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Evaluating the performances of various satellite-based rainfalls in monitoring global rainfall-induced landslides

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Satellite-based precipitation estimates (SPE) have a promising potential to promote landslide monitoring and mitigate the landslide disaster risk with quasi-global coverage, near real-time monitoring, increasing spatiotemporal resolution and accuracy. In this study, we evaluated the performances of four SPE products in monitoring the initiation of rainfall-induced landslides globally. The evaluation was conducted in terms of Hanssen-Kuiper (HK) skill score and a comprehensive skill score index (CSI), based on the empirical rainfall thresholds. The results show that SPE can distinguish landslide-initiating rainfall events from no-landslide-initiating rainfall events significantly, suggesting that SPE can capture rainfall conditions responsible for landslide occurrence well and are of great use for landslide monitoring. Further investigation indicates that performances at the global scale vary with products. TMPA-3B42RT V7 is superior to the other three rainfall products with the highest HK of 0.33 and the largest CSI of 0.57. The performances also vary spatially with CSI (HK) ranging from -2.00 (-0.60) to 2.00 (0.80) at a spatial grid of $3^\circ \times 3^\circ$. The spatial distribution of skill scores indicates better performances at the low latitudes compared with the high latitudes. This work can promote the application of satellite-based rainfalls in landslide monitoring.