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Multi-hazard assessment in Europe under climate change

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While reported losses of climate-related hazards are at historically high levels, climate change is likely to enhance the risk posed by extreme weather events. Several regions are likely to be exposed to multiple climate hazards, yet their modeling in a joint scheme is still at the early stages. A multi-hazard framework to map exposure to multiple climate extremes in Europe along the twenty-first century is hereby presented. Using a coherent ensemble of climate projections, changes in the frequency of heat and cold waves, river and coastal flooding, streamflow droughts, wildfires and windstorms are evaluated. Corresponding variations in expected annual exposure allow for an objective comparison of hazards described by different process characteristics and metrics. Projected changes in exposure depict important variations in hazard scenarios, especially those linked to rising temperatures, and spatial patterns largely modulated by local climate conditions. Results show that Europe will likely face a progressive increase in overall climate hazard with a prominent spatial gradient towards south-western regions mainly driven by the rise of heat waves, droughts and wildfires. Key hotspots emerge particularly along coastlines and in floodplains, often highly populated and economically pivotal, where floods and windstorms could be critical in combination with other climate hazards. Projected increases in exposure will be larger for very extreme events due to their pronounced changes in frequency. Results of this appraisal provide useful input for forthcoming European disaster risk and adaptation policy.