Coastal Inundation Mapping Course - NOAA Office for Coastal Management

With financial assistance from MESA, I attended a two-day intensive workshop on the mapping of coastal inundation risk using ArcMap on February 6th & 7th, 2020. This course was taught by two instructors from NOAA’s Office for Coastal Management and was hosted by the Washington Department of Ecology’s Coastal Training Program, which offers a variety of training opportunities throughout the year - everything from wetland plant ID to effective stakeholder engagement.

The course began with a discussion of vertical and tidal datums, which are the most critical building blocks to modeling how water behaves in coastal environments. The former represents the topology of the earth’s surface and can change due to geologic forces such as tectonic plate movement, land subsidence and coastal erosion. The predominant vertical datum is NAVD 1988 (quite old at this point), but new datums are set to be released by the National Geodetic Survey in 2022. Tidal datums on the other hand relate to average sea height during various tidal stages, averaged over a period called the “tidal epoch” (a period of ~20 years). This period corresponds to a cycle in the orbital path of the earth around the sun; the current tidal epoch is set to end this year. The takeaway of this portion of the course was the particular importance of using accurate data when trying to predict inundation, as well as the caution that our current data sets are aging and set to be replaced soon.

For the rest of the course, we worked through a variety of exercises that increased in complexity as we went. We started with some simple analyses comparing LIDAR DEMs (digital elevation models) with potential increases in water height (say from a riverine flooding). From there, we then explored comparisons of historical data from some large storms (Hurricane Sandy notably) with what our previous predictions would have indicated and learned how to include tidal variability data in our models. Towards the end of the course we moved into still more complex modeling that takes into account events such as storm surge and tsunamis. Finally, we assembled all the tools we had developed and put them together to map areas that are at greatest risk of inundation with the addition of sea level rise as a driving force.

Overall, this course was a great experience and taught me how to accurately predict areas at risk of inundation from various threats (storm surge, tsunamis, sea level rise, etc.), as well as the plethora of tools and databases that NOAA makes available to the public via online databases. I’m grateful to MESA for helping me cover the cost to attend and highly recommend others who are interested in doing something similar reach out to them to see if assistance is available.

For those interested in this subject, here are some of the main resources we used in this course:

tidesandcurrents.noaa.gov (tidal data for individual monitoring locations)

vdatum.noaa.gov (tidal datum conversion tool)

coast.noaa.gov/digitalcoast (main repository of NOAA coastal data)

hazards.fema.gov (FEMA flood hazard mapping service)

nhc.noaa.gov/surge (storm surge informational page and data)