Workshop on Understanding and Modeling Complex Risks in Coupled Human-Environment Systems

Proposed: Day 2 – Advances in Modeling Socio-Economic Impacts

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Abstract: the natural hazard risk to global critical infrastructure

Critical infrastructure (CI) is fundamental for the functioning of a society and forms the backbone for socio-economic development. Natural hazards, however, pose a major threat to CI. They can cause direct physical damages to CI in a region struck by an event, which may lead to disruption of essential services provided by them. Due to interdependencies in the infrastructure network, and the dependence of society to CI, such disruptions can lead to wide-spread impacts. Moreover, the overall risk for CI is expected to rise. This is due to climate change (i.e. intensification and more frequent hazards), and socio-economic development (i.e. increase in the amount and value of CI). This calls for risk assessments to support policy decisions, and to effectively prioritize areas where investments are needed.

We developed a first-of-its-kind globally consistent spatial dataset for the representation of CI. This spatial dataset consists of a (1) harmonized and consistent sub-dataset for the amount of infrastructure and its spatial location for 39 infrastructure types, and (2) the Critical Infrastructure System Index (CISI) that expresses the spatial intensity of CI. The dataset can be deployed as a tool to gain insights in the current landscape of the CI network, to identify hotspots of CI, and to gain exposure information for risk assessments. The next step in our research is to provide first global estimates of multi-hazard risk to CI under current climate conditions. To this end, we will assess the global exposure of CI to multiple natural hazards, and quantify the potential asset damages as a consequence of these multi-hazards. Therefore, data will be combined on hazard intensities and extents, exposure of infrastructure and the vulnerability of these exposed assets. Future research will include efforts to develop a dataset that incorporates Shared Socio-Economic Pathways to establish projections for infrastructure expansion, explore interdependencies, and assess adaptation strategies.

I am looking forward to attend the workshop ‘Understanding and Modeling Complex Risks in Coupled Human-Environment Systems’, and to have discussions on systemic risks within the context of the complex and highly interconnected human-environmental systems we are currently living in.