European exposure data for BN-FLEMO models
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1. Licence

2. Citation

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3. Data Description

3.1. European asset map

The European asset map for residential and commercial buildings provides information about the reconstruction costs for affected buildings. The asset data set was created by adapting the approach by Huizinga et al., (2017) who found a relationship between construction cost (material and labour cost) and Gross Domestic Product (GDP) per capita by comparing national socio-economic parameters with construction cost surveys from multinational construction companies. The replacement values of buildings for the European asset map are calculated using the relation of construction cost and GDP per capita on the NUTS-3 level to account for regional differences.

To develop the European asset map for this study we used the GDP per capita information for all NUTS-3 regions available from Eurostat (2018) for the year 2013. The GDP per capita values can be adjusted to different flood event years by the GDP per capita growth rate of the respective region affected such as a sub-basin or municipality. The resulting asset values for residential and commercial buildings reflect tangible monetary assets and are based on the concept of reconstruction cost. The reconstruction costs of residential and commercial buildings are translated to unit area values in [EURO/m²] for NUTS-3 regions and can be disaggregated on land-use areas such as the CORINE Land Cover - CLC 2012 (EEA, 2016) classes: continuous urban fabric (111) and discontinuous urban fabric (112). The data are made available in GeoJSON format in epsg 4326.

3.2. Residential building areas in Europe

OpenStreetMap (OSM contributors 2018) was identified as a suitable source to provide information on the building footprint area. OSM is a geographic database with worldwide coverage. It relies on a community of contributors to constantly add information and assure regular updates to enhance accuracy and completeness.

The OSM project provides freely available open data and is nowadays considered a reliable source for most civil and common use cases (Barrington-Leigh & Millard-Ball, 2017). To obtain the building footprint area of the OSM database was filtered to only include building objects with residential usage. Based on location buildings were attributed to their respective NUTS 3 region. The building area was calculated from the objects geometries.

For each NUTS 3 region and in addition the following countries (ISO-3166 Alpha-3): Albania (ALB) Bosnia and Herzegovina (BIH), Belarus (BLR), Moldavia (MDA), Serbia (SRB), and Ukraine (UKR) a maximum of 10000 building area values were sampled from the OSM data to represent the building area distribution of the region. In regions where less than 10000 buildings were listed in the OSM data, the entire population was taken to represent the building area distribution.

3.3. Flood experience in Europe

In studies by Thieken et al., (2005); Merz et al., (2013); Schröter et al., (2014), flood experience is used as an indicator for flood loss modeling which is based on different factors such as the number of experienced floods, the associated losses with the latest flood experienced and the time period since the last flood event. Such details are available from empirical micro-scale damage data, but are not available on the same level of detail in Europe. Thus, proxy data for the variable flood experience had to be simplified to cover the continent consistently. Based on the assumption that the more floods individuals have experienced during the last years, the larger is their flood experience, the meso-scale variable for flood experience is represented by the number of floods that occurred during the last 25 years in the particular region.

To derive the number of floods people were exposed to at their home location, we use the database of the Dartmouth Flood Observatory (DFO) (Brakenridge, 2018). The DFO catalog is an archive of historic flood events starting in the year 1985. This archive comprises maps of flood-affected areas with a set of additional characteristics like severity, start and end date as well as the cause for flooding. One drawback of this data source is that the spatial extent of flood-affected areas is very coarse, as it often consists of an outline of the affected area instead of a detailed flood footprint. Nevertheless, to our knowledge, this data set is the only one that provides a comprehensive record of flood events in space and time across Europe. The data set included in this report holds all major flood events from 1985 to 2015 with their respective geometries and starting dates (Figure 1). The data is made available in GeoJSON format in epsg 4326.

4. File description

4.1. File inventory

- assets_residential_commercial.geojson
- building_area_residential.csv
- flood_experience.geojson

4.2. Description of data tables

4.2.1. assets_residential_commercial.geojson

Column header	unit	Description
id		Unique identifier
nuts_id		NUTS 3 id (version 2013)
res_land_use_structure	EURO/m²	Asset value in EURO (2013) per square meter for land use areas under residential use
com_land_use_structure	EURO/m²	Asset value in EURO (2013) per square meter for land use areas under commercial use
coordinates	lat, lon	MultiPolygon geometries in epsg 4326

4.2.2. building_area_residential.csv

Column header	unit	Description
id		Unique identifier
sample_id		Sample number per NUTS 3 region
nuts_id		NUTS 3 id (version 2013)
building_area_m2	m²	Building footprint area in square meters

4.2.3. flood_experience.geojson

Column header	unit	Description
id		Unique identifier
event_id		Event identifier (multiple geometries per event possible)
start_date	date	Date in the format yy-mm-dd
coordinates	lat, lon	Polygon geometries in epsg 4326

5. References

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