

Plinius Conference Abstracts
Vol. 15, Plinius15-43, 2016
15th Plinius Conference on Mediterranean Risks
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Epistemic and aleatory uncertainty in the study of flood risk dynamics

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Epistemic and aleatory uncertainties affect the study of flood risk dynamics. Here we identify three types of lack of understanding: (i) known unknowns, which are things we know we don't know; (ii) unknown unknowns, which are things we don't know we don't know; and (iii) wrong assumptions, things we think we know, but we actually don't know. We posit that a better understanding of human-flood interactions and feedbacks can help coping with wrong assumptions and known unknowns. Moreover, being aware of the existence of unknown unknowns, and their potential capability to generate surprises or black swans, suggest the need to rely more on bottom-up approaches, based on social vulnerabilities and possibilities of failures, and less on top-down approaches, based on optimization and quantitative predictions.