

EGU21-13600

<https://doi.org/10.5194/egusphere-egu21-13600>

EGU General Assembly 2021

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## Identifying different types of individual flood precautionary behaviour from panel data

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Individual precautionary behaviour towards and in response to flooding has received much attention in current research, as precautionary behaviour can reduce flood impacts considerably. Therefore, private precautionary measures are increasingly considered in integrated flood risk management plans. Integrated flood risk management requires that all stakeholders threatened by flooding undertake action to limit adverse impacts. However, our current understanding of private precautionary measure employment has mostly been drawn from cross-sectional studies, i.e. data from one-time snapshots. While cross-sectional data has its uses in understanding individual behaviour and its drivers, other questions require the use of panel data, i.e. repeated surveys of the same individuals in order to correctly identify and understand temporal behavioural dynamics which cross-sectional data is unable to capture.

Here we use panel data to identify different types of dynamic adaptive behaviour. We applied and compared two classification methods to panel data from 227 individual households who were repeatedly interviewed across Germany about their implementation of precautionary measures after the widespread flood of June 2013: Latent Class Growth Analysis (LCGA) and Cluster Analysis based on k-means for longitudinal data. Results indicate three different groups of adaptive behavior over the survey period that are identified by both classification methods: (I) a group that maintains a “high standard” of protection, (II) a “performer” group that implements a fare share of precautionary measures after the flood and during the survey period and (III) a “non adaptive” group that shows little or no implementation of precautionary measures. As a considerable share of flood-prone residents did almost not adapt, results indicate that specific risk communications and funding schemes are needed in order to trigger adaptation of this group.