Logistics:

- Spend 5-minute max to do a quick introduction among all in your group (name, what institute do you work for)
- Determine who takes notes and who will present a summary of the outcome of this breakout this afternoon.
- Make small subgroups (3-5 people) and answer each of the questions below, ensuring a mix of expertise within each group. Ensure each group has 1 laptop with access to this Google Doc, and write down your group's answers in the obvious place. Take for each question ~15-20 minutes in your small subgroup and brief back to larger breakout group (~3-5min each subgroup).

Leader: Simon Young

Feedback Presenter:

Developing World Parametric Insurance Developing World Parametric Insurance Today 90% of economic losses from disaster in the developing world remain uninsured and vulnerable populations shoulder a disproportionate amount of this burden, living and developing without sufficient protection. Insurance could help buffer these populations and nations against development setbacks from floods. While drought insurance has been implemented, floods are more challenging due to high spatial specificity of damage. What EO is available now and what needs to be developed for this application? Can this be applied in urban areas where remote sensing and modeling is a challenge?

Broad vision:
Session is not really about can we do parametric insurance fo XYZ. What can the tools/quantitative side of EO can give us, how can that be deployed to move forward the risk management agenda in the developing world? How to communicate risk, who owns risk, (e.g., how to allocate risk between govts, individuals, donors, etc.).?
End point: What do we need for parametric insurance? What do we need on data side? What co-benefits does moving toward that goal have in those spaces.

Example of African Risk Capacity (ARC) and John from AER, moving into multi-peril (with flooding):
For parametric insurance that ARC is providing, needs to be long-term historical data that is consistent with what is produced in near real time. Every gridpoint on Africa gets a decision daily (flooded or not).
Algorithm is objective.
False positives problematic, e.g., moving from no-flood to some flood is meaningful. Not just part of the noise. → detection floor so that you don't have too many false positives. Rebranded the model as a river flood model to distinguish from flash flooding.

Policies are re-done each year. So if there are tweaks in algorithm, they can be re-applied to the historical data and a new cost curve can be used for the next year's policy. Same is done for WRSI drought models. This has a co-benefit of really generating buy-in from members. They are also able to understand that cat risk models can be updated as the science improves. Transparency of modeling is a very important piece (equally important as the transparency of the trigger). It's a huge step forward for local capacity to inform AER modeling.

ARC takes daily flood layer and computes interactions with population (LANDSCAN), and other layers (e.g., agriculture) to develop the index.

Q: Yearly policy renewal: how to avoid situation e.g., to avoid buying the policy based on ENSO?
A: They try to safeguard against this. Require countries to sign up on policies before the skilled predictions come out. Schemes are multi-national, encouraging a community feel and a long-term feel. Encourage that it is a budget line item, i.e., renewed automatically. They've tried to put in place a long-term view of risk (e.g., keep pricing the same instead of pricing in increased risks due to yearly changes).

Q: How does AER find out about false positives? What about false negatives?
False negatives are pretty clear (lots of reported ones that don't show up).
If there's a big event, you see it.
For false positives, usually the radar sees water, but it's not conventionally defined as "flooding". E.g., some water persists due to local conditions, and they've worked to filter this out.
They don't have ground data. FloodTags is using social media with World Bank for parametric insurance.
Simon: they've been trying to collect other ground data as well in order to get more validation. The river flood product is pretty set. But for urban detection they're actively discussing other types of validation.

Q: Continuity of inputs (90m based on SRTM?): 90m TandemX product is going to be publically available globally now. Would switching this break anything? (A: No). How far off of the AMSR series would break it?
AER product is 90m is based on MERIT.
Redundancy because GMI and AMRS-E is the current product used along with past sensors. Cross-calibration has been very successful.
If there's a new sensor, it'll have different specs. They do footprint matching to get everything on the same sensor. They calibrate earth incidence angle to make a curve to put everything on the same basis. Simple endmember algorithm (dry land versus water and there's a measurement of how much water in between).
Q: Is the 200 page report publicly available? A: Yes. It is on the website.

Q: How is ARC transitioning from drought insurance to flood insurance? Drought is a long temporal event. There is a latency of how to use money from insurance. Flood is a smaller,

sharp spatiotemporal event. How is the index being validated against the money being paid out to achieve the goal?
A: Work for flooding product is ongoing; hat's why it hasn't yet been launched. ARC built up for drought: slow onset, longer response (e.g., months) versus flooding (e.g., days).
When ARC system started, contingency plans/capacity in African countries very low. ARC started standards for contingency plans, having those reviewed/peer-reviewed/certified. Created a second set of guidelines for sudden onset events (for tropical cyclone in Southern Indian ocean and also for floods). Learning process, but that handles the temporal aspect. They have a number of workshops in focus countries to develop these.
What has not been address is urban flash flooding. Haven't gotten a model to address it from a quantitative technical perspective. What are the funding needs and what actions need to be taken? Big river flooding is similar broadly: agricultural communities, rural. Urban is a different context. Concerns are different for different countries, e.g., Ghana and Cote D'ivoire care about cocoa, e.g., cash crops.

David Green's new project on flash flooding. Working on collating records and response/impacts. Make a database something complementary to Dartmouth Flood Observatory (DFO) but focused on urban flash floods and impacts. This would be really useful for validating new efforts. Elke is leading this at ARC.

Opening it up: If we could get good global rainfall index at hourly or 3-hourly that's a good proxy of what's on the ground, that would be hugely useful.

Rainfall is rough compared to indicators of flooding, but as a global proxy it's really important.

Princeton Climate Analytics has a system that creates a dataset (using reanalysis, satellite, in situ). However, there is a lot of input data that does not get ingested into the creation of this dataset (i.e., some countries they have access to but others not so much). We want to create data that happen very quickly. But big challenge: how to bring in these input data sets into modeling system? How to solve this problem?

Cloud to Street: Global Parametrics firm is developing a Global Rainfall Insurance Risk Index. Contracting out to Kinetic Analysis Corp. Calibrating to local stations, but on the whole getting near real time in developing world countries from cross-checking is really challenging. Part is technology, part is institutional.

Quality of the ground-truth data is important too. Also, sovereignty issues whereby data leaves the countries and never comes back. This is the historical context behind charging for data and other roadblocks.

Spatial variability of rain and existing rain gauge network is not enough. Limitations of thermal infrared for satellite remote sensing of rain (and it's the only historical data). Relationships with local MET services is important, but for flood insurance fundamental questions: physical issues.

What would be a new satellite product that measures extreme rainfall ? Or temporal consistency of rainfall events. What does it mean if you monitor rainfall now but don't have history? Improving rain gauge datasets is part of the solution, but it's not the only answer.

Maybe not measure extreme rainfall but focus on water on the ground. New company: Daily Radar from Finland. It's not too far off for Daily flood monitoring. If we can't wait for history, is there to cross calibrate rainfall with flood footprints/damage data on the ground.

Validation is not just for extreme rainfall, but for the ability of the index to pay out during extreme events. E.g. exact rainfall amount maybe not, but if you ask it to identify the three worst events in the last X years, it could o that. Big Q: are you capturing payouts, not are you capturing flood levels, etc.

They've had a lot better time telling a story about NASA measured rainfall amounts versus a modeled output. Developing world partners: If it's from NASA, thumbs up. Download real-time from the web has huge transparency benefits. Versus a black-box model. Scientifically it's not always the best/perfect answer, but somewhere in between.

How to balance uncertainties of false positives/false negatives? Varies country to country, minister to minister (e.g., if the model missed a historical flood in their district). Missed floods are the most important to partners. To handle false positives, as part of the insurance contract the country has to certify that says they experienced a loss (not quantified though) (CRIF). For ARC, there's a secondary certification of how to spend the money which has to be reviewed (a Final Implementation Plan). That's a higher barrier.

Q: Doesn't that reduce the speed of the payout?
A: For drought: 6-month is food security crisis. 3-months more humanitarian crisis,. Preference is to start activities by 2 months, so still able to capture value of early money. Process actualy starts at 70% chance of payout, getting them to start thinking about planning. There's a master plan where this plan is a subset of the master. Working on building capacity (e.g., signatures internal). Internal procurement has been a challenge, e.g., treasury → ministry → goods and services. Starting pre-certified activities.
Also due diligence requirements when financial capacity of who receives the payments is challenging. E.g., Haiti when treasury staff were killed in earthquake (World Bank relied on there for due diligence).

Q: Sounds like rainfall is most important for insurance. What about for microinsurance/mesoscale projects?
A: Rainfall drives vast majority of losses. Index at reasonable resolution/historical data has a lot of value at the sovereign level / mesoscale level. Micro level is much harder. Wish list is something that does'nt need a lot of local adjustments wherever you go. Pretty vanilla wherever you go. Microinsurance projects are pretty small; if there's a lot of need for tweaking/bringing in new satellites, resources to upkeep the model, etc. is hard to sustain.

As frictional costs increase, these start to make up a large portion of the costs.

Ulrich 2006 paper: use TRMM for global extreme rainfall product. Subsequently they used TRMM for CRIF as a coarse estimate that get refined. But the Ulrich paper principle still applies. Where it's at: rainfall provides the most risk-quantified and then transferred in an efficient way, to help/underpin resilience. Cost-effective risk transfer is really important, and won't happen until we can transfer a lot of those risks off the balance sheets. E.g., 70% of African rainfall risk cost effectively is a big step forward. It's not 100%, but 70% is a lot!

Conflict between incentives of academic research/remote sensing industry and the need for applied research for "vanilla" index needed for risk management. There has to be a "sweet spot" between academic research partners and applied work over large aggregated areas.

Not one sweet spot, but several places where that overlaps. In the U.K., LERC. One of the swett spots is uncertainty. If your'e able to say whether this data is good or not at a specific place. That's useful for applied cases about whether or not to trust it. Ensembles are really useful for generating uncertainty and building that into index. AER/Cloud to Street flood maps have uncertainty, but users don't care about it.

Rather than ensemble values, generate an envelope. Rather than a PDF of rainfall, but generate a PDF of potential payouts.