

Visualizing the Spread of Zika

New Mexico

Supercomputing Challenge

Final Report

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ABSTRACT: Zika is a mosquito and sexually transmitted disease that caused microcephaly in infected infants. The mosquito that causes Zika *Aedes aegypti*, is a cause for concern given its active in the day leaving people more at risk. This project entailed visualizing the places in the world that are safe for women to bear children, using the virtual reality of Google Cardboard and the mapping platform of ArcGIS. The results indicated that areas near the equator, given the intense heat are at risk for Zika. Men and women who are sexually active should be cautious in these zones. Safety measures should be evaluated for efficiency to reduce the spread of the virus. Since climate change is a noted area of exploration, the gradual heating of the Earth's atmosphere should be considered to project future places at risk of acquiring the detrimental disease.

STATEMENT: Zika has been around since the late 1940's, but was not discovered to be sexually transmitted until 2008. This was the first instance of a traditionally insect-transmitted disease being spreadsexually. A few years later, in March 2014, birth defects due to Zika also began to manifest in French Polynesia. Thus began the trend of babies born with microcephaly, meaning small heads. The Zika transmitting mosquito, *Aedes aegypti*, is more dangerous than traditional mosquitoes, because it is active during the day, thus putting more people at risk. Travel statements were issued to expectant mothers planning to visit the country, warning of the danger to fetuses exposed to Zika. In the past, people have been unaware of exactly where it is safe to travel if you plan on having a baby in the near future. We hoped to change this with our project by creating a virtual reality map of the places where the *Aedes Aegypti* is able to live based on humidity, temperature, and elevation.

DESCRIPTION: Using one of the Google Virtual Reality Software Developer Kits and Unity Game Engine, we have been working on creating an application for Google Cardboard. Using Arcgis, a cloud-based mapping platform, we created a map displaying the elevations, humidity, and temperatures of the world for a standard July to show where people are most at risk during the upcoming summer.

DISCUSSION: We verified our results by comparing our ArcGIS map to that of the Central for Disease Control (CDC) and several other graphical depictions of where Zika is most prominent globally. According to our predictions, based on our boundary points in the areas of temperature, humidity, altitude and elevation our model accurately showed the regional limitations for zika and the places where it could potentially spread.

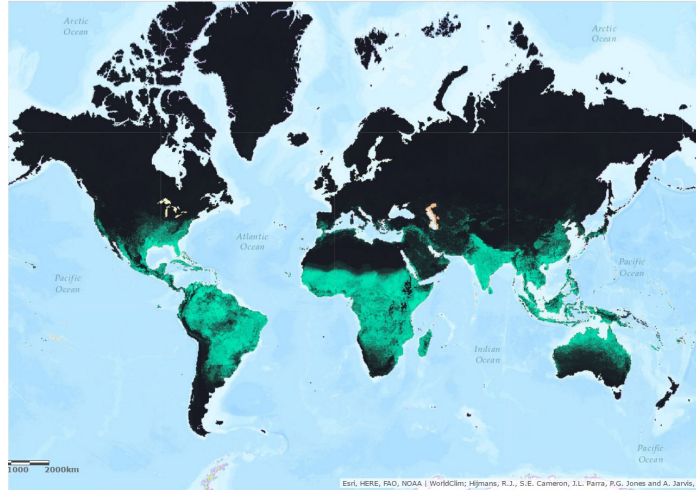
RESULTS: The results indicated that areas close to the equator will put women at a higher risk of acquiring Zika. By referencing this map, users will be able to see where exactly Zika is probable and can plan accordingly. It also shows countries and regions that should be put on alert and begin preparing for a possible outbreak this summer, since they are within the habitable zone of the *Aedes Aegypti* mosquito.

CONCLUSIONS: In conclusion our model showcased that areas near the equator, given the extreme heat are at most risk for Zika. Men and women should be wary of these areas when traveling while sexually active. Although women are expected to be most vigilant about their health during a pregnancy, men also need to be aware of the risks associated with Zika. We hope that this project opens the eyes of people and helps minimize the traumatic effects of Zika.

FUTURE WORK: Since our model is a graphical representation of the safe places in the world that will ensure healthy infant growth (Zika free zones), our next step would be to consider the role of global warming in the development of Zika. A predictive model that encompasses the current trend of climate change will be implemented to further verify the places at risk for Zika and most importantly the places that are potentially at risk for acquiring the virus. Based on these predictions we can evaluate the effectiveness of the current measures used to prevent the virus from spreading, and come up with new ways to make more efficient.

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Map of Zika Viable Regions

ACHIEVEMENTS: Our biggest achievement this year was creating a program that has the potential to save lives by educating in a fun and interactive manner, and teaching ourselves a new coding platform.

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