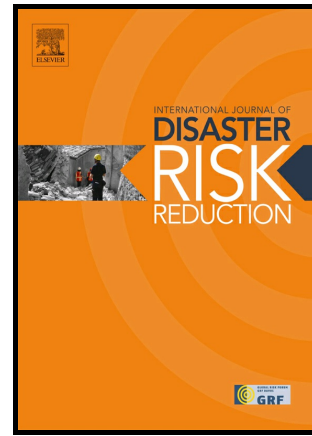


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Modeling Fire Spread in Cities with Non-Flammable Construction

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Abstract

City-scale models of urban fires were developed for countries where most construction is highly flammable, such as the US, China and Japan. Essential adjustments of existing models are required for modeling fire spread at the city scale in urban areas where construction is non-flammable and the space between buildings is filled by flammable vegetation, as in Mediterranean and Middle Eastern cities. We develop a spatially explicit city-scale model of urban fire spread for cities consisting of non-flammable buildings and apply it to different areas of the city of Haifa, Israel. We demonstrate that adequate modeling of fire spread inside non-flammable buildings demands accurate partition of the intra-building space into apartments and corridors. We present and evaluate the algorithm for establishing such partition based on standard GIS layer of the buildings footprints.

Based on the model, we demonstrate that fire spread in cities consisting of non-flammable buildings is highly sensitive to the structure of urban vegetation within the immediate surroundings of each building and investigate the effects of vegetation management policies on fire spread mitigation. We discuss the use of the model for establishing the procedures of firefighters' response during routine and multiple ignition scenarios.

Highlights

1. A model of fire spread in a city of non-flammable construction and abundant dry vegetation is presented and validated.
2. The model includes a novel algorithm for partitioning building footprints into rooms, apartments, and corridors.

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