scatter plot using percentage population loss as the x axis and percentage high intensity of violence as the y axis. A regression line illustrates the correlation between loss of population and high intensity conflict.

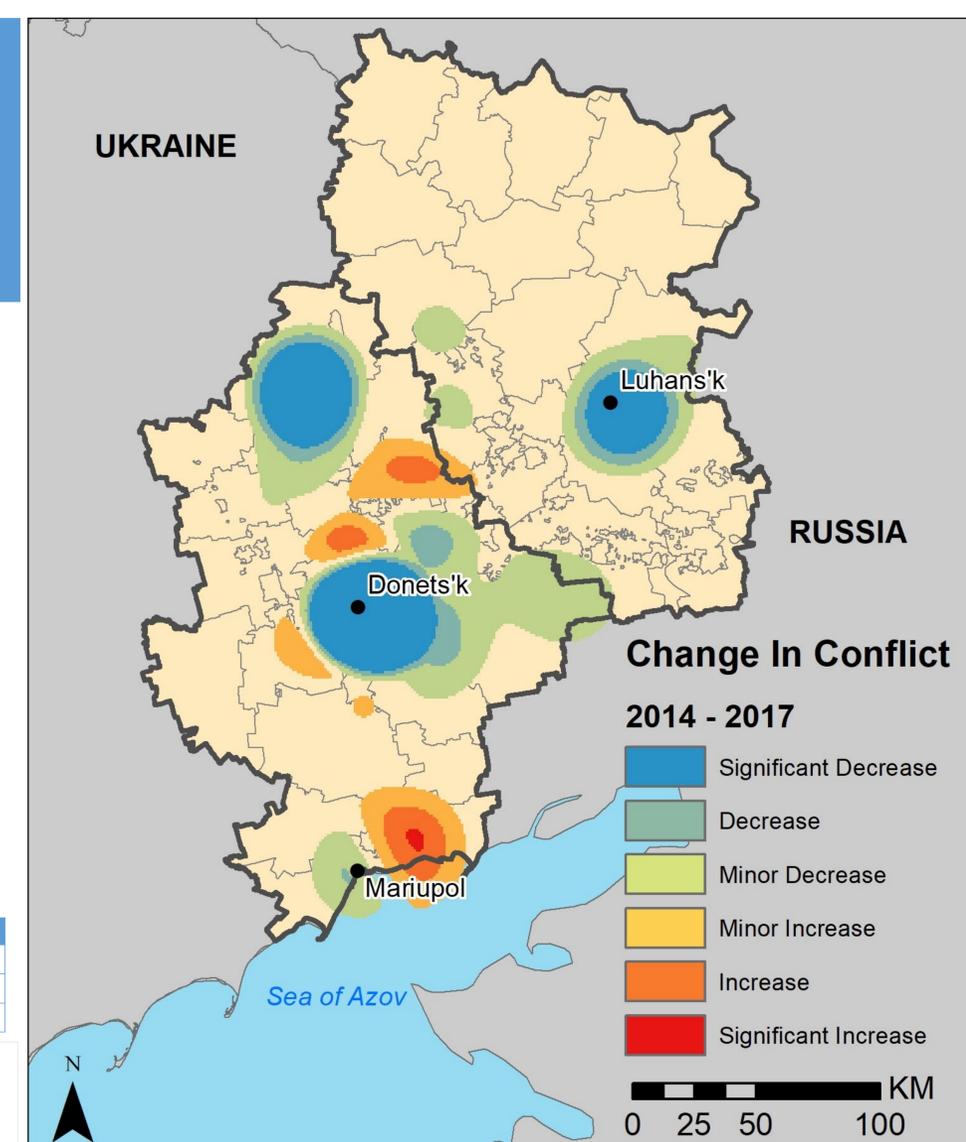
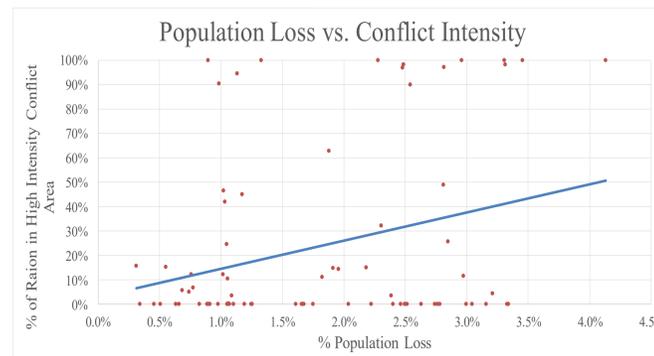
Results and Limitations

The rasters produced by the initial kernel density analysis reveal that violence around the Donetsk capital remains relatively high each year. The change analysis, however, demonstrates that the violence inside the Donetsk and Luhansk capital cities and the major port city of Mariupol actually decreased from 2014 to 2017. The violence appears to have increased slightly along the southern coast and in some rural spaces between the major urban areas.

Calculations indicate a slight positive correlation between the percent of a raion within a high intensity conflict zone and the percent of the raion's population lost. Calculations also indicate that over 2 million Ukrainian citizens live within the moderate risk zone and nearly 1 million live within the high risk zone. This conclusion is an estimate based on an assumed even distribution of population over each raion.

The analysis is primarily limited by the methods used to collect underlying data. Due to the risks associated with operating in the region, the data used in this analysis was an aggregation of open source reporting. Approximately 25% of the dataset had to be deleted due to a lack of precision in location. Data produced by the ongoing OSCE Special Monitoring Mission (SMM) is likely to be much more precise.

Location	Moderate Intensity	High Intensity
Donetsk	870458	314808
Luhansk	1198360	651745
Total	2068818	966553



MAP PROJECTION: Ukraine 2000 3-Degree GK Zone 9

SOURCES: Uppsala Conflict Data Program (2018), HALO Trust (2018), UN Humanitarian Data Exchange, UN Office of Coordination for Humanitarian Affairs - Ukraine, ESRI

THE FLETCHER SCHOOL OF LAW AND DIPLOMACY
TUFTS UNIVERSITY

Cartographer: James Kelly
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