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: Matt Reid

Feedback Presenter:

Developed World Insurance

Across the developed world we find that flood insurance penetration is variable as is the market's appetite to write flood cover. National programs such as FloodRe (UK) and the NFIP (USA) have considerable impact on the market but do not necessarily help with re/insurers understanding of the underlying hazard and risk.

In this session we would like to explore where and how flood risk data (modeled and observed) can help improve the re/insurance industry's understanding of, and willingness, to write flood business.

Questions

Question One: What are the use cases for flood risk data within the insurance industry?

GROUP 1:

- Flood hazard maps across portfolios to assist in their pricing
- Direct flood damage to structures (often constrained by relating simulated flood depths to a certain damage)
- Divergence between governmental and commercial flood maps
    - Generally, government maps are of a single return period (maybe up to 3 are simulated)
    - Insurance companies license data using multiple return periods
- Potential to encourage/enforce resilience measures (e.g. raising first floor elevations)
- Agriculture...
- Real-time forecasting (particularly atmospheric models) to help insurers make decisions on reinsurance

GROUP 2:

- Agriculture
    - USDA
    - GOVT backed
- Pricing insurance and reinsurance
    - Primary
    - Broker
    - Reinsurance
    - Planning (To purchase or not to purchase)
    - Accumulation management and development
    - Portfolio management
    - Parametric side
    - Repeat loss locations
    - BI
    - CAT Bonds
        - Could be for govt or private
            - Govt could be for remediation etc.
    - Near time forecasting
        - Exclusion areas(an event is pending, so don't write a new policy)
- Banks and mortgage backed securities
    - Lending
    - Due diligence for acquisition
    - Pre-Disaster planning
- Geohazard abatement and resilience building
- Post event management
    - Verification
- Liquefaction/landslide

Question Two: What data needs to be combined with hazard data for the insurance industry to develop the most comprehensive view of the risk possible?

GROUP 1:

- Accurate geolocations of assets (buildings, infrastructure etc.)
    - Other information about the assets (type, elevation, location of valuable contents within building)

- Testing hazard models against historic claims data, satellite observations, validation measures
- Highly localized (temporary) resilience measures
    - Early warnings permitting preparedness
    - Information on flood defences
- Recognition of non-stationarity in river gauge/tide gauge data, development, DEMs
- Vulnerability -- how you can calculate a potential loss given hazard model output
- Potential for (very harmful) contamination of floodwaters (e.g. chemical plants, coal power stations, pig farms)
- Consideration of impacts beyond direct damage: indirect damages, impacts on health, ability for community recovery

GROUP 2:

- Evaluation
    - Agriculture (remote sensing)
        - Crop condition before and after
            - NDVI
    - Post event footprints for model evaluation etc.
- Exposure identification
    - Where locations are
    - Where the damage may have occurred
    - Land use change, development
    - Population density
    - Geocoding
    - Replacement value vs recovery cost
    - Building stats
        - Using machine learning and multi-angle sat images
        - land change over time (
- Contamination and remediation
    - Cost of long term recovery
    - Environmental insurance (community/governmental)
- Repeated loss history
    - Home buyout and relocation
- Social media flood locations

Question Three: What data are available to serve those use cases?

GROUP 1:

- Insurers actually collecting information on the policies they sell (geolocations, type of structure, any resilience measures employed)
- Local knowledge (that is perhaps not utilized currently)
- Historic claims data does exist, it's just very difficult (or impossible) to obtain
- Remote satellite observations of flood extents with which to validate the hazard model
- Locating mobile phone calls that requested help
    - Also: use of social media (e.g. Twitter posting)
- Mobility data (again, difficult to get hold of)
- Ongoing research (e.g. at GFZ-Potsdam) on multiple factors (other than flood depth) that influence flood damage (velocity, duration, contamination etc.)
- Post-flood damage reports
- High water marks (in US these are often collected by USGS/FEMA)
- Statistical methods for dealing with non-stationarity in river gauge/tide gauge data
- Generally, data is out there but is not collated in an accessible way
- Local flood drivers/better characterization of flood drivers
    - Flood maps often do not differentiate between hurricane / convective storms / anthropogenic floods (blocked culverts & drains, dam & levee breaches)

GROUP 2:

- Private industry
    - Tidal
    - Pluvial
    - Fluvial
    - Storm Surge
    - Insurance reports
    - Post event
- Govt/Public
    - Gauge data
    - Sat data
        - All inputs
    - DEM
    - Private sats
    - Radar Sats (Precip etc)
- Event hazard deaths and loss Historic Data
    - Presidential disaster declaration
    - NOAA hazards
    - SHELDUS
- Crop land data layer (CLDL) (30m)
    - USDA (George Mason Univ)

    - 2008 - present
- Weekly crop condition product (George Mason)
- Global bi-weekly agg drought (George Mason)
- GLAM
    - Global agg
- GLobal agg disaster assessment system (GADS)

Question Four: Where does the insurance industry's needs for flood risk data diverge from those of other communities?

Question Four: How can remote sensing data be incorporated into flood risk modeling for the insurance industry?

GROUP 1:

- Calibration of poorly understood parameters (e.g. emerging research on using this data to better constrain channel bathymetry)
- Ensuring up-to-date maps of elevation, land-use
    - Recognition that constant updates can be detrimentally disruptive
- Use of post-event observations in conjunction with claims data
    - Understand why apparently inundated properties don't claim
    - Find fraudulent claims/identification of damaged buildings
- Event attribution to inform hours clauses
- Aid in more accurate geolocation of exposure (e.g. use of AI to identify building footprints)

GROUP 2:

- Post Event
    - Evaluation etc.
- Post event Agg
- Pre event emergency response and planning (First responders)
    - Flood frequency maps
    - Precip -> Return Period -> Footprints
- Terrestrial home monitors
    - Home stream gauges
    - Personal parametric losses
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Breakout Outcome

Top Priority Need (where don't we do well)

GROUP 1:

- Better constrainment of where the models are wrong to calculate and communicate uncertainties
    - Is inability of cat models to replicate claims data due to hazard, exposure, vulnerability?
    - Failure to represent local data (e.g. fine-scale features, responses)
- Improve communication to encourage insurance uptake and aid public understanding of risk
- More accessible databases (much of what we need already exists, it's just too difficult to obtain)

GROUP 2:

- Point 1
    - We need better exposure and vulnerability and history
        - Using remote sensing to get building footprints/Vuln
        - Remediation vulnerability
        - Record of losses and insurance costs etc.
            - Repeated loss location etc.
            - Rainfall
            - Sewage backup
            - Rainfall frequency/FloodFlash response/tide flood response
- Point 2
    - Post Event analytics (Global)
        - Standards
        - Availability
        - One stop market
        - Easy to access
    - Wider question of data availability and access
        - Stream guage and dtm example
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Where do we do well (no priority)

GROUP 1:

- Variety of risk profiles offered by commercial hazard models

- Independence of model vendors; producing purely scientific (unbiased) views of risk with no political (or other) tampering
- Total spatial model coverage

GROUP 2:

- Flood hazard modelling
    - Acknowledge that NFIP is bad and dangerous as it exists now
        - Houston x zone reservoir
        - Houston outside of x-zones
    - NFIP using cat modellings
    - people using cat models
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