

# MEGAN LINK – JAMES MADISON UNIVERSITY

## STATEMENT OF PURPOSE:

The Open Data Cube has the potential to become an outlet for countries all over the world to collaborate on Earth's datasets to run analyses. With the data and analyses we performed, we provided an effective example of how to use the Open Data Cube as a program and for detecting deforestation. Although we ran into problems along the way, these issues were handled and solved so in the future these setbacks will not happen in other areas. Our partners can use our workflow to continue detecting deforestation to reduce tree loss in Caquetá and Colombia as a whole. Before this project, the process to identify deforestation areas in Caquetá was time consuming and expensive. Our partners did not have much knowledge about the Data Cube despite implementing a Colombian Data Cube. We were able to identify areas of deforestation, validate them to reputable sources, and present our methodology to members of IDEAM so they could start a forest management program surrounding the areas we tested. Through our work, we were able to share an effective tool with another area in the world, and present vital information to help fight against deforestation in Colombia and start the process of reviving the Amazon rainforest. We created a user guide for our partners and other organizations to be able to see our process and follow our methods to save time, money, and data storage on unnecessary parts. Within a few years, the amount of interest and ability to make Open Data Cubes operational in various countries has increased immensely. The Open Data Cube's ability to make time series is important for users and audiences to see visually distinct differences in the world as time progresses. Since the software is open source, improvements to the Data Cube will grow exponentially because users all around the world can update and improve their own or other people's work at any time. CEOS, a supporter of the Open Data Cube initiative, wants to use our results and our experience as an example that a group of students with no previous knowledge of the Data Cube can effectively learn and use the software within a ten week term. This experience supports the initiative that the Open Data Cube is accessible and easy to use. The Open Data Cube is the future for satellite data analysis, and after this project, I, along with many others, readily promote this software.

## DESCRIPTION OF DATA SETS:

For this project, we utilized Landsat-7 Enhanced Thematic Mapper and Landsat-8 Operational Land Imager. The satellite data was pre-ingested into the Open Data Cube for our use. We analyzed data from 2000-2017 in Caquetá, Colombia, to detect differences in land cover over time that could be caused by deforestation. We had the ability to use Sentinel-1 data, but the algorithms were not fully functional in the Open Data Cube to be used for our analyses. With the satellite data, we compared changes in land cover to validation data that our partner, the Institute of Hydrology, Meteorology, and Environmental Studies (IDEAM), sent us along with Global Forest Watch data. We also used Google Earth Engine to study land cover changes observationally. Without the available satellite data, it would be very difficult to be able to identify deforestation areas without going into the forests themselves.