Economic consequences of catastrophic events can be mitigated by parametric insurance when modelled with actuarial methods and geospatial analytics

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Frequency and severity of catastrophic events is increasing

There is an unfortunate confluence of economic damages occurring worldwide from natural events (inclusive of, though not limited to, wildfires, hurricanes, strong winds, flooding, and earthquakes) alongside a growing reluctance of traditional insurance venues to provide coverage for these calamities. Parametric insurance offers an additional choice for consumers and businesses in the form of low-cost coverage, coupled with capped liabilities for insurers.
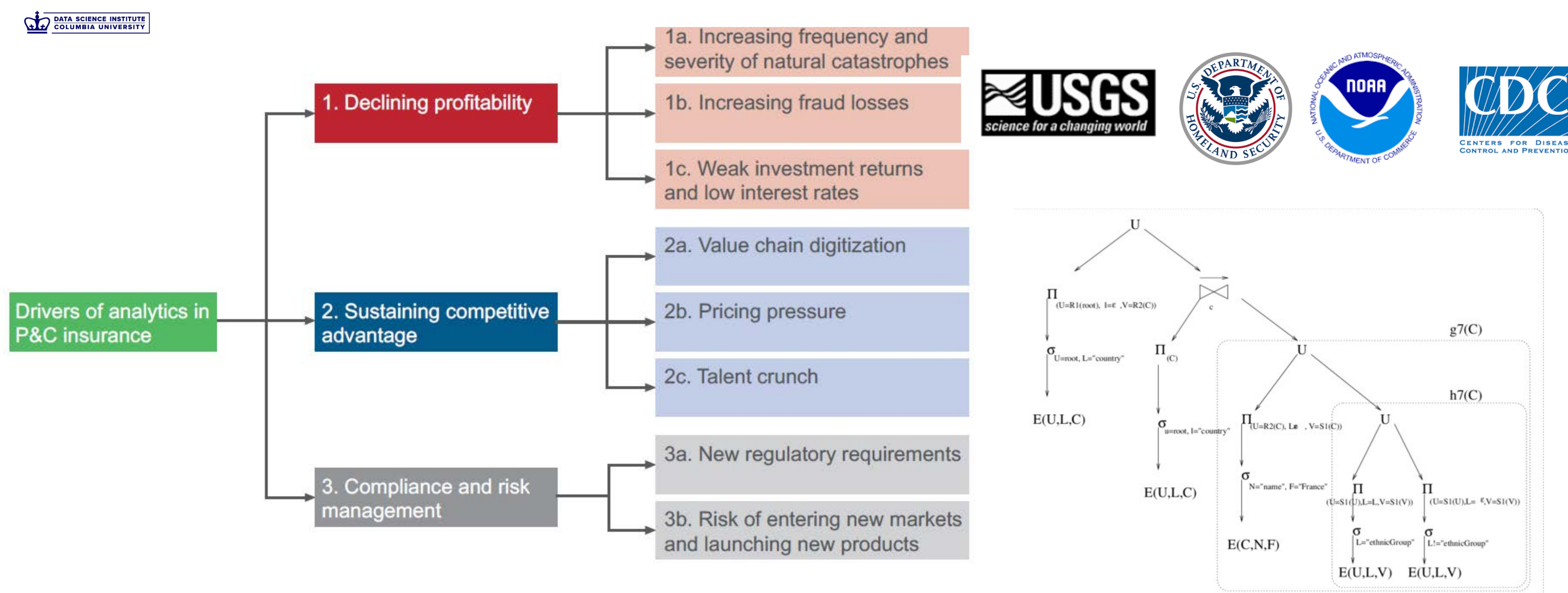

Figure 1. Unmet product demand attributable to challenges with traditional insurance contexts can be addressed with publicly-available data and well-designed data structures

Structured and unstructured data elements

Predictive models are used to calculate expected losses in relation to potential adverse events, invoking location-enriched data that in the case of floods might include location features and characteristics inclusive of soil type, proximity to rivers, home characteristics, rainfall, storm intensity, and historical river levels.
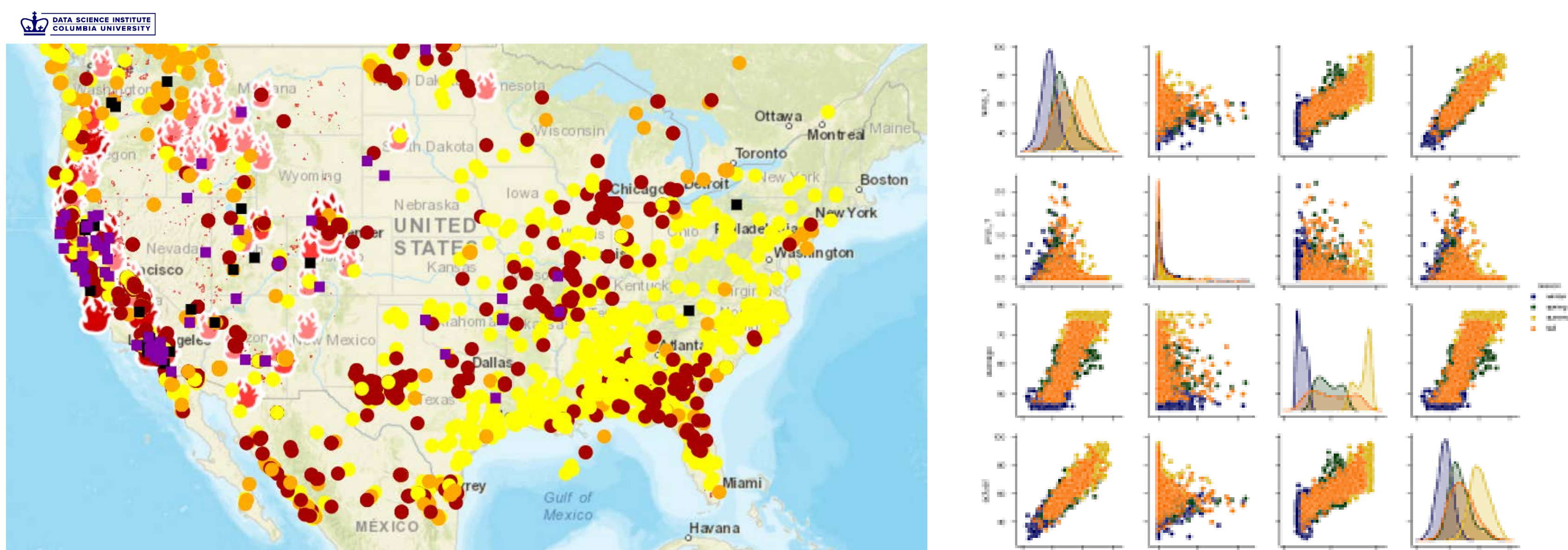

Figure 2. Wildfires are affected by wind, temperature, cloudiness, moisture and air pressure, as well as by vegetation and structures

Combining actuarial probabilities with geospatial modelling

Parametric insurance provides for a fixed and known payout upon the occurrence of a defined event or sequence of events that are objectively evaluated on the basis of data supplied by an independent third party. There are no claims to be filed, investigated, or adjudicated. An example could include an immediate fixed payment to all applicable insureds when a magnitude 4.5 Richter scale earthquake occurs (Mercalli Scale also permissible) within their coverage zone.
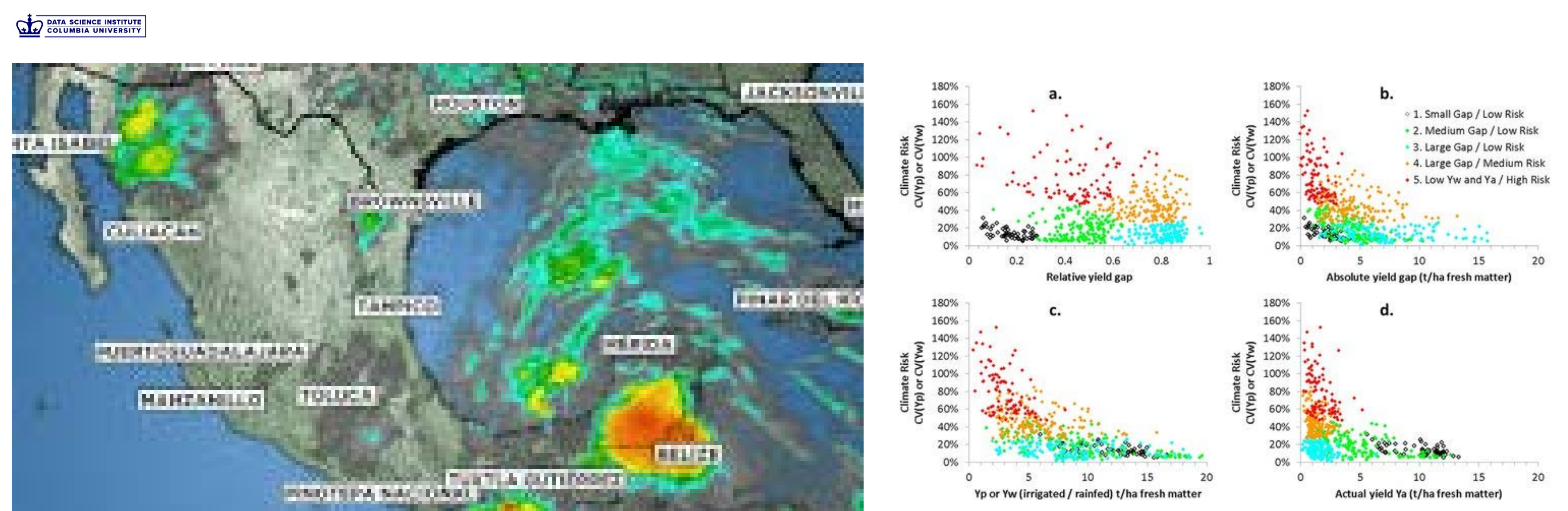
$$V(z, t-\Delta) = \frac{\frac{1}{2}V(z-\sqrt{\Delta}, t) + \frac{1}{2}V(z+\sqrt{\Delta}, t)}{1 + r(z, t-\Delta)\Delta} + O(\Delta^2)$$

Figure 3. The characteristics of many catastrophic events exhibit a Pareto-type of distribution profile, especially with weather in the context of cluster analyses

Additional applications

Additional areas for Parametric Insurance applications include business disruption (as with abrupt adverse developments with a local or national economy), reputation risk (via social media postings or other), and situations involving massive chemical-related damages.

References

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