Development of a Probabilistic Flood Hazard Assessment (PFHA) for the nuclear safety

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The purpose of this study is to lay the basis for a probabilistic evaluation of flood hazard (PFHA). Probabilistic assessment of external floods has become a current topic of interest to the nuclear scientific community. Probabilistic approaches complement deterministic approaches by exploring a set of scenarios and associating a probability to each of them. These approaches aim to identify all possible failure scenarios, combining their probability, in order to cover all possible sources of risk. They are based on the distributions of initiators and/or the variables caracterizing these initiators. The PFHA can characterize the water level for example at defined point of interest in the nuclear site. This probabilistic flood hazard characterization takes into account all the phenomena that can contribute to the flooding of the site. The main steps of the PFHA are: i) identification of flooding phenomena (rains, sea water level, etc.) and screening of relevant phenomena to the nuclear site, ii) identification and probabilization of parameters associated to selected flooding phenomena, iii) spreading of the probabilized parameters from the source to the point of interest in the site, v) obtaining hazard curves and aggregation of flooding phenomena contributions at the point of interest taking into account the uncertainties. Within this framework, the methodology of the PFHA has been developed for several flooding phenomena (rain and/or sea water level, etc.) and then implemented and tested with a simplified case study. In the same logic, our study is still in progress to take into account other flooding phenomena and to carry out more case studies.