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A globally consistent approach for basic service disruptions after natural disasters

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Critical infrastructures (CIs) such as powerlines, roads, telecommunication and healthcare systems across the globe are more exposed than ever to the risks of extreme weather events in a changing climate. Damages to CIs often lead to failure cascades with catastrophic impacts in terms of people being cut off from basic service access. Yet, there is a gap between traditional CI failure models, operating often at local scales, with detailed proprietary, non-transferrable data, and the large scales and global occurrences of natural disasters.

We demonstrate a way to bridge those incompatibilities by linking a globally consistent and spatially explicit natural hazard risk modelling platform (CLIMADA) and a CI failure cascade model. The latter is built on publicly available infrastructure, end-user and supply data, and makes use of consistent and transferrable dependency heuristics between CIs to represent infrastructure systems at national scales for any place interest. Impacts are then spatially mapped in terms of people experiencing disruptions to basic service access.

With this approach, we aim to showcase how the interplay of available data and well-informed heuristics can allow large-scale impact models to produce consistent hot-spot analyses and rapid emergency assessments, which may then provide a starting point for more detailed, local studies.