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Evaluation of landslide proximity to faults: the Almacik tectonic block in the North Anatolian Fault Zone (Turkey)

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Regional landslide susceptibility and hazard maps have become an interesting topic among the international landslide researchers, because they have a great potential for landslide hazard mitigation effort. However, the quality of a landslide susceptibility map depends on not only the technique employed but also the quality and validity of the parameters involved. In the last decade, the techniques employed during the landslide susceptibility mapping have been developed drastically. However, some parameters considered for the landslide susceptibility mapping are open to discussion. One of these parameters is proximity to structural lineaments. Especially, in the active fault zones, this parameter has crucial importance. To discuss this problem and to produce some valuable data for this problem are the main targets of the present study. For this purpose, the Almacik tectonic block from Turkey and its close vicinity is selected as the study area. The Almacik tectonic block locates between two active branches of the North Anatolian Fault Zone, one of the most active tectonic zones of the World. Due to recent large earthquakes, several landslides were triggered or reactivated in the study area. Two negative effects on the landslides were created by the faults. During the earthquakes, the lateral ground acceleration occurs and this acceleration increases in the driving forces on the slope. The other negative effect of the faults on the landslides forms disturbed zone. It is too difficult to investigate these two negative effects separately. For this reason, these two effects are considered together in the present study. To make such type proximity assessment, two methods such as

grid and buffer zone analyses exist in the literature. In this study, the buffer zone analysis is preferred. The faults are buffered into 500 m zones such as 0-500 m, 500-1000 m, 1000-1500 m, 1500-2000 m, 2000-2500 m. The maximum distance is selected as 2500 m because approximate width of the block is 5000 m. If the maximum buffer zone is selected as more than 2500 m, there would be a overlap. To prevent this overlap, the maximum width of the buffer zone is considered as 2500 m. Moreover, the additional analyses show that the landslides, distant more than 2500 m to the Almacik tectonic block, are not related with the faults in the study area. During the analyses, the geological map, fault map, 1/25000 scaled digital elevation model and landslide inventory map prepared during this study were used. As the result of the present study, the landslide density is the highest in the zone of 0-500 m, and a systematic decrease in the landslide density is observed depending on the distance. Probably, it is possible to conclude that the disturbance effect of the faults on the slope-forming material is highly important.