**A robust adaptation strategy to non-stationarity of in-land floods under uncertainty: Elevating local houses to an optimal elevation**

Mahkameh Zarekarizi, Vivek Srikrishnan, and Klaus Keller

Earth and Environmental Systems Institute, Pennsylvania State University, University Park, PA

1. **Abstract**
2. **Motivation**

Robust decision making is essential given the uncertainties associated with climate change.

Robust decision making is defined as …

Not only the stakeholders need to make such decisions but also regular people need to make such decisions as well.

These decisions range from simple questions such as carrying an umbrella or not to more difficult ones such as elevating a house or not.

Why would someone want to elevate their house? <introduction about the NFIP program> <discussion about insurance premiums>

Recently Xiang et al (2017) addressed the question of optimal house elevation but they did not discuss the robustness of such decision. <Discussion on what could be improved in that paper>

But why do we need to consider non-stationarity, robust decision making, and uncertainty quantification? <description on non-stationarity and uncertainty quantification> This paper aims at providing a robust framework to facilitate making this decision using Robust decision support frameworks.

What are robust decision support frameworks? <categories and methods will be described>

What decision support framework we would like to use and why?

Therefore, the objectives of this study are the following <list the objectives>

Discuss the significance and the implications of the study <why is it important to answer these questions> <what are the implications of this study?>

The paper is organized as the following ...

**3. Study area**

Where the gage is located?

The gage numbers.

A map of the study area

*Figure 1: The study area and the location of the gauge(s)*

**4. Data**

Describe NFIP data

Describe FEMA flood maps and where to find/download the maps

Calculation of

1. **Methods**

*Figure 3: The flowchart of obtaining the adaptation elevation plan*

* 1. **Non-stationarity**

C(h) remains time-invariant in this paper as it is assumed that the house is elevated right now.

E(h,t) is the expected annual cost at year t with height h

Hopt=Argmin(C(h)+1(1+r)tE(h,t))

* 1. **Damage Function**
  2. **Uncertainty Quantification**
  3. **Global Sensitivity Analysis**

1. **Results**
2. **Discussion**
3. **Conclusion**