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Spatially explicit urbanization projections for the Greek coastal region

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Changes in the spatial distribution of human settlements will be one of the main drivers of future coastal flood risk. Spatial projections of future urban settlements are however rarely available, which is a major limitation in regional flood risk assessments. In this study, we develop a new set of spatially explicit coastal urbanization projections for the Greek coastal region, which are consistent with the global urbanization and population projections for the Shared Socioeconomic Pathways (SSPs). To model plausible future urban development we develop an Urban Change Model, which uses a machine learning approach, namely Artificial Neural Networks (ANN).The ANN model employs simple parameters as proxies to depict processes that drive urbanisation on a regional scale (e.g. distance to coast, elevation, slope, roads, or population density) and estimates the likelihood of urban transformation for every grid cell. In a next step, we calculate for each SSP the urban land demand in 2100 and classify our ANN model outputs accordingly. Using the spatially explicit coastal urbanization projections we then assess future coastal exposure. Preliminary results for Athens indicate that accounting for the spatial patterns of coastal development can lead to significant differences in future exposure. Therefore, it is essential to account for this process in long-term adaptation planning, e.g. in the form of land-use planning as it can be a very effective measure for reducing future coastal flood risk on a regional scale.