Questions & Answers Part 4

Please type your questions in the Question Box. We will try our best to get to all your questions. If we don't, feel free to email Jamon Van Den Hoek (vandenhj@oregonstate.edu), Andrew Kruczkiewicz (andrewk@iri.columbia.edu), Michael Owen (m.owen@columbia.edu), or Sean McCartney (sean.mccartney@gmail.com).

Question 1: Why winsorize the data when the top and bottom percentiles may be of most interest (unless bad data, which can be filtered using quality flags in GEE)? Crops thermal shock, Heat stress, fire hazard, flood hazard are the first perils that come to mind thinking of extreme values.
Answer 1: We want the general trends along with the extreme values. With the WWF Flow Accumulation layer, there were some skewed variables that caused the extreme values.

Question 2: Is the exposure index a comparative measure among the camps we want to measure? Like a ranking?
Answer 2: We use it for two purposes, to use for comparison among camps and within camps themselves.

Question 3: Are the Bangladeshi refugee camps large in size because their usage stretches back to 1947, and then again in 1971, and now the Rohingya crisis?
Answer 3: It is not accurate to say that the camps are large due to the time frame that they were established. Large camps are large due to the influx of new refugees such as with Rohingya in 2017.

Question 4: What sources do you use when choosing variables to integrate in the index? What role do locals (by locals I mean people living there that know about the context, rather than refugees) play in informing about conditions?
Answer 4: We tried to find variables that already existed within GEE to make it more compatible to use on a global scale. Variable selection was also due to field work that was conducted within the area as well. Given the example covered in the presentation, the conditions have changed so significantly that it is important to understand the history of these areas.

Question 5: Following the Q2: If I would be interested in just one Camp, would the Exposure Index be informative (i.e., provide info to identify areas to prioritize help)?

Answer 5: At the sub-camp level, there is enough information to be informative given high resolution data. There are other layers you can incorporate as well. It is also dependent on the camp as well, since no one camp is the same as another. For these scenarios, a relative climate index can prove to be useful.

Question 6: How different is the indexing approach used here from the Analytical Hierarchy approach (AHP)? Which one gives a better susceptibility outcome?

Answer 6: We did not consider AHP in our work as it has a different weighting scheme that has different categories of concerns. We could have taken this approach, but we chose not to.

Question 7: Andrew, you mentioned the high number of products available in Cox's Bazar context. Would you say that most of them were just not used? As a humanitarian sector worker, I know the amount of information available, usually little relevant, and definitely not used. How do I focus on what actually can be useful? How do I avoid this over production of underused reports and assessments?
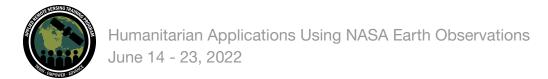
Answer 7: Surprisingly, this has become a significant part of my work. There is not a simple answer as identifying what can be useful when it comes down to a local use case. It can also be dependent on time as well, being that there is so much data and information out there to complicate your work as well. A link to a paper that discusses the roles and responsibilities of climate and humanitarian actors can be found below:

https://journals.ametsoc.org/view/journals/bams/103/4/BAMS-D-20-0263.1.xml

Question 8: What was your experience with the final users of the results of this research?

Answer 8: This is still something we are working on since we are approaching this from an academic approach. Based on some of the results that have been compiled, it led to an enhanced understanding of climate risk and how to mitigate risk of landslides in Cox's Bazar.

Question 9: In your opinion, can fusing radar images into pan-sharpened optical data detect the urban sprawl area outside the metropolitan cities?

Answer 9: In regards to urban sprawl, it would be best to work with Landsat and pan sharpening is not really necessary. SAR data (i.e., Sentinel-1 C-band) also has high spatial resolution and can work for this application. Time series data is important for urban sprawl and legacy products such as Landsat and MODIS would be very beneficial.

Question 10: Question for you on how to account for cholera and other diseases using machine learning and satellite data. Do you know of any tutorials?
Answer 10: I don't have any background in epidemiological applications of satellite data, but it does look like there has been some work on cholera mapping by NASA researchers in the past:
https://www.nasa.gov/press-release/nasa-investment-in-cholera-forecasts-helps-save-lives-in-yemen and https://svs.gsfc.nasa.gov/4603

Question 11: Is it possible to use ArcGIS Pro (Notebook) and ArcGIS Online to get data and make all steps for analyzing data?
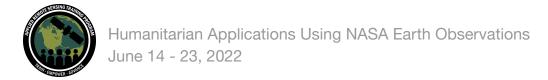Answer 11: Yes! All of the data is publicly accessible, but we are unsure if they are available directly from ArcGIS and ESRI themselves. You would primarily use zonal statistics when working with the imagery and ancillary information.

Question 12: Thanks for this, what about exposure within refugee camp sites?
Answer 12: There is risk and variation of hazard within the sub-camp level. Most of the data we are working with is coarse due to the analysis being conducted at the camp or regional level versus the sub-camp level.

Question 13: Where have you applied this in Africa, so we can try and learn and modify the code to the context of the African region and compare our results and learn what we picked up?
Answer 13: We have looked at five countries including Ethiopia, Tanzania, etc. and we are currently working on a publication in regards to this that will be wrapping up this summer. The data is open-access and freely available.

Question 14: Could you recommend material/courses (fast-paced is okay) for learning Google Earth Engine (including advanced topics)? I am new to GEE and remote sensing (but I have done non-trivial analysis on Sentinel-1 data). I have substantial experience in scientific software development in general.

Answer 14: There are a number of online materials/courses. We are including some below, but we encourage you to explore and find the appropriate course(s) to meet your needs.

https://appliedsciences.nasa.gov/join-mission/training/english/arset-using-google-earth-engine-land-monitoring-applications

https://geohackweek.github.io/GoogleEarthEngine/

https://developers.google.com/earth-engine/tutorials/tutorials

www.twitter.com/EEFAbook

https://geemap.org/tutorials/

https://www.youtube.com/c/Qiushengwu

https://earthoutreachonair.withgoogle.com/events/geoforgood22

Question 15: Could you share a selection of a few relevant scientific papers on the topic?
Answer 15: Examples are included below:

For the example of landslides in Cox Bazar:
https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2020EF001666

Regarding the roles and responsibilities of translating/brokering between EO/data/climate scientists and decision makers:
https://journals.ametsoc.org/view/journals/bams/aop/BAMS-D-20-0263.1/BAMS-D-20-0263.1.xml

Case studies on using EO for anticipatory action in humanitarian contexts:
https://www.sciencedirect.com/science/article/pii/B9780128194126000110

Question 16: Is it possible to build a "local" (i.e., outside of GEE), Python-based analytical pipeline that contains certain GEE components (for data access and certain calculations, using the API to retrieve the intermediate results generated on the GEE server side)?

Answer 16: If you are using GEE, you are still connected to the cloud. Colab is completely offline and can be used locally. You can also incorporate local data into your work as well. Amazon Web Services (AWS) and Microsoft Planetary Computer are also other options for cloud computing resources.

Question 17: Is it possible to predict future hazards like floods/landslides in the planning-stage in places that are not yet built out to host refugee camps (still natural vegetation), but we know are going to be built out rapidly and replace natural vegetation with "built up?"
Answer 17: We were mapping risk through today's presentation, not hazard.

For the example of landslides in Cox Bazar, please see below:
https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2020EF001666

Question 18: How could we analyze settlements that are not that big as the given example? There are so many dynamics around refugee populations, sometimes they are not located in exact areas, or some areas can be temporarily occupied.
Answer 18: The settlements are relatively small in regards to physical size and population, with Cox's Bazar being an exception. With a diffuse population of refugees, it becomes more difficult. We are working under the assumption that the climate conditions will not vary at the local scale, as we are working at larger scales. Refugee camps can stay open for 10 years or longer and as such tend not to be temporary. If the camp is temporary, the populations tend to be very small. Refugees also tend to live in cities with only one-quarter of all displaced persons living in a camp.