



Geostatistical mapping of soil permeability in flooding areas: the case of Pla de Sant Jordi (Balearic Islands, Spain)

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Since the last decades until nowadays, Pla de Sant Jordi area (Palma de Mallorca, Balearic Islands, Spain) experiences specific events of flood due to the progressive rise of piezometric levels, although other factors also interfere. Depending on the intensity of the torrential rain events, these floods are more or less extensive and devastating (Robledo, 2016). In many cases they cause several problems: waterlogging of agricultural fields, mosquito plagues and damages in urbanized areas and transport infrastructure (e.g. the third Spanish airport, in terms of total passenger numbers, is located in the study area).

In order to identify the processes linked to the intermittent phenomenon of flooding in the study area, 98 infiltration tests have been carried out with the purpose of determining and representing in a map the soil permeability of the Pla de Sant Jordi.

Hatt and Le Coustumer (2008) described the method that determined in situ the basic infiltration rate (f_0), using a cylinder under constant load. Results of f_0 have been recalculated to obtain more plausible saturated hydraulic conductivity values (Kfs) with the method of Reynolds and Elrick (1990).

Finally, a geostatistical analysis was applied to map the values of Kfs with simple kriging (Samper and Carrera, 1990). The quality of the resulting map has been verified using cross-validation and checking the results with maps and aerial photographs from the past flooding events.

The main contribution of this map is the possibility to identify the distribution and values of superficial permeability of the Pla de Sant Jordi area, which constitutes an essential tool for planning and management of the land uses and groundwater resources.

References:

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