Geophysical Research Abstracts
Vol. 13, EGU2011-10230, 2011
EGU General Assembly 2011

Detention basin impact on flood risk and systemic effects of dike performance in a complex channel-dike-floodplain system

Sergiy Vorogushyn (1), Karl-Erich Lindenschmidt (2), Heidi Kreibich (1), Heiko Apel (1), and Bruno Merz (1)

(1) Deutsches GeoForschungsZentrum, Section 5.4: Hydrology, Potsdam, Germany, (2) Manitoba Water Stewardship, Surface Water Management, Winnipeg, Canada

Highly concentrated asset values are often protected by dikes stretching along the river course. During extreme floods dikes may fail due to various breach mechanisms that may cause considerable damage. Therefore detention basins are often additionally installed to reduce the flood risk for downstream communities. In such situations, however, the systemic performance of dikes and spatial redistribution of inundation patterns are often unknown. Intuitively expected effects such as more probable breaches downstream due to fewer breaches upstream and consequently higher conveyance of upstream reaches lack evidential proof. With a coupled probabilistic-deterministic 1D-channel - dike breach - 2D-inundation - flood damage model the impact of a detention basin on losses to residential buildings and agricultural crops is investigated. We demonstrate the changes in dike performance due to systemic load and relief along the river course on the Middle Elbe, Germany. Finally, the uncertainty in hazard and damage estimations are analysed and compared. Despite high uncertainties in flood hazard and damage estimations, we conclude that the risk reduction in the private sector downstream exceeds the higher losses to agricultural crops within the filled detention area.