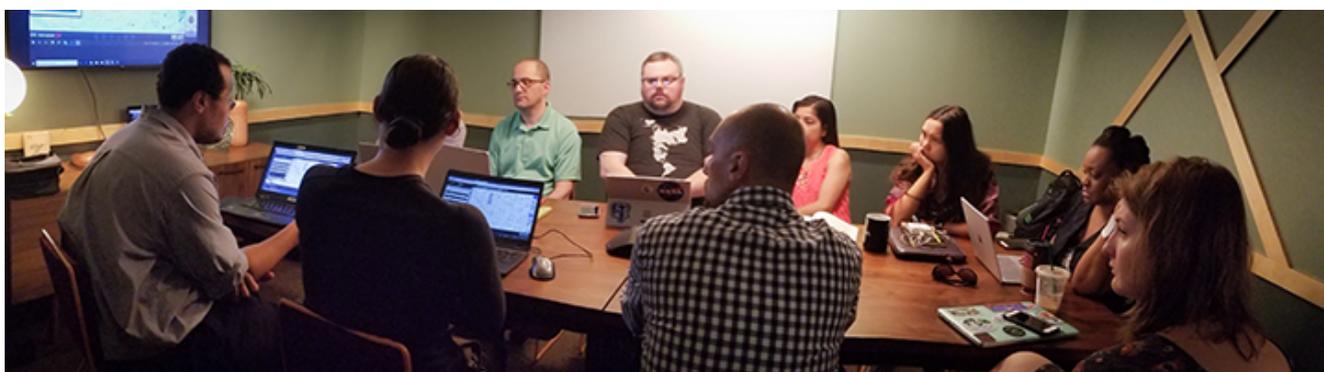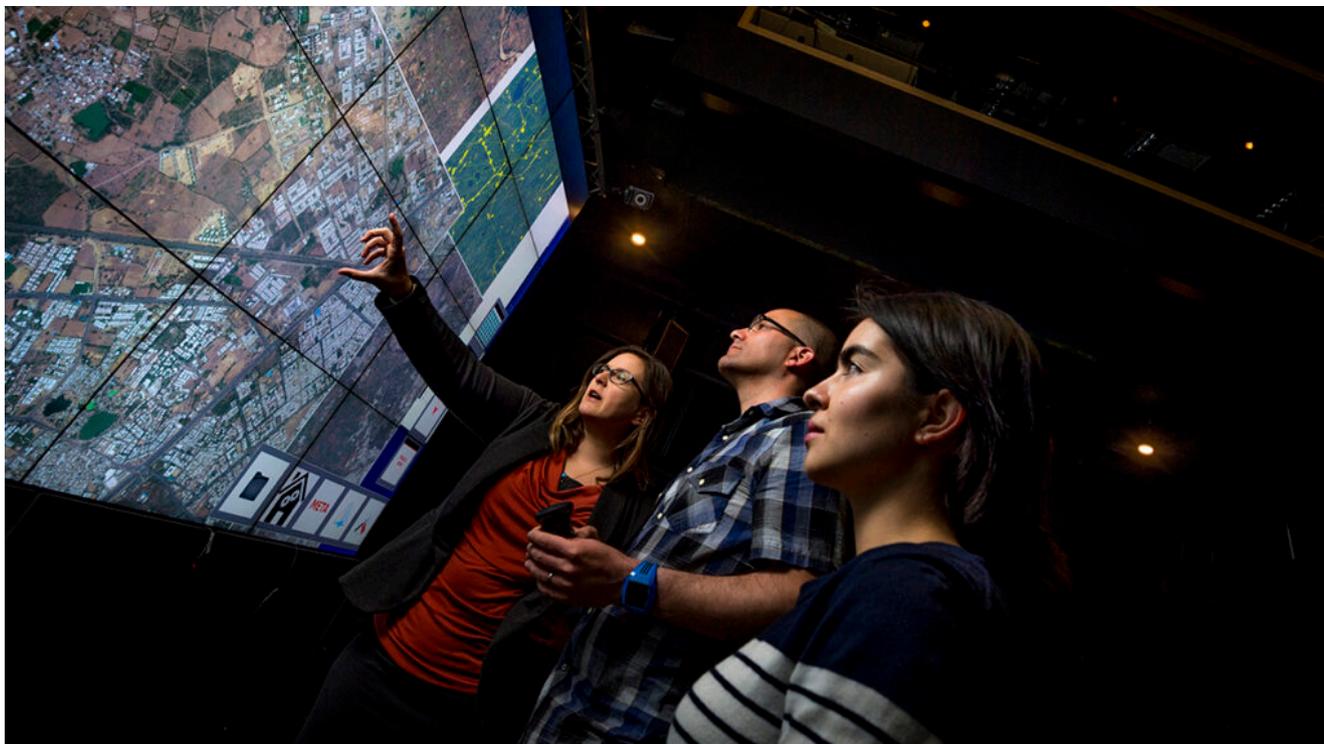# Big Pixel Initiative brings hurricane research to Washington

GPS graduates Dana Kozhakhmetova, MIA '18 and Joanna Valle Luna, MIA '18 harness the power of big data to help solve the economic impacts of hurricanes

By Rachel Hommel | GPS News

At UC San Diego's School of Global Policy and Strategy (GPS), students become masters of quantitative research methods. When an opportunity to work in big data or in the emerging big geodata comes calling, you answer it.

In conjunction with New Light Technologies, two recent graduates had the opportunity to combine their passion for technology with Geographic Information Systems (GIS) in Washington, D.C. this summer. Gaining hands-on experience to understand spatial patterns, the project links remote sensing, big data, climate and economic development, all while working with state-of-the-art analytical tools.

"Big Pixel interns working at New Light Technologies this summer are applying their skills in GIS and remote sensing to analyze how hurricanes affect regional economies in the United States," said Professor Gordon Hanson who also co-leads the Big Pixel Initiative at UC San Diego. "They are doing technically sophisticated work that addresses first-order issues of policy importance."

As a requirement, interns must have completed courses in GIS and Spatial Data Analysis and/or Advanced GIS and Remote Sensing, taught by former GPS lecturer and New Light Technologies senior researcher Ran Goldblatt. He highlights this as an advantage — students having been exposed not only to policy but also to qualitative research methods.

"For these students, this is their first job in the real world after graduating from GPS, and I want to help them develop their professional career – from defining the research question to finding the right methodology and tools to answer this question," said Goldblatt. "We want to encourage independent research and help them develop their skills in working with big data."

In the ten-week program, Kozhakhmetova and Luna will have the opportunity to assist in all stages of the research, including data collection, data preparation and analysis, from sources such as the Federal Emergency Management Agency (FEMA) and the U.S. Census Bureau. These real-world experiences in governmental and international agencies has proven invaluable.

"This opportunity offers a practical use of everything we have learned, starting from econometrics to GIS and remote sensing analysis," said Kozhakhmetova. "What I like most about geospatial analysis is the visualization. It is powerful for many people whose perception of information is incompatible with numbers and equations, like me."

As leading consultants to the government, New Light Technologies has provided services to FEMA for 12 years, including using satellite data to help them with disaster operations. Clients also include the World Bank and the Census Bureau of Statistics, among others.

From July through September, Kozhakhmetova and Luna will look at how hurricanes disrupt local economic activity in the short-run as well as how storm-related damage affects regions' growth trajectory in the long-run.

"Personally, I've seen the importance of this kind of information when working for the Minister of Economy in Mexico," said Valle Luna. "After Hurricane Odile in 2014 affected the whole south peninsula in Baja, I saw how geospatial tools could have been a great asset towards more efficient and accurate information."

Implementing what they learned in class, the project will allow graduates the opportunity to understand remote sensing analysis as it applies to the growing industry of big data. From defining recovery to natural disaster response and mitigation, the project will utilize lessons learned in GIS and Spatial Analysis taught by [Professor Gordon McCord](#).

"It is important to understand how exactly hurricanes and other natural disasters impact economic development. But then economic development is also a question in itself," said Kozhakhmetova. "There are a lot of moving parts in this research that need to be explored and answered, as they impact government decisions not only in the U.S. but around the world."

One of the biggest barriers in econometrics and impact evaluation is how to understand and identify potential bias coming from patterns. For natural disasters, these are highly correlated with spatial patterns. During the project, Kozhakhmetova and Luna search for and download relevant data from multiple sources, write and run codes in [Google Earth Engine](#) or [Stata](#) and create maps and panel data that allow them to analyze the economic characteristics of vulnerable areas and flood prone regions.

"We hope to create a robust geospatial data set that could be used as a reference for other researchers or future projects," said Valle Luna. "Currently, that data set doesn't exist, which makes it exciting to be a part of this great project."

Utilizing information about hurricane patterns from FEMA and census data, another project goal will be to collect and put together labor data using [Longitudinal Employer-Household Dynamics (LEHD)](#). Since labor and its changes is another potential way to measure changes in economic activity, this can help address the impacts of natural disasters.

"Everything in the world has a spatial dimension, whether it's policy, economics or disaster relief," said Goldblatt. "The industry is going towards big geodata to help us understand our world, not only for research but also as human beings."

Using their GPS toolkit, the project so far has allowed Kozhakhmetova and Luna to hone in on their career endeavors, with hopes to stay in GIS and big data fields. With so many applications in the modern world, the internship program hopes to start small and grow over the coming years, exploring our world at scale.

"Long-term disaster recovery is an important topic that needs to be understood and redefined, at the cross section between science and policy," said Ghermay Araya, New Light Technologies CEO. "We need to make sure the academic research continues to be done. We hope we can continue providing training to GPS students to do this."