Geophysical Research Abstracts
Vol. 15, EGU2013-2930, 2013
EGU General Assembly 2013

Can we (actually) assess global risk?

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The evaluation of the dynamic interactions of the different components of global risk (e.g. hazard, exposure, vulnerability or resilience) is one of the main challenges in risk assessment and management. In state-of-the-art approaches for the analysis of risk, natural and socio-economic systems are typically treated separately by using different methods. In flood risk studies, for instance, physical scientists typically focus on the study of the probability of flooding (i.e. hazard), while social scientists mainly examine the exposure, vulnerability or resilience to flooding. However, these different components are deeply interconnected. Changes in flood hazard might trigger changes in vulnerability, and vice versa. A typical example of these interactions is the so-called "levee effect", whereby heightening levees to reduce the probability of flooding often leads to increase the potential adverse consequences of flooding as people often perceive that flood risk was completely eliminated once the levee was raised. These interconnections between the different components of risk remain largely unexplored and poorly understood. This lack of knowledge is of serious concern as it limits our ability to plan appropriate risk prevention measures. To design flood control structures, for example, state-of-the-art models can indeed provide quantitative assessments of the corresponding risk reduction associated to the lower probability of flooding. Nevertheless, current methods cannot estimate how, and to what extent, such a reduction might trigger a future increase of the potential adverse consequences of flooding (the aforementioned "levee effect"). Neither can they evaluate how the latter might (in turn) lead to the requirement of additional flood control structures. Thus, while many progresses have been made in the static assessment of flood risk, more inter-disciplinary research is required for the development of methods for dynamic risk assessment, which is very much needed in a rapidly changing world. This presentation will discuss these challenges and describe a few initial attempts aiming to better understand the interactions between the different components of flood risk with reference to diverse case studies in Europe, Central America, and Africa.