

# 洪水保险定价的水文极值 统计方法

过去几十年中，全球出现了越来越多的洪水事件，造成了巨额的经济损失。这些灾难性洪水事件的频率和强度都在以令人担忧的速度不断增加。如今我们有必要更仔细地研究该风险，并努力构建更好的风险缓解措施和风险共担机制。本研究旨在提供一个建模框架，以评估房屋淹水的风险以及带来的预期损失，从而为洪水保险定价奠定基础。

为此，我们提出结合极值统计模型和水文模型来评估房屋的淹水概率，并使用混合（广义）贝塔模型来估计保险索赔。基于对区域洪水风险的分析，我们引入一个分层模型，用于评估淹水概率。该分层模型由一个评估附近测站流量峰值的极值模型和一个模拟各地点流量率及浸没值的水文模型组成。这些分析为我们得出一个概率分类模型。该模型可以视为给定流量值条件下，淹水概率与地质和水文变量之间的关系。结合上流量峰值模型，我们便能够评估淹水概率。

此外，为研究因洪水风险而导致的保险损失，我们研究了美国国家洪水保险计划 50 多年来共 250 万条索赔记录。我们找到能用来预测房屋的洪水损失的房屋特征变量，并得出了一个混合贝塔模型，将房屋被淹情况下的预期损失与相关房屋特征联系起来。

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Society of Actuaries Research Institute  
475 N. Martingale Road, Suite 600  
Schaumburg, Illinois 60173  
[www.SOA.org](http://www.SOA.org)