

RiskKAN Working Group: *Climate Risk Modeling for the Financial Sector*

Working Group Leads:

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Rationale

The Working Group (WG) aims at addressing some of the challenges associated with modeling physical climate risks to the financial sector by focusing on stress-test methodologies, credit risk modeling, the design of new and innovative insurance products, how to use and improve simulation models and the definition of modeling frameworks to assess systemic risk in the context of the financial sector. In particular, the WG focuses on:

1. *Modeling of systemic risk.* Emerging and systemic risks arise from the interaction of phenomena in a complex system. When faced with such risks, commonly used statistical techniques may fall short and thus new methods to risk quantification may be needed. Systemic risk in the financial sector may imply there is limited possibility to diversify portfolios to reduce risk due to climate change as many regions and sectors will be affected by more frequent and intense climate extremes simultaneously. For example, systemic financial risk may emerge when asset managers with significant holdings in low-lying coastal real estate fail to integrate future flood risk into investment decisions, potentially leading to mispricing of property values and cascading mortgage defaults. We will explore methods and opportunities to address systemic risks relevant to the financial sector.
2. *Credit risk modeling & stress-testing.* Credit risk modeling estimates the probability of default and potential credit losses, while stress-testing simulates extreme but plausible scenarios to evaluate financial resilience. The working group will focus on integrating physical climate risk into both approaches. This includes designing plausible scenarios that capture acute and chronic climate hazards and aligning them with regulatory and supervisory expectations. The objective is to improve the quantitative understanding of how physical climate impacts may drive credit deterioration, increase default risk, and lead to portfolio-level losses.
3. *Designing new and innovative insurance products which consider the value of ecosystems.* the role of insurance and other risk transfer and economic instruments in protecting and restoring ecosystems and their services. With the increasing recognition of the value of nature-based solutions as protection measures against natural hazards, insuring ecosystems and their services could be a valuable solution. Some efforts from the (re)insurance industry already point towards this direction. For example, a parametric re-insurance product has been created for the sake of protecting the Mesoamerican Barrier Reef System from hurricanes. This allows strengthening the resilience capacity of the region as the coral reef prevents beach erosion and proves crucial in sustaining the tourism and fishing industries.

4. *Improving physical climate risk assessment models.* Modeling and managing physical climate risk relies on the use of computer models. These models have improved over the years thanks to increasing research, data availability and computational power. Yet, significant gaps are identified, which relate to many research opportunities, such as:
- Establishing a framework for the treatment of model uncertainties (via a global sensitivity analysis) and disagreements between outcomes of different models.
 - Providing a comprehensive modeling of indirect impacts.
 - Thoroughly modeling climatic and socioeconomic changes, including feedback mechanisms.
 - Expanding from single to multi-hazard modeling.
 - Benchmarking and evaluation of models, based on an assessment of available observational data, involving methods of data-driven science or machine learning.

Activity

The group's main goal is to carry out and disseminate scientific research in the areas above. This includes activities like 1) organizing workshops or sessions in scientific conferences, 2) fostering research collaborations between group members and 3) holding a series of webinars from experts in the field, and 4) initiate joint publication opportunities (e.g. in special issues).

So far, the group has organized a number of webinars and a three-day online workshop. Videos of webinars and of most workshop's presentations can be found on the group's YouTube channel.

If you are interested in actively joining the group, please get in touch with the Group Lead. If you would like to stay informed about the group's activities, please subscribe to the mailing list via <https://www.risk-kan.org/>.