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A geospatial liquefaction probability models for the 2017 M5.4 Pohang, South Korea, earthquake

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ABSTRACT

During the **M**5.4 2017 Pohang earthquake, approximately 600 sand boils and ground rising and settlement were observed. This has become of interest due to the first case of liquefaction in South Korea. Several researchers have performed the liquefaction hazard assessments based on field tests (e.g., Ji et al. 2022). In addition, there are attempts to develop the geospatial liquefaction probability models using geospatial data and logistic regression (e.g., Zhu et al. 2015; Rashidian and Baise 2020). In this study, we develop a logistic regression-based geospatial liquefaction probability model for the Pohang earthquake, using the 598 sand boils and seven explanatory variables (i.e., peak ground acceleration (PGA), slope-derived average shear wave velocity of the upper 30 meters (V_{S30}), standard penetration test N value, depth to rock (D^{rock}), compound topographic index (CTI), distance to a river (d_r), and roughness). Based on the various indicators, we evaluate the classification performances of the candidate models and the global model (Zhu et al. 2015). It turned out that the model with 13 variables of PGA, V_{S30}, d_r, Roughness, D^{rock}, $V_{S30}*\bar{N}_{20}$, $V_{S30}*D^{rock}$, d_r*PGA, d_r*D^{rock}, Roughness*PGA, $\bar{N}_{20}*D^{rock}$, $\bar{N}_{20}$*CTI, and D^{rock}*CTI outperforms the other candidate models, as well as the global model. Finally, we generated a map for probabilities of liquefaction in the Pohang city.

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