

## Transition to resilience to extreme weather ,high-resolution monitoring and international synergies

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SCHERTZER, Daniel<sup>1\*</sup> ; MAKI, Masayuki<sup>2</sup> ; TCHIGUIRINSKAIA, Ioulia<sup>1</sup>  
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<sup>1</sup>Ecole des Ponts ParisTech, U. Paris Est, <sup>2</sup>Research and Education Center for Natural Hazards, Kagoshima U.

<sup>1</sup>Ecole des Ponts ParisTech, U. Paris Est, <sup>2</sup>Research and Education Center for Natural Hazards, Kagoshima U.

Transition from high vulnerability to extreme weather to resilience is a major challenge for megacities in response to two main drivers: urban sprawling and climate change. The functioning of cities, particularly the large ones, should be observed, understood, simulated and monitored on much larger ranges of scales than usually done. This requires at first observations of many geophysical fields with an unprecedented resolution to achieve high-resolution monitoring. However, this also requires an advanced understanding/modeling of the nonlocal interactions between large and small scales, e.g. between weather and climate scales.

Finally, this pleads in favor of methodological approaches across scales, rather than over very limited ranges of scales. Such methodologies aim in fact to quotient out non trivial symmetries and therefore should enable us to dig out the relevant information from otherwise under-exploited big data.

Such approaches have been often invoked, but barely achieved because they correspond to formidable tasks that require an unprecedented development of international cooperation on both advanced technologies and methodologies. We will illustrate these questions with examples of research and innovation programs on flood resilience which seem rather complementary across national boundaries but require nevertheless much stronger international synergies.

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