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Preliminary results of the building damage assessment after the July 2018 Eastern Attica (Central Greece) wildfire based on building-by-building inspection and Unmanned Aircraft Vehicle (UAV) survey

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Recording and understanding the characteristics of buildings that have undergone the destructive impact of a fire is very crucial for human safety in wildland urban interface areas such as many settlements in Greece. This study contains the preliminary results of the building damage assessment of the July 2018 wildfire in Eastern Attica (Central Greece), which is one of the most destructive fire event that has occurred in Greece during the last century and one of the most deadly events worldwide with 100 fatalities and huge economic losses. This study aims to the significant enrichment of our knowledge on the vulnerability of buildings in case of a forest fire taking into account parameters and characteristics of the affected natural and built environment of the affected areas. It is under way with new data being added continuously and more parameters studied.

The damage assessment was done by means of building-by-building inspection and Unmanned Aircraft Vehicle (UAV) survey in the fire-affected area. Two types of structures were distinguished: the fire-affected and the non-affected ones. Then, a database was created with 33 parameters for each affected building. The studied parameters included type of structure (reinforced concrete (R/C) buildings with R/C frame and infill walls, masonry buildings with load-bearing walls, buildings with light timber framing system and plasterboards and mixed-type structures), type of damage (structural or non-structural) and building use (residential building or other secondary uses) among others.

According to information extracted from the database:

• Most buildings were R/C (91.97%), followed by those with light timber framing system and plasterboards (5.68%) and the masonry ones (2.34%).

• Most of the affected structures were residential buildings (95.88%), while only 4.11% corresponded to secondary use.

• 52.95% of the inspected buildings suffered non-structural damage, while 8.09% structural damage and 38.62% no damage at all.

• As regards the impact on R/C buildings, the structural damage comprised decomposition of the concrete mass and partial collapse of the structure, while the non-structural damage included discoloration of plaster due to direct or indirect contact with flames, external epidermal deformation of plasters, destruction of external and internal combustible elements and cracks in the infill walls.

• The masonry buildings suffered both structural and non-structural damage. In particular, these buildings suffered damage varying from destruction of internal and external flammable materials to partial collapse.

• Buildings with light timber framing system and plasterboards which appear to a large extent in the area, suffered only structural damage. More specifically, decomposition of the exterior and interior wall materials almost into powder due to extreme temperatures, collapse of burned wooden roofs, melting and buckling of the galvanized light wire mesh and subsequent cracking and collapse of the walls and partial or total collapse of the building. Most of these structures containing non-fire resistant materials suffered partial or total collapse. In these constructions, fire resistant materials (such as chimneys) were not destroyed by the fire.

In conclusions, buildings with light timber framing system and plasterboards were found to be more vulnerable to the fire attack, compared to R/C and masonry buildings.