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# Exploratory GIS & remote sensing analysis for developing statistical correlations between environmental parameters and mass movements' occurrence

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Among the various natural hazards, mass movements (MM) are probably the most damaging to the natural and human environment in Mediterranean countries, including Lebanon which represents a good case study. This research deals with how to use Geographic Information Systems (GIS) for establishing the relationships between MM occurrence and different factor terrain parameters over a representative region of Lebanon. Parameters expressed by: 1—ancillary data like lithology, proximity to fault zone, soil type, land cover/use, distance to drainage line and rainfall quantity, and 2—derived data like slope gradient, slope aspect, soil rugosity, and soil texture from radar satellite imageries were correlated with MM using GIS-approaches. The MM were first detected through visual interpretation of two stereo-pairs of SPOT 4 images (anaglyph) at 10 m resolution. This study indicates, depending on bivariate Remote Sensing and GIS statistical correlations (Kendall Tau-b correlation), that the lithology is the most influencing factor on MM occurrence. It also shows that statistical correlations to mass movements exist best between factors at the following decreasing order of importance: lithology–proximity to fault line, lithology–soil type and lithology–distance to drainage line at 1% level of significance, and soil–land cover/use, slope aspect-land cover/use, and soil–slope gradient at 5% level of significance. These correlations were verified and checked through field observations and explained using univariate statistical correlations. Therefore, they could be extrapolated to other Mediterranean countries having similar geoenvironmental conditions.

Keywords: Mass movement (MM); Mediterranean region; GIS; Bivariate statistical correlations, Radar images